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Birth Pattern of Feral Goats on Haleakala

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Various breeding patterns have been described for feral goat *(Capra hircus)* populations, ranging from a single season to breeding year-round (Geist 1960, Yocom 1967, Rudge 1969, Williams and Rudge 1969, McDougall 1975, Coblentz 1974, 1980, Clark 1976, Watts and Conley 1984, Parkes 1984). Despite the problems associated with large, uncontrolled numbers of feral goats in Hawaii, there has been only one short-duration study that described their breeding in the islands. Yocom (1967) made observations of feral goats on Haleakala, Maui Is. over a two month period in the summer. He reported that mating occurred throughout the summer and that a peak period of birth must have occurred in December and January. We studied the same population of feral goats and report our observations of newborn kids over a 13-month period.

STUDY AREA AND METHODS

A study to determine the movements and population characteristics of feral goats in Kahikinui Forest Reserve, on the southern slopes of Haleakala, Maui Is. was conducted from August 1982 to August 1983. The 9 km^2 study area, located in the center of the forest reserve, was between 1524 m (5000 ft) and 2743 m (9000 ft). The terrain was steep and deeply dissected. The vegetation followed an elevational gradient from a *Styphelia*-dominated subalpine shrub zone on the upper slopes, down to a mesic forest of scattered *Acacia koa* and *Meterosideros collina* with an understory of introduced grasses at the lower elevations.

Generally, clouds and rains occurred below 1829 m (6000 ft), above this level the slopes were relatively dry (Blumenstock and Price 1967). No precipitation data were available for the study area. The nearest weather station to the study area was at the Haleakala National Park Headquarters, at an elevation of 2143 m (7042 ft). National Park records, from 1969-1983, showed an average monthly rainfall from 1969 to 1983 (Fig. 1), varying from a low of 2.76 cm (1.09 in) during June to a high of 37.41 cm (14.73 in) during January, with most rain falling from December through March. During our study period, total rainfall (September 1982 to August 1983) at the Headquarters was 56% of average, while during the same period the previous year, total rainfall was 202% of average (Loope and Crivellone 1984). Average monthly temperatures measured in our study area from August 1982 to August 1983 ranged from 3.3° C (37.9° F) in February 1983 to 19.2° (66.6° F) in July 1982.

A 20-power spotting scope was used to survey the census area of approximately 130 ha of grass and shrub-covered slopes. Direct counts were made as goats moved from bedding areas to feeding areas and included the number of newborn kids. The survey began 30 minutes after sunrise and took between 30-50 minutes to cover the entire census area. Counts were made 3 to 6 times each month.

Five feral goats were radio-collared. Other goats were identified by recording their distinct pelage colors and patterns resulting in 44 identifiable individuals representing 8-10% of the study area population of between 500 and 600 animals.

RESULTS AND DISCUSSION

Counts of newborn kids during our study showed a major birth peak in January and revealed the existence of additional birth peaks in April-May and October (Fig. 2). These peaks had pronounced periodicities. The majority of kids were born during the January and April-May peaks. By back-dating (using the 150-day gestation period for domestic goats) we determined that important mating periods should have occurred in August and in November-December with an additional mating period in May.

Our study confirmed the existence of the January birth peak described by Yocom (1967), but revealed other birth peaks that he did not predict because of the limited period during which he made his observations. Our data was collected over a 13-month period and itself requires further verification, however, the similarity between the birth peak pattern from our study area and those from other areas, that will be described later in this paper, compelled us to offer an explanation for the cause of the peak pattern. Although our explanation at this point is speculative, the supporting arguments are based on empirical evidence from studies of domestic and feral goats and domestic sheep.

Winter and Spring Births Peaks

The origin of the domestic stocks introduced to Hawaii by the 18th Century explorers, James Cook and George Vancouver, is not specifically known, but it is presumed that the progenitors of the present feral goat populations were of temperate breeds (Williams and Rudge 1969, Mason 1981).

