HAWAII AUDUBON SOCIETY

'ELEPAIO

Journal of the Hawaii Audubon Society

For the Protection of Hawaii's Native Wildlife

VOLUME 52, NUMBER 7 JULY 1992

Human-assisted Fostering of Hawaiian Monk Seal Pups

by Tim Gerrodette[1], Mitchell P. Craig[2], and Thea C. Johanos[2]

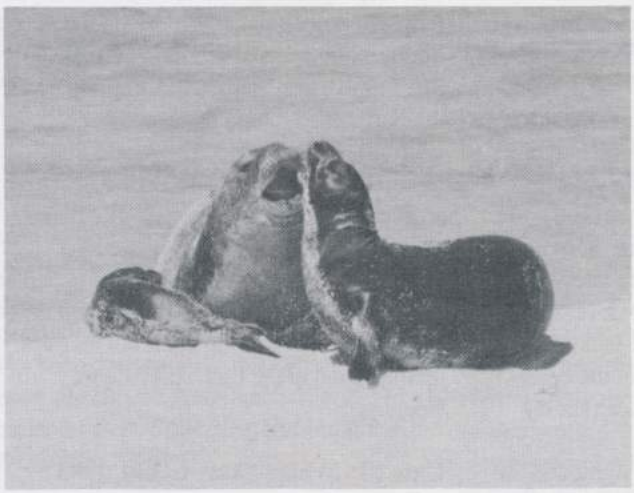

Fig. 1: Female Hawaiian monk seal with two pups. One of the pups is not hers but has been temporarily adopted. This represents an unstable situation, because the female will not continue to nurse both pups. The rejected pup will have to be adopted and nursed by another lactating female if it is to survive. The feeding and care of another animal's offspring is called fostering. Photo by M. Craig

An unusual feature of Hawaiian monk seal (*Monachus schauinslandi*) reproductive behavior is that lactating females often nurse pups other than their own (Johnson and Johnson 1984, Alcorn and Henderson 1984, Boness 1990). A female apparently becomes confused over the identity of her pup and allows another pup to suckle. However, because females do not have sufficient nutritional reserves to raise more than one pup, the female will usually allow only one pup to suckle at a time. In order to survive, the displaced pup must find another lactating female, and this is frequently the one from which the first pup just came. The net result is an exchange of pups. Such "pup switching" or fostering behavior is more common where the density of mother-pup pairs is high (D.J. Boness, pers. comm.).

Why such a "loose" system of pup recognition should have evolved is an interesting question. Perhaps there has been little selection for accurate pup recognition because there was little need for it. True to their name, monk seals are solitary animals, and do not form the dense colonies that characterize other pinniped species. Widely scattered mothers are less likely to encounter other pups and to have to distinguish them from their own. On the other hand, fostering behavior may have evolved because it has positive benefits. There are several hypotheses to account for the evolution of fostering behavior: increased maternal experience, continuation of normal reproductive cycle, and increased inclusive fitness (kin selection). Riedman and Le Boeuf (1982) have suggested that some combination of these factors may explain fostering behavior in northern elephant seals (*Mirounga angustirostris*).

Whatever the reason for its evolution, we may be able to use the apparent lack of own-pup recognition in Hawaiian monk seals to aid in the recovery of this endangered species. A separated, abandoned, or prematurely weaned pup with little chance of survival can, with human assistance, be reunited with a lactating female, who will then nurse it through weaning. Here we describe several such successful rescue efforts and discuss their implications for future conservation work.

Human-assisted Fostering

The breeding range of the Hawaiian monk seal (Fig. 1), one of Hawai'i's two native mammals, is from Nihoa Island to Kure Atoll in the Northwestern Hawaiian Islands. Occasional births occur in the main Hawaiian Islands. Last year they included a birth on Kaua'i and the first recorded birth on O'ahu in modern times. Individual adult females can often be recognized by distinctive scars and natural marks in the pelage, and nicks and cuts on the flippers. Pups are more difficult to distinguish individually because they lack scars. However, pups pass through definite stages (termed P1 through P5 in our field notes) during the nursing period, and, combined with the fact that the mother-pup pairs usually remain on the same section of beach, it is often possible to follow a pup during its nursing period with reasonable certainty. Weaning occurs after an average nursing period of 39 days (T.C. Johanos, manuscript in prep.) at stage P4 or P5. Similar estimates, based on smaller samples of females, have also been reported (35 days: Kenyon and Rice 1959; 37 days: Johnson and Johnson 1984; 41 days: Boness 1990).

