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RECENT RECORDS OF THE 'UA'U (DARK-RUMPED PETREL) AND THE 'A'O (NEWELL'S SHEARWATER) IN HAWAI'I

by Sheila Conant

There are two subspecies of rare seabirds that breed only in the Hawaiian Islands. The 'Ua'u or Dark-runped Petrel (Pterodroma phaeopygia sandwichensis), an endangered subspecies, has only one known major breeding colony, which is on Haleakala, on east Maui. The 'A'o or Newell's Shearwater (Puffinus puffinus newelli), a threatened subspecies (King and Gould 1967) is known to breed in about a dozen (Sincock pers. comm.) restricted sites on Kaua'i (Sincock and Swedberg 1969). A small breeding colony of this shearwater may exist on the walls of Makaopuhi Crater on the Island of Hawai'i (W. E. Banko in Kepler, et al. 1979). Recent observations and field surveys by several ornithologists have resulted in sightings of these two subspecies on islands other than those on which they are known to breed. These observations have provided cause for tempered optimism about the possibility of locating additional breeding colonies of these poorly known seabirds (Kepler, et al. 1979).

Shallenberger (1974) reported an 'Ua'u from 820 m on Lāna'ihale (Lāna'i's only mountain range). Apparently the bird, probably a young of the year, was attracted to a light set up for insect collecting on a cool, foggy night in October of 1973. In 1976 Hirai (1978a, 1978b) found the 'Ua'u on Lāna'ihale. He estimated that there were as many as 100 birds (Hirai 1978b), and later field surveys led him to speculate that a breeding colony might exist (Hirai 1978a). The last report of this species breeding on Lāna'i was in 1941 by Munro (1960).

During the summer of 1977 U.S. Fish and Wildlife (USFWS) personnel reported hearing this species in Hualalai in the North Kona District on Hawai'i Island (Pyle 1978). I visited the summit area of Hualālai on the night of 3 July 1978; there appeared to be abundant suitable breeding habitat, but no petrels were detected.

C. Corn (pers. comm.) found the remains of dead seabirds at 2440 m on the Mauna Loa Trail on Hawai'i Island in the summer of 1974. Dr. Alan Ziegler, B. P. Bishop Museum zoologist, confirmed my tentative identification of one remains as Dark-rumped Petrel, and made three partial specimens of this material: a partial skull (BBM-X 148206), and two partial body skeletons (BBM-X 148207 and BBM-X 148208) representing at least two, and possibly three birds. On the basis of these collections, I asked P. Conant and S. Nagata, who were assisting me with some field surveys, to camp in the same area where the remains were collected and search for the species at night. P. Conant and I had accompanied Hirai on trips to the Lana'i petrel site and we both had previous field experience with the species in Haleakala on Maui.

A three-day (28-30 July 1978) survey of the Mauna Loa Summit Trail on Hawai'i Island by P. Conant and S. Nagata revealed the presence of 'Ua'u in a small (approximately 2 ha) area at about 2440 m elevation. Although overnight camps were made at both higher and lower elevations, birds were not sighted or heard elsewhere. A thorough daytime search of the area where the sightings occurred revealed no burrows. Additional field work at this location is needed to determine whether or not a breeding colony exists.

There have been a number of recent sightings of the 'A'o or Newell's race of

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the Manx Shearwater in Hawai'i (Shallenberger 1976; Hirai 1978a; Shallenberger and Vaughn 1978; Kepler, et al. 1979) on islands (i.e., O'ahu, Lana'i, Hawai'i) other than Kaua'i, where the known breeding colonies are located (Sincock and Swedberg 1969, Sincock pers. comm.). Such sightings provide reason to think this threatened subspecies may breed on these islands, especially Hawai'i (Kepler, et al. 1979). Colonies are exceedingly difficult to find because birds dig burrows in isolated rain forest areas, often underneath dense growths of understory plants. Burrows under a blanket of uluhe fern (Dicranopteris linearis) on Kaua'i were located using directions from a pig hunter whose dogs were found with feathers in their mouths (Sincock and Swedberg 1969).