Domestic goats from temperate latitudes are seasonally polyestrous (Asdell 1964). The main breeding season occurs during the fall and winter months (Turner 1936), but females may come into heat in nearly all other months of the year (Phillips *et al.* 1943). Photoperiod is the primary influence in the timing of the breeding

An adult female feral goat and her juvenile female kid, Kahikinui Forest Reserve, Maui, Hawaii.

season, and caprines show their full mating behavior in the portion of the year with the shortest daylength (Hafez and Scott 1962).

A primary fall-winter breeding season has been described for feral goat populations in British Columbia (Geist 1960), Scotland (McDougall 1975) and in the Hunua Ranges near Aukland, New Zealand (Clark 1976). It is evident from these populations that the reproductive responses to photoperiod found in temperate breeds of domestic goats can continue to be operative in some feral populations, especially in more temperate latitudes.

Synchronization of breeding during the fall season is partly achieved by photoperiod initiation. After a relatively quiescent period in the spring and summer, estrous behavior and ovulation in temperate breeds of domestic goats resumes abruptly in late summer and early fall, stimulated by the shortening daylength. Blood testosterone also reaches maximum levels at this time (Hafez 1964).

The presence of a major January birth peak in the Kahikinui population may indicate that declining photoperiod is a stimulus for initiating the breeding season in Hawaiian feral goat populations. An abrupt resumption of the breeding season in August would cause an early winter birth pulse and account for the January birth peak. Phenological studies conducted by Loope and Crivellone (1984) in Haleakala National Park showed that many common native and introduced plants have their flush of growth primarily between the months of March and June. The authors indicated that photoperiod is a controlling factor, but that plant phenology also may be influenced by water stress and rainfall events. Goat births in January would be advantageous since new plant growth, which is generally more palatable and nutritious, will be available to kids after weaning. The degree of later summer and early fall mating by feral goats also may depend on the same environmental factors which affect the phenology of plants.

Male fertility can be lowered by excessive heat or poor quality forage (Corteel 1981). Under these conditions luteinizing hormone production also may be reduced, decreasing both ovulation and implantation as found in domestic ewes (Ulberg 1958, Clegg and Ganong 1959, MacFarlane *et al.* 1959, Dutt 1963, Doney and Gunn 1969). If summer conditions are sufficiently hot and dry to cause these conditions in feral populations, conception during the early breeding period may be lowered, reducing the early winter birth pulse. With the onset of the cooler rainy season in the late fall, conditions for both sexes would improve, resulting in higher conception rates later in the breeding season. A time lag to achieve a higher plane of nutrition and an improved reproductive state following a stressful summer may delay successful breeding long enough to separate the resultant spring birth pulse from the winter pulse. Such severe summers need to occur only occasionally to initiate and maintain the later breeding pulse and the separate birth peaks.

Although temperatures at Kahikinui do not appear excessive during summer months, dry conditions prevail, and intense solar radiation at high elevations may cause some stress in goats at maximum summer temperatures. Weather data from Haleakala National Park Headquarters show how the rainfall also may vary considerably between years. An occasional dry year that reduces forage quality or a wet year that produces favorable growing conditions could intensify the effect that normal late fall and winter rainfall may have on the reproductive performance during the fall breeding season.

Summer and Fall Birth Peaks

The influence of photoperiod and local weather patterns may account for the 2 pulses of the fall breeding season that result in separate winter and spring birth peaks. Birth peaks during the summer and fall, however, may be tied to the ability of female goats to give birth twice in the same year.

Although feral goats are capable of producing kids twice each year, they do not usually reach this full potential every year (Rudge

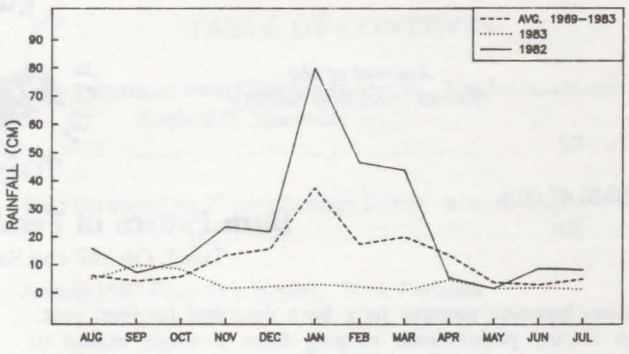

Figure 1. Rainfall from Haleakala National Park Ranger Headquarters (2143 m elev.), Maui, Hawaii.

1969). In domestic goats the average birth interval may be between 240 to 390 days (Garcia and Gall 1981). If parturition consistently occurred twice each year, the birth interval would be only about 180 days. The potential to produce young twice in the same year may nonetheless provide an explanation for the existence of the summer and fall birth peaks. Females that kid in the spring birth peak may under favorable conditions conceive and kid again in the fall. During this study, 2 radio-collared females had 2 separate births in the same year, roughly coinciding with these 2 peak periods. In Haleakala Crater it was not uncommon to see adult females with a newborn kid and a 6-8 month juvenile (Rodrigues pers. comm.). Williams and Rudge (1969) found some females on Macauley Island, New Zealand, to have bred twice, with a birth peak in the winter and one expected in the summer. They found that 22 percent of females over 2 years old were simultaneously pregnant and lactating in the winter

Females that kid in the winter could, therefore, kid in the summer, most probably in July if the dam gave birth in January. A summer birth peak, however, was not observed in Kahikinui during the study period. There were no significant numbers of newborn kids during July and August 1983 and none observed in August 1982.

Lawson and Shelton (1982) studied a herd of free-ranging domestic meat-type goats in Texas, where males continually ran with about 50 females for about 9 years. Most kids were born from November to February with most births occurring in January. A small peak also occurred in May, and some females that gave birth in the spring also gave birth in October. The authors did not observe a summer peak. From 327 slaughtered or laparotomized females they found an anestrus period from March to April. Their findings suggest that females that kid in the winter may have to rebreed before the anestrus period if they are to kid again in the summer. Most of the females in the Texas population had kids in January, leaving only about 1 month available for post-partum estrus and rebreeding. This shorter opportunity to rebreed may have accounted for the near absence of summer births occurring in the Texas population. This explanation for the absence of summer births may apply to the Kahikinui population where most of the winter births also occurred in January.

Another factor that may lower the success of a late season post-partum rebreeding before the anestrus period is the possibility of poor sexual condition in males between March and June. Studies of domestic seasonally breeding goats indicate that the amount of ejaculate, sperm count and sperm motility decreases and the number of abnormal sperm cells increases during this period, effectively reducing male fertility. In addition, the blood testosterone level, which may affect libido, may be reduced (Corteel 1981).

The timing of breeding during the main fall breeding season may be influenced by photoperiod and local weather conditions and subsequently have some affect on the potential to rebreed during the

rest of the year. The absence of a mid-summer peak during our study, however, may be the result of the weather pattern variation that restricted rebreeding to the spring. A summer birth peak may occur in other years when weather conditions allow earlier winter breeding and the opportunity for subsequent rebreeding. Although he did not make systematic counts, Rodrigues (pers. comm.), a backcountry ranger at Haleakala, observed 4 birth peaks in goats of Haleakala Crater, from May 1983 to December 1984, with a summer peak occurring from mid-July to mid-August.