On 18 July 1975 H. D. Pratt, Jr., collected a male road-killed 'A'o at the entrance to a tunnel on the Pali Highway on O'ahu (Louisiana State University, Museum of Zoology, Specimen No. LSUMZ 81425). The bird may have been attracted to the highway lights, a well-documented phenomenon for the subspecies on Kaua'i (Telfer 1979). Swedberg (Sincock and Swedberg 1969) and Shallenberger (1976) have also reported seeing this shearwater at night on the Pali Highway on O'ahu. USFWS surveys have recently turned up several sightings of the subspecies in rain forests in the Hamakua District on the Island of Hawai'i (Kepler, et al. 1979). In addition, Hall (1978) and Collins (in Shallenberger and Vaughn 1978) reported 'A'o from the Kohala Mountains. On 4 July 1978 I picked up a dead 'A'o at 287 Kaumana Drive in the northern part of Hilo, Hawai'i. This specimen has been deposited at Brigham Young University Hawaii Campus Museum of Natural History (BYU-HC 2327).

Sincock (pers. comm.) believes Kaua'i is the stronghold of the 'A'o and that public cooperation in releasing downed fledglings and turning them in to shearwater aid stations has enhanced the survival potential of several thousand birds over the past dozen years. He also suggests (pers. comm.) that the rising population resulting from survival of rescued birds may also increase the species' likelihood of recolonizing other Hawaiian islands.

The National Park Service is funding a study (conducted by Ted Simonds) of the breeding biology of the Hawaiian race of the Dark-rumped Petrel in Haleakalā on Maui. In addition to adding to our knowledge of this endangered seabird, this study also may stimulate interest in active searches for

breeding populations of both the Hawaiian race of the Dark-rumped Petrel and Newell's race of the Manx Shearwater on other islands. Naturally the existence of such populations would provide knowledge of greater security for the survival of the two subspecies in the event of a catastrophe or disease epidemic in the known breeding colonies. Furthermore, location of additional breeding populations might allow protective measures and scientific studies of accessible colonies. For example, a predator-control program conducted by the National Park Service on Haleakalā may provide some protection for nesting birds from rats (Kjargaard, in press). Rats (Rattus rattus), cats (Felus catus), and mongooses (Herpestes auropunctatus) are likely to prey on burrowing birds of either subspecies, and, in some habitats, feral dogs also may take their toll. According to Sincock (pers. comm.) important causes of 'A'o mortality include destruction of burrows by feral pigs (Sus scrofa) and predation on adults by Barn Owl (Tyto alba) and Pueo (Asio flammeus sandwichensis). Most important for the 'A'o on Kaua'i, of course, is loss of downed fledglings in October and November when birds are attracted to lights on their first flight to the ocean.

The "rash" of recent sightings of these birds surely provides good reason for field ornithologists who are camping in rain forests during spring and summer nights, to spend time outside their tents looking and listening for Hawaii's two rarest nocturnal seabirds. Sincock (pers. comm.) offers the following hints on making detections: 1) calling normally starts at darkness (about 7:30-7:45 p.m.) and most calling is over by about 9:30 p.m.; 2) on cloudy, rainy, nights birds may call all night; 3) in the morning calling increases about one hour before dawn; and 4) April (Sincock detected first spring returns in 1979 and 1980 on April 6 and April 7, respectively), May, and June offer the best possibilities for detections, as calling intensity decreases in July and August. The call of the 'Ua'u is roughly transliterated in its name, "aooowwah-oo." This species also gives another short call similar in sound to the first syllable of the call just described. Sincock (pers. comm.) describes the 'A'o (the name is also a sort of rough transliteration) call as a loud and raucous sound that can be heard at about a half mile distance, sounding like a cross between a jackass and a crow.