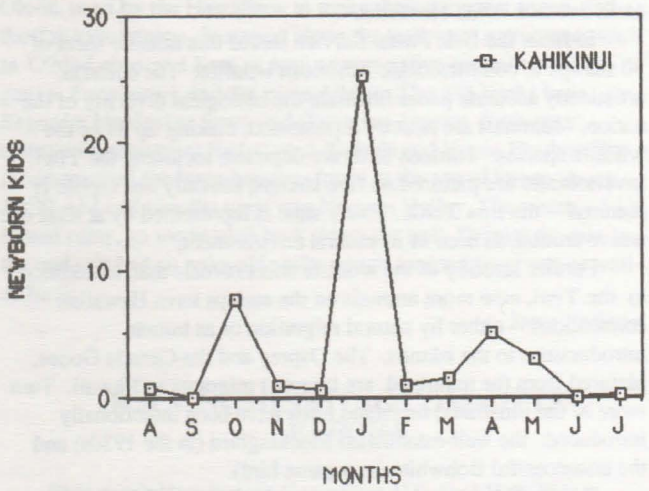

Figure 2. Distribution of newborn kids of feral goats in Kahikinui Forest Reserve from August 1982 to August 1983 (values represent average where n=3 to 6; August value is an average for the 2 years).

Birth Pattern in Other Areas

We compared the birth peak pattern observed in Kahikinui with other birth patterns from long-term studies of feral goats conducted on Santa Catalina Island (Coblentz 1974) and on the southern end of North Island, New Zealand (Rudge 1969). The fall, winter, and spring peak periods of births were prominent in the Santa Catalina population, and all coincided temporally with the peaks at Kahikinui. In addition, Coblentz (1974) found an important birth peak in mid-summer and relatively more newborn kids in the spring than during the winter.

The general rainfall pattern of dry summers and wet winters on Santa Catalina was similar to that at Kahikinui. Coblentz reported that 88% of the rain fell from November to February from 1969 to 1973. Summer conditions at Haleakala were apparently less severe than on Santa Catalina Island. There were no observed instances of kid mortality in Kahikinui during the 2 summer periods.

Successful breeding on Santa Catalina may be regularly suppressed during early fall because of heat stress and poor range conditions in the summer. The onset of the cooler rainy season may provide better forage and temperature conditions which result in more successful late breeding. The apparent severity of the summers on Santa Catalina may account for the higher spring birth peak during March-April, compared to the winter birth peak in January. Lower births in the winter are offset by winter breeding to produce the mid-summer birth peak.

Rudge (1969) considered breeding to occur year-round on North Island, but four small birth peaks were evident in his data. The periodicity of the birth peaks of the North Island feral goat population was slightly out of phase with the Santa Catalina and Kahikinui patterns, and this may be attributed to the differences in climate. Both Santa Catalina and Kahikinui experienced hot, dry summers and cool, wet winters. In contrast, the rainfall pattern described by Rudge (1969) for the Rimutaka Mountains on North Island was more equitable throughout the year although summers are generally warmer than winters, and drier conditions prevail on the eastern side of mountains where droughts may occur (Fielding 1973).

It has been demonstrated that the introduction of domestic males to segregated female groups during the transition period from anestrus to estrus not only brings about early estrus, but also synchronizes estrous cycles in female goats (Shelton 1980). Coblentz (1980) discussed this influence as a possible reason for the quadrimodal breeding pattern he first described on Santa Catalina Island. According to Coblentz, birth peaks would occur if segregated males went into breeding condition periodically, 4 times each year. When these males joined the females just before the breeding period, estrus would be induced early and breeding would be synchronized. Births would result in temporally compressed peaks at periodic intervals. Although bachelor groups were present in New Zealand and Kahikinui, there was no clear separation of the sexes. Males could be found with females at all times of the year. The continual presence of males, however, may help to regulate estrous cycles in females and together with the environmental factors that affect the reproductive condition of the females determine the 3-4 birth peak pattern.

CONCLUSION

Our observations show that there is a 3-peak birth pattern in feral goats of Kahikinui. We postulate that photoperiod and seasonal rainfall operate directly and indirectly on the reproductive capability inherent in feral goats to cause the observed pattern. Females have the potential to kid twice in the same year, but this ability is dependent on the condition of the dam. Nutrition, temperature, and the timing of breeding around an anestrus period may effect this ability to rebreed during the same year. Partial synchrony of estrous cycles may be occurring for the regular, temporally compressed birth peaks to occur during the spring and fall. As Coblentz (1974) suggests, the presence of male goats may also have a role in regulating estrous cycles and, therefore, have a role in determining the birth pattern.

ACKNOWLEDGEMENTS

The study was supported by the Hawaii Division of Forestry and Wildlife, a National Wildlife Federation Environmental Conservation Fellowship Grant and a Hawaii Audubon Society Research Grant. The authors would like to thank M.L. Ueoka of the Hawaii Division of Forestry and Wildlife for his support of this study. We would like to thank J. Kumm, J. Barnitz, D. Halford, T. Rodrigues for contributing their ideas and P. Higashino, A. Kikuta, L. Stemmermann, C.P. Stone, S. Fefer, and Y. Ohashi for reviewing the manuscript.

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'I'IWI PORTRAYED ON 22-CENT POSTAGE STAMP

Tired of drab, run-of-the-mill postage stamps? Now you can brighten your mail with 50 different full-color portraits of American wildlife for the price of only a 22-cent stamp apiece. The favorite Hawaiian honeycreeper of many bird-watchers, the I'iwi, is an eye-catcher in the middle of the fifty-stamp sheet, portrayed in a wary, look-out posture in brilliant scarlet plumage amid crimson lehua blossoms.

In June, the U.S. Postal Service issued this notable sheet of 50 stamps to commemorate American wildlife. The colorful, artistically accurate panes illustrate the biological diversity of the nation. Mammals are heavily represented, making up 31 of the wildlife species. Thirteen birds are depicted, including the I'iwi. Invertebrates are pictured on five stamps, but only one reptile is featured -- the Box Turtle. Every state is represented by at least one native animal, as seen in its natural environment.

Further scrutiny of the wildlife sheet reveals that, in addition to the I'iwi, nine more animals on the stamps have Hawaiian connections -- either by natural migration or as human introductions to the islands. The Osprey and the Canada Goose, pictured from the mainland, are frequent migrants to Hawaii. Two more of the illustrated mainland birds have been intentionally introduced: the well-established Mockingbird (in the 1930s) and the unsuccessful Bobwhite (as a game bird).

Two well-known mainland mammals portrayed in the series were brought to Hawaii for sport hunting. Mule Deer from Oregon were released in the 1960s in the Puu Ka Pele Game Management Area on Kauai and readily established a breeding population. The herd is a threat to native plant communities. Pronghorn antelope from Montana were introduced to Lanai in 1959 for hunting purposes. Apparently, Pronghorn have not adapted well to this foreign environment, and their numbers have dwindled sharply in recent years. Both Mule Deer and Pronghorns can be seen easily in their native habitats in the western states.

The only reptile figured, the humble Box Turtle, may soon be counted among Hawaii's alien fauna; several of these woodland turtles have been picked up along roadsides mauka of Hilo.

Two invertebrates on the postage stamps are newcomers to Hawaii, assisted by modern man. The Monarch Butterfly, despite its amazing records of long-distance migrations, was unable to establish a breeding population in Hawaii until continental man brought in its host plants, milkweeds, which are not native to Hawaii but which now have successfully naturalized. The Ladybug, featured on one of the wildlife stamps and now common in the Hawaiian lowlands, was brought to Hawaii in the form of over a dozen species late in the last century as biological control agents to suppress foreign aphids and mealybugs that attack introduced crops.

American Wildlife Stamps can be purchased at your local post office or ordered by mail from: U.S. Postal Service, Philatelic Sales Division, Washington, D.C. 20265-9997. A sheet of fifty 22-cent stamps costs $11.00. Wildlife stamps will add a special attraction to your correspondence -- but there's only one I'iwi on each 50-stamp sheet!