ACKNOWLEDGMENTS

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TREATED CHICKEN EGGS REDUCE PREDATION ON SHEARWATER EGGS

by G. Vernon Byrd and Daniel Moriarty

In previous years the Common Myna (Acridotheres tristis) has been a serious predator on eggs of the Wedge-tailed Shearwater (Puffinus pacificus) at Kilauea Point, Kauai (Byrd 1979).

Beginning in April 1979, chicken eggs treated with one of three bird repellents were placed near shearwater burrows in an effort to reduce the predation by "conditioning" mynas not to eat eggs.

METHODS

About 20 cc of egg albumen was removed from chicken eggs with a syringe and a large needle. The extracted albumen was replaced with either tabasco sauce, household ammonia, or aqueous mesurol (a bird repellent). The hole was then sealed with melted candle wax.

Tabasco and ammonia were selected for use in April trials on the basis of what would be subjectively considered unpalatable to the birds. Aqueous mesurol was substituted for ammonia in May and June after it was recommended by personnel of the U.S. Fish and Wildlife Service, Denver Research Laboratory.

Eggs were conspicuously placed either near the entrance of shearwater burrows or in depressions left by collapsed burrows (the wax covered hole was always turned downward so mynas could not see the wax).

Eggs were checked daily for 7 to 10 days. After that period eggs became dry because the candle wax either fell off or was removed by insects and the contents drained.

The test began two months prior to the shearwater laying period. The initial trial began 11 April and involved six tabascoinjected eggs (Table 1). Thereafter additional eggs were introduced at approximately weekly intervals for two weeks.

After the first three-week trial, no more eggs were placed in the colony until a week before the onset of shearwater laying. Twelve eggs were put out on 31 May and 9 June. No additional eggs were placed in the colony until 28 June, the day after a predated shearwater egg was discovered.

RESULTS

Predation of chicken eggs

Six tabasco-treated eggs placed in the colony on 11 April were quickly taken by mynas (Table 1). The next batch of eggs, treated with ammonia, had a predation rate of 42 percent. When the six untreated eggs put out next were untouched at the end of a week, it was apparent the mynas had stopped taking eggs.

It was impossible to ascertain whether the tabasco was ineffective, or whether it and the ammonia were jointly responsible for conditioning mynas not to take eggs.

In the trial starting 31 May, the predation rate was low, suggesting the conditioning may have lasted for one month. The relatively heavy predation rate on chicken eggs put out 28 June is attributed to the presence of many unattended shearwater eggs laid on the surface by birds nesting for the first time (see below).

Table	1.	Dates	and	meth	nods	of	chi	icken	egg
		treatment		and	pred	predation		rates	5
		during	19	79.					

Date	No. eggs Treatment		No. taken ¹	% taken	
ll April	6	tabasco	6	100	
18 April	12	ammonia	5	42	
23 April	6	untreated	0	0	
31 May	12	mesurol	1	9	
9 June	12	6 untreated 6 tabasco	1 1	17 17	
28 June	12	6 tabasco 6 mesurol	3 2	50 33	

Number taken or missing with 7 days of being put out.

Predation of shearwater eggs

In 1979 no predated shearwater eggs were found until 27 June. This is remarkable considering 64 eggs were taken during the corresponding period the previous year (Table 2). Mynas took 15 shearwater eggs between 27 June and 8 July 1979 (14 were laid on the surface, not in burrows). This is the period when young shearwaters, probably laying for the first time, deposit eggs on the lawn at Kilauea Point. Most of these eggs are probably infertile and few are ever incubated. The mynas probably could not resist so many eggs (approximately 20 to 30) available during this period. Also, since newly treated eggs were not put out until 27 June, the probability of getting a palatable egg compared to a treated one was high. In 1978 fewer eggs were taken during the period when surface eggs were available because mynas were being shot or frightened (Byrd 1979).

An interesting comparison of treated with untreated eggs was afforded by looking at data from Mokuaeae Island (100 m north of Kilauea Point). On 19 June five myna-pecked eggs were found on the island which had about 230 birds in burrows. On that date approximately 80 percent of the eggs had been laid at Kilauea Point, and since the nesting phenologies were similar, it is assumed about 185 eggs were present on Mokuaeae. Twelve treated eggs were left on the island, six each with ammonia and mesurol. During additional visits to Mokuaeae Island on 3 and 12 July; 40 and 13 predated eggs were found respectively. More eggs were probably taken than we found because gusty winds over the unprotected surface of Mokuaeae would have blown empty egg shells, not lodged in crevices or vegetation, into the sea. Thus the treated eggs deposited at this late date had no apparent effect.

DISCUSSION

Treated chicken eggs apparently reduced the rate of predation of shearwater eggs by Common Mynas at Kilauea Point. The eggs that were lost probably would have produced few chicks anyway, since they were laid late in the season on the surface of the ground, and many were abandoned soon after laying.

The high rate of predation on nearby Mokuaeae Island was unexpected because we

Table 2. Number of shearwater eggs taken by mynas during period.

	Second States	Total egg	s taken
Dates		1978	1979
12	June - 26 June	64	0
27	June - 8 July	10	15 (14 on sur- face)

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thought the mynas feeding there were part of the same population at Kilauea Point, which we had conditioned. Apparently this was not true.

Efforts to condition mynas after they started eating shearwater eggs proved ineffective, probably because preconditioning was not achieved. The relative effectiveness of the three substances used to treat the eggs were not studied.

RECOMMENDATIONS

Treated chicken eggs should be placed in the shearwater colonies at Kilauea Point and Mokuaeae Island weekly from early May through June each breeding season. The relative effectiveness of tabasco, ammonia, and mesurol should be determined through a carefully designed research project. Using the research results, applicability of the technique to other areas with similar problems should be evaluated.

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REPRINTS OF ARTICLES

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OBSERVATION OF 'APAPANE ON LANA'I

by Patrick Conant

On Sunday, March 2, 1980 at approximately 10:00 hours on the east side of Kapōhaku Gulch on Lana'i I heard the calls of 'Apapane (Himatione sanguinea) coming from a grove of tall Albizzia (sp.) trees in a small gulch. The weather was clear and wind less than 5 mph. Their number was estimated at three or four, but only one was observed foraging in the terminal leaves of the branches. About 15 minutes later I saw a flock of three in dense native mesic scrub about 300 yards from where I first saw the birds. Other 'Apapane calls were heard in this vicinity.

'Apapane are still locally common on the northwest side of Lanaihale as Hirai (1978) reported. To hear them on the lee (southeast) side of the mountain at the relatively low elevation of 100 ft. was surprising to me. Hirai did, however, encounter them occasionally at lower elevation in predominantly introduced vegetation. It is likely the birds move freely about the slopes of the mountain, since the forested portion is not continuous and small in total area. The observation of foraging in Albizzia is similar to observations I have made in my yard in Woodlawn, Manoa Valley on Oahu. 'Apapane have foraged for a few consecutive days in recent months in the large Albizzia in front of my house.

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FEEDING HABITS OF THE ERCKEL'S FRANCOLIN ON OAHU, HAWAII

by Lawrence T. Hirai and Nelson K. Rice

The Erckel's Francolin (Francolinus erckelii) is a partridge-sized game bird, with a dark brown-red body and a chestnut-colored crown. It is native to eastern Africa and was introduced from a game farm on the mainland into Hawaii on all the major islands from 1957 to 1962 (Walker 1967). The release on Oahu was done in August 1959 in Kuaokala Game Management Area (KGMA) (Medeiros et al. 1970). Today huntable populations are found on Hawaii, Lanai, Oahu, and Kauai (Kramer et al. 1973).