Mae E. Mull

AUGUST FIELD TRIP REPORT MANOA CLIFFS TRAIL

The August 16th field trip to Tantalus was a lot of fun. The hike began at 8:15 AM on the Ewa side of the Manoa Cliffs Trail. The weather was cool and partly cloudy in the morning. Right away we spotted a pair of Red-billed Leiothrix in the Rose Apple trees beside the trail. The Leiothrix's harsh chatter alerted us to their presence. Interesting plants along the way were the native Olona, used by the Hawaiians to make their strongest ropes, and the Tahitian banana. Scattered along the trail were native trees such as 'O'hia Lehua and Koa, as well as non-native avocado, mango, guava, *Eucalyptus*, and the giant *Albizia*. The wet banks have *Begonia*, Maidenhar ferns, and flowering gingers. Birds most commonly seen were Red-vented Bulbuls and House Finches. The group reached the large bamboo forest at the top of Pauoa about 10:30 AM and saw the view into Nuuanu Valley. The weather had turned rainy, so we headed back down the trail. Despite the rain at the end, we had an enjoyable hike which focused on plants as well as birds.

Steve Perlman

H.A.S. NOMINATING COMMITTEE REPORT

This year's Nominating Committee (Michael Hall, Phil Bruner, and Sheila Conant) has nominated a slate of officers for the December elections. The following members have been nominated:

President:	Bruce Eilerts
1st Vice-President:	Tim Ohashi
2nd Vice-President:	Wayne Gagne
Recording Secretary:	Michael Hall
Corresponding Secretary:	Mae Mull
Treasurer:	Joel Simasko
Directors:	George Campbell
	Fern Duvall
	Robin Eilerts
	John Engbring
	Craig Harrison
	Peter Luscomb

Should any member wish to nominate additional "write-in" candidates, the By-Laws allow for this possibility. The nominator must send his or her nomination to the Nominating Committee (c/o Hawaii Audubon Society, P. O. Box 22832, Honolulu, HI 96822) so that it is received no later than 13 November 1987. The nominator should also include a two- or three-line biography of the candidate to be published on the ballot that will be mailed out in late November. The written nomination must be accompanied by, or the Committee must receive, also by 13 November, written notice from the person being nominated that he or she is willing to run for election and to serve in the appropriate post on the Board of Directors. The deadline is set to allow time for preparation and mailing of the ballots.

Michael Hall

INTRODUCTION TO HAWAIIAN BIRDS, A NONCREDIT UNIVERSITY COURSE

A noncredit course, entitled Introduction to Hawaiian Birds, will be offered by the University of Hawaii, Manoa, and co-sponsored by the Bishop Museum's community education program in honor of The Year of the Hawaiian.

Andrew Engilis, staff member and ornithologist of the Zoology Department at the Bishop Museum, will cover the natural history and identification of Hawaii's water and forest birds in a series of lectures, slide programs, and a field trip to a local wildlife refuge. Specimens from the Museum's extensive ornithological collection will augment the lectures and slide programs. Enrollment is limited.

The class will be held at the Bishop Museum's Bishop Hall Board Room and will run from 21 October to 11 November; the field trip will be held on 14 November. A total of five meetings, Wednesdays 7:00-9:00 PM, will complete the series. The cost is $35 for the general public and $32 for Bishop Museum Association members. For information on how to enroll, contact Andy Engilis at 848-4155 (wk).

THE NATURE CONSERVANCY OF HAWAII

VOLUNTEERS -- The Nature Conservancy's Hawaii Heritage Program is looking for volunteers!

Across the country, Heritage Program databases are used to identify the best remaining examples of a state's natural heritage by compiling comprehensive and up-to-date information on all rare species and ecosystems in that state. The Hawaii Heritage Program is seeking volunteers: (1) with typing skills to assist in entering information on rare and endangered Hawaiian plants, animals, and ecosystems in a computerized database, and/or (2) with library or literature search skills to assist in compiling information on rare Hawaiian plants, animals and ecosystems. Previous computer experience is desirable but not required.

You will receive training in Heritage methodology, as well as training in the computer program, Dbase III+. We would request a minimum commitment of 4 hours per week. For more information call Christa Russell, Robin Eilerts or Sam Gon at the Heritage Program office: 537-4508, Mon. to Fri. 8 AM to 5 PM.