On Oahu the Erckel's Francolin has significantly increased in importance as a game bird since it was first opened to hunting during 1972-1973. During the 1978-1979 hunting season (November 4, 1978 to January 21, 1979) 95 of the 107 birds reported taken by hunters from the KGMA and the adjoining Mokuleia Forest Reserve were Erckel's Francolins (Saito and Hirai 1979). These two units are the only public lands opened for game bird hunting on the island of Oahu. The 2,000-acre KGMA unit is located on the plateau area at the western end of the Waianae Mountain Range, extending from 800 feet elevation near Kaena Point to 1,900 feet at the eastern boundary (Figure 1). The terrain is rough, bisected by numerous gulches and covered by such introduced vegetation as koa haole, lantana, guava, and Christmas berry.

To better understand the biology of the Erckel's Francolin on Oahu we conducted a limited study of its food habits in the Kuaokala GMA and Forest Reserve.

On November 4, 1978, we manned a hunter checking station at the access road into the unit and collected eight Erckel's Francolin food crops from cooperative hunters. We analyzed the crop contents, segregating material by food type (e.g., animal matter, fruit, browse, or seed) and took volume and wet weight. The birds were all shot before noon; five were males and three were believed to be females. Body weights ranged from 300 gm for a juvenile male to over 1,150 gm for an adult male that had been field dressed prior to weighing.

The analysis of the items in the crops (Table 1) revealed that the diet of the Erckel's Francolin consisted of animal matter (80.9% of the diet by aggregated volume), fruit (14.9%), browse (2.6%), and seed (1.6%)

(Table 1). We did not find grit in the crops. We identified 13 different food items, reflecting resources that appear to be readily available on or near the ground. Major food items included the Pacific beetle roach, Diploptera punctata, (occurrence in five crops and 60% of the diet by aggregated volume); guava and/or waiawi fruit, Psidium spp., (four crops and 15%); and the small native land snail, Succinea caduca, (two crops and 15%). According to Kondo and Christianson (pers. comm.), this Hawaiian snail is found on Oahu, Kauai, and perhaps one or two other islands. It seems to have adapted to environmental changes caused by man and is present in fair numbers in arid, lowland habitats.

Our findings present only a general picture of the food habits of the Erckel's Francolin. We hope that subsequent field studies will result in more detailed knowledge of this important game bird on Oahu.

This study was conducted as part of the Hawaii Division of Fish and Game management program for game birds on Oahu. We thank the following for their assistance in identifying the crop items: David H. Woodside, Ralph S.



Figure 1. The Kuaokala Game Management Area and Forest Reserve on the island of Oahu.

Table 1. Food items taken from crops of eight Erckel's Frankolin in the Kuaokala Game Management Area on Oahu (November 4, 1978).

Food Item	No. Crops	Aggregated ⁺					
	with Item	Volume-cc		Wet Weight-gm			
Animal Matter							
Pacific Beetle Roach (Diploptera punctata)	5	87.0	(63.8)	92.3	(65.3)		
native land snail (Succinea caduca)	2	20.1	(14.7)	21.2	(15.0)		
Small Garden Snail (Bradybaena similaris)	2	3.1	(2.3)	1.8	(1.2)		
Sowbug (Porcelio sp)	1	0.1	(0.1)	0.1	(0.1)		
beetle (Blapstinus dilatatus)	3	*		*			
Beetle (Gonocephalum seriatum)	1	*		*			
Dung Beetle (Copris incertus)	1	*		*			
bug (Coriscus pilosulus)	1	*		*			
Subsample Total		110.3	(80.9)	115.4	(81.6)		
Fruit Guava (Psidium sp)	4	20.3	(14.9)	22.6	(16.0)		
Browse							
Japanese Tea (Cassia leschengultigna)	3	1.0	(0,7)	0.1	(0, 1)		
grass leaf (unknown species)	2	2.6	(1.9)	0.9	(0.6)		
Subsample Total		3.6	(2.6)	1.0	(0.7)		
Seed							
Koa Haole (Leucaena glauca)	4	2.2	(1.6)	2.4	(1.7)		
small green seed (species unknown)	1	*		*	10 m2		
Subsample Total		2.2	(1.6)	2.4	(1.7)		
Sample Total		136.4		141.4			
Sample Total	on al General Legen General Let and Lot	136.4		141.4	AT LO		

* less than 0.1 cc or 0.1 grams

+ number in parentheses () refer to percent of sample

Saito, Carolyn Corn, Larry Nakahara, Stanley Y. Higa, George Y. Funasaki, Yoshio Kondo, and Carl Christianson. Comments on the manuscript were kindly provided by Ronald L. Walker, D.H. Woodside, R.S. Saito, C. John Ralph, and Charles van Riper, III. We extend a special mahalo to those game bird hunters who saved and gave us the food crops.

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JUNE FIELD TRIP TO PACIFIC PALISADES

In ideal trade wind weather, eleven persons met at the top of Pacific Palisades at 0830 on June 8. Most of the party had joined up earlier at the Society's customary rendezvous, the downtown library at King and Punchbowl Streets. Leader Omer Bussen set a leisurely pace on Manana Trail, providing ample time to look for birds, check plants and enjoy superb mountain and valley views. Following a lunch break at 1115, the birders encountered the well-known mauka showers and voted to resume birding toward the parking area.

Apapane were seen several times, usually single birds in flight. Yellow-faced Grassquits were heard on several occasions but kept out of sight. Other species heard but not seen were Shama, Japanese Bush Warbler, Northern Cardinal and Spotted Dove. Seen in good numbers were Spotted Munia (Ricebird), Japanese White-eye and House Finch. Not in evidence were the hoped-for Grey Swiftlets.

The six walkers who did the complete trip were back at the cars by 1300.

The Manana Trail provides walking suitable for birders of modest or ambitious intentions. For <u>hikers</u>, time to the summit of the Koolaus is rated as 4½ hours, with return in 3 hours. Such a trip is considered appropriate only for experienced hikers in good physical condition. Although leader Bussen is one of the Society's more vigorous hikers, the June trip was done very comfortably.

George Campbell

NENE FEATURED IN NEW BOOK

A new book is out and will be reviewed in a future '*Elepaio*, "THE HAWAIIAN GOOSE, An Experiment in Conservation", by Janet Kear and A.J. Berger.

The Hawaiian Goose, Hawaii's state bird, has become a classic symbol of man's unconscious destruction of nature and, later, of his conscious effort to conserve. As is so tragically typical for many island birds, man reduced the numbers of this unique, tame, land-living goose to less than 50 by the 1940's.

Usually nothing can be done when a point so low is reached, but in the case of the Nene, international effort achieved a great deal--aviculture stepped in and saved the species. A happy set of circumstances provided the opportunity for a joint project beween Hawaiian and British workers just at the time when the Nene population reached its lowest ebb. This book brings together the experience gained in both countries over the last quarter century.

Dr: Kear has worked for the Wildfowl Trust, in the Research Department, since 1959, and is Assistant Director. She is Chairman of the IUCN Endangered Waterfowl Group, and author of over 70 papers on birds. Dr. Berger has been Professor in the Department of Zoology at the University of Hawaii since 1965.

Approximately 160 pages, photos (color frontispiece), drawings by Peter Scott, Tim Halliday, Sue Monden, maps, 8 appendices, bibliography, index.

The cost is \$29.00 at BUTEO BOOKS, P.O. Box 481, Vermillion, South Dakota 57069.

ALOHA TO NEW MEMBERS

Welcome to the following new members. The Society hopes that they will share our activities and help further the protection of Hawaii's wildlife.