STUDENT INTERNSHIPS -- Student internships are available with the Nature Conservancy's Hawaii Heritage Program during the 1987-1988 school year. Previous interns have assisted us by compiling and mapping information on rare plants and animals, entering biological information in our computerized database, and producing overlays.

Internships have been arranged for credit, or possibly for a stipend, through the University of Hawaii/Manoa Campus and Oahu Community Colleges.

Our office hours are listed in the notice above. Contact Audrey Newman, Heritage Program Coordinator, at The Nature Conservancy office, 537-4508.

CONSERVATION SYMPOSIUM SAVING HAWAII'S NATIVE PLANTS: NOW OR NEVER

On 18 and 19 October, 1987, The Garden Club of Honolulu and its co-sponsors will present a symposium "Saving Hawaii's Native Plants: Now or Never." Co-sponsoring this event are the Honolulu Academy of Arts, Pacific Tropical Botanical Garden, Waimea Arboretum and Botanical Garden, Bernice P. Bishop Museum, The Nature Conservancy of Hawaii, Harold L. Lyon Arboretum, and Honolulu Botanic Gardens.

Please refer to the detailed announcement in last month's issue *'Elepaio* 47:96. Contact the Garden Club of Honolulu in writing at 3860 Manoa Rd., Honolulu, Hawaii, 96822, or by phone at 808-988-7533, for further information.

INFORMATION ON BULBULS SOUGHT BY USDA

Red-vented Bulbuls have been implicated in damaging various agricultural and horticultural crops on Oahu; however, there is very little information that has been substantiated. H.A.S. members are asked to contact the Animal Damage Control, USDA-APHIS office in Honolulu if you have actually observed Red-vented Bulbuls causing damage to such crops or to flowers and fruits in your backyard. We need to know the extent and frequency of damage, the parts of the flowers and fruits eaten, the species of plant damaged, and the remedies taken, if any. The information will be used to evaluate further action to prevent the establishment of this bulbul on the neighbor islands.

Please write or call Tim Ohashi, Wildlife Biologist, Animal Damage Control, U.S. Department of Agriculture, P. O. Box 50225, Honolulu, HI 96819 or phone 541-3063.

NATURAL HISTORY WORKSHOP AND 1987 VOLCANO CHRISMAS BIRD COUNT

Again this year, a Hawaii Natural History Workshop is planned in conjunction with the annual Volcano Christmas Bird Count on the Island of Hawaii, 18-19 December. This year's workshop and Bird Count is being sponsored jointly by HAS, Hawaii Volcanoes National Park, and U. S. Fish and Wildlife Service Hawaii Research Station. The objective is to spend time in the field observing native Hawaiian birds and plants and to participate in the bird count. Field identification aids will include bird tapes and photographs. Biologists will present evening talks on various aspects of Hawaiian Natural History. We encourage outer island folks to arrive in Hilo on 17 December, Thursday evening, when we will pick you up. On Friday, we will have an early start, with one group birding at Kulani and the other at Hawaii Volcanoes National Park. (Be sure to bring binoculars, rain gear and warm clothing.) All day Saturday will be the annual bird count. That evening will be a dinner at Magma House, followed by a slide presentation and the count compilation.

Please supply your full name, address, phone number, social security number and birthdate by 9 November for registering, and be sure to let us know your travel plans if you need to be picked up at the airport. The Natural History Program cost will be $5.00 for the workshop and $3.00 for the bird count. Dorm fees are $7.00 per person. Send information and make checks payable to Hawaii Audubon Natural History Workshop, P. O. Box 164, Volcano, HI 96785. For further information call Paul Higashino at 967-7262 (res.) or Julie Williams 968-8156 (res.).

OCTOBER FIELD TRIP: JAMES CAMPBELL NWR

The 18 October field trip, lead by Bruce and Robin Eilerts, will be to James Campbell National Wildlife Refuge. This will be an excellent opportunity to get to know all the native waterbirds and many of the species of migratory waterbirds and shorebirds. Scoping from the shore, participants can try their luck at spotting albatross and other seabirds. Bring binoculars, lunch, sunscreen, field guides, and drinking water. Meet at the State Library on Punchbowl Street at 7:30 AM or at the Kahuku Sugar Mill at 8:30 AM. For more information call the Eilerts at 941-5974.