Local: Mary V. Amoss, Annapolis, MD; Robert V. Clayton, Honolulu; Grace Fuller, Honolulu; Mary Grantham, Kailua; Elizabeth Hatcher, Honolulu; D. Hopkinson, Honolulu; T. Kelley, Kaneohe; N.L.H. Krauss, Honolulu; Mr. and Mrs. John H. Mitchell, Honolulu; Florence Ricci, Waianae; Terri S. Tawata, Honolulu; Diana Trembly, Honolulu; Frederick and Cynthia Wilmoth, Honolulu; E.L. Winternitz, Honolulu; Pauline Yu, Honolulu.

Joint with National: Bruce L. Bickle, Honolulu; Kevin Costello, Honolulu; Capt. W.S. Hansen, MC USN, Honolulu; Mrs. Eileen S. Hendrickson, Honolulu; Karen Kosasa, Honolulu; Gerry Lopez, Makawao; Steven H. Morgan, FPO San Francisco; Karen E. Shigematsu, Pearl City; Harold O. Temme, Caroline Is., GU; Kathleen A. Yanamura, Aiea.

HAWAII AUDUBON RESOLUTION ON GOATS

A resolution in support of fencing goats out of Haleakala National Park was approved at the May Board and General Membership meetings. It was hoped such a resolution, made known to state and federal officials, and congressional representatives would aid attempts by Haleakala Park managers to acquire funds for fencing.

MAHALO TO CONTRIBUTORS

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ENDEMIC LAND SNAILS

After the U.S. Fish and Wildlife Service (USFWS) received a substantial petition from Mr. Alan Hart in July 1979, the endemic Oahu tree snail genus *Achatinellà* was the subject of a notice of review in the 17 September 1979 <u>Federal Register</u> (44 FR 54011).

USFWS has now published its proposed rule (45 FR 43358-43360) that all species of the genus be listed as Endangered without designation of Critical Habitat (publication of location maps would make these snails more vulnerable to taking).

Of the 41 species of the genus. Only 19 are believed to still exist, the others having been pushed into extinction by overcollection, predation by introduced carnivorous snails and rats, and habitat alteration (primarily displacement of native host plants by exotics after habitat disruption by humans or introduced animals).

Under the proposed rule the entire genus is to be protected, so that a species believed to be extinct but found to be extant will automatically be protected. Public hearings will be held on the proposed rule and public comments are being sought. Comments should be sent to Director (OES), USFWS, Department of Interior, Washington, D.C. 20240. Public deadline is 25 August 1980. HAS members are invited to participate in preparing comments for the Society by telephoning Peter Galloway at 947-4045.

AIEA FOREST TRAIL HIKE TO FEATURE NATIVE INSECTS

The August 10 hike up Aiea Ridge and Aiea Loop Trails will combine bird and insect study, with attention being drawn particularly to plant hosts of these. We will try to focus on native plants and animals, and conservation problems confronting these.

The trails are of easy grade but there will probably be some muddy spots. Koster's curse (*Clidemia hirta*) will likely encroach on the ridge portion of the trail. The lower portions of the trail are usually well maintained.

Meet at 7:30 a.m. at the State Library at Punchbowl and King Streets or at 8 a.m. in the Aiea State Park parking lot at the upper comfort station. Bring water and lunch. For more information call Wayne Gagne at 847-3511 ext. 164 (work) or 941-5659 (home).

AUGUST PROGRAM: COLORFUL CORAL REEF FISHES

August's program will feature a color slide presentation on the behavioral and ecological adaptations of Hawaii's varied and interesting coral reef fish. Like many groups of Hawaiian plants and animals, these fishes are noted for their evolutionary adaptations to a broad spectrum of habitats in the marine environment. The speaker Mr. Jerry Ludwig, came to Hawaii from Wisconsin to study Hawaiian fishes as part of his work towards the doctorate in Zoology at the University of Hawaii. At present he is Assistant Refuge Manager for the U. S. Fish and Wildlife Service in Hawaii.

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