OCTOBER PROGRAM: NATURAL HISTORY EXPEDITION TO MARQUESAS ISLANDS

At the 19 October general meeting, HAS President Phillip Bruner will give a slide presentation showing native land birds and scenery of the Southern Marquesas Islands. In 1985 and 1987, Mr. Bruner did extensive field work on Marquesan flycatchers, warblers, kingfishers, and fruit doves. Mr. Bruner is Assistant Professor of Biology and Director of the Museum of Natural Hisotry at Brigham Young University Hawaii at Laie.

FREE ICE CREAM

At least three of your favorite flavors will be offered at the Saturday, 24 October, *'Elepaio* paste-up at Thane Pratt's house. Paste-up will commence at 1:00 PM, with ice cream served somewhat later in the afternoon. We thank Sheila Conant, Greg R. Homel, David Millard, and Leann Syrotuck for their help on the September paste-up. For more information and to request flavors, call Thane Pratt at 524-8464 (res.).

AN INVITATION FROM THE EDITORS: A CALL FOR ARTICLES

As recently published, scientific contributors to the *'Elepaio* will know, scientific articles are now being published within a year of submission. Some recent articles have appeared less than six months after the date of submission. However, this increase in efficiency has decreased our backlog of longer articles. Potential contributors are invited to submit suitable scientific articles for publication. Please see "Notice to Contributors" in this issue for more information.

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

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

Editorial Committee: Robert Fleischer, David McCauley, Marie Morin, Bob Pyle

Mailing: George Campbell, Elizabeth Edwards, Susan Schenck, Alan Ziegler, Marjorie Ziegler

NOTICE TO CONTRIBUTORS

The *'ELEPAIO*, Journal of the Hawaii Audubon Society, invites authors to submit scientific articles on natural history of Hawaii and the Pacific. Scientific articles are subject to peer review. The *'ELEPAIO* also serves as a newsletter to inform members of conservation issues, Society events, and other subjects of interest to members. Manuscripts of articles and newsletter items may be sent to Thane Pratt at 1022 Prospect St., Apt. 1103, Honolulu, HI 96822. Articles not subject to peer review MUST BE RECEIVED BY THE 15TH OF THE MONTH to be considered for publication in the next month's issue.

IF NOT A MEMBER, PLEASE JOIN US

JOINT MEMBERSHIP -- National and Hawaii Audubon Societies

Individividual	$30.00
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Contributing	250.00
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LOCAL MEMBERSHIP -- Hawaii Audubon Society only

Regular	$6.00
Junior (19 years and under)	3.00
Subscriber (off-island residents)	6.00
Life (payable in three equal annual installments)	150.00

All local memberships and subscriptions are for the calendar year.

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 $0.85 surface mail or $1.03 air mail. Hawaii residents add $0.20 State tax.

FIELD CHECKLIST OF BIRDS OF HAWAII by R. L. Pyle and A. Engilis, J. (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

CALENDAR OF EVENTS

July 30 to November 10. Exhibit of original bird art by Douglas Pratt . Jabulka Pavillion, B. P. Bishop Museum.

Oct 12 (Mon.) Board Meeting at Bishop Museum at 7:00 PM. Call Pete Luscomb, 923-4772 (wk).

Oct 18 (Sun.) Field trip to James Campbell NWR. Meet at the State Library on Punchbowl St. at 7:30 AM. Announcement on page 103.

Oct 19 (Mon.) General Meeting at **Atherton Halau, Bishop Museum** at 7:30 PM. Program: Marquesan Birds. Announcement on page 103.

Oct 24 (Sat.) *'Elepaio* paste-up at Thane Pratt's house, 1:00 PM. Call 524-8464.

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