The four cases of successful human-assisted fostering described below took place at French Frigate Shoals, Northwestern Hawaiian Islands. French Frigate Shoals is an atoll composed of about 10 more or less permanent sand islands and one volcanic pinnacle (Amerson 1971). From beach counts of 250-300 seals made during recent years, it is estimated that about half of the current monk seal population lives at this atoll (Gerrodette 1985). East and Whale-Skate Islands are the two most important breeding islands at French Frigate Shoals (Westlake and Gilmartin 1990). Tern Island is an important hauling site, but births rarely occur there. The number of seals using Tern Island has increased greatly over the

last 15 years since the U.S. Coast Guard abandoned a loran station on the island (Schulmeister 1981, Gerrodette and Gilmartin 1990).

Case #1: East Island, 1986

Female B had two P1 pups with her at 1300 hours on 20 April. One pup looked approximately a day older than the other, which still had its umbilical cord attached. Both pups suckled briefly, but were interrupted by the female. She alternately attacked and fled short distances whenever the pups approached. From the water's edge, the female hauled up to the beach crest, traveled in circles, and eventually headed back down to the water. Both pups attempted to follow her, but they moved slowly and appeared to become tired and weak. The smaller pup became stranded at the beach crest. We decided to intervene because of the risk of the pup developing heat stress. At 1504 hours we picked up the extremely hot pup, cooled it in the ocean, and carried it to an adult female that lay nearby. This female vocalized and chased the pup away. Female F was sighted in the water, investigating the shoreline. As soon as she saw the pup, she began giving characteristic "moaning" vocalizations often emitted by mothers to attract pups (Eliason et al. 1990). We placed the pup on the berm, and female F and pup immediately moved toward each other. She nuzzled the pup all over and rested her chin on it. The pup had not suckled, but the pair was asleep, hauled up for the night, when observations ended at 1557 hours. It is unknown whether this pair remained together or if further pup exchanges took place. However, the pup survived to weaning, even though its exact identity was unknown, because all pups on the island at the time weaned.

Case #2: East Island, 1986

On the same day as the previous incident, female H was swimming with one P1 pup when she was approached by another swimming P1 pup about 1600 hours. The female vocalized repeatedly but did not attack either pup. When the trio hauled out, we could see that one pup was slightly larger, and the larger pup blocked the smaller from nursing. Female H was still accompanied by both pups the following day. She appeared agitated whenever the pups attempted to suckle and neither pup was nursed for a sustained period. Only one pup (usually the larger) was able to get into suckling position at a time. At 1450 hours female M was seen swimming nearby, making the same "moaning" vocalizations described above, and investigating each mother-pup pair along the beach. We decided to intervene because it was unlikely that female H could successfully wean both pups. At 1500 hours we picked up the pup farthest from the sleeping female H (the larger one). The female did not awake. We placed the pup at midbeach in front of searching female M. She immediately hauled out, approached the pup, nosed it, and presented her ventrum. The pup began to suckle three minutes after being placed on the beach, and continued for 15 minutes. The pup soon fell asleep, and the pair was still asleep together when observations ended at 1753 hours. As with Case #1, it is unknown if the pair remained together, but all pups on the island at the time survived to weaning.

Case #3: Whale-Skate Island, 1988

Female W10 was accompanied by both P1 and P2 pups on 24 May. The female alternately repulsed one pup or the other, and neither pup was able to suckle in an hour of observation. The next day a P2 pup (presumably the same one as the previous day) was with female W10; a P1 pup was alone nearby and its movements appeared weak. We knew that female W6 had been nursing a young pup two days previously, but that she had been without a pup since then, so it was likely that she was still lactating. At 1530 hours we picked up the lone pup, carried it 50 m down the beach, and placed it near female W6, who was sleeping at the water's edge. Female W6 did not see us approach but turned and saw us as we were moving away. The adult female and pup both vocalized, moved together, and sniffed each other. About two minutes after the pup was placed near her, the female rolled on her side, presenting her ventrum to the pup. The pup immediately began to suckle. For the next two days, female W6 was seen, apparently with the same young pup, but on 28 May, female W7 appeared to be nursing the pup we had picked up (based on the size of the pup), and female W6 had a larger pup. After that, female W7 continued to be seen every few days with what was probably the same pup until weaning occurred about 25 June.

Case #4: Tern and Whale-Skate Islands, 1988

An abandoned P1 pup was found on Tern Island on 16 June. From observations the previous day, we knew that female W28 on Whale-Skate Island, 5.5 km away, had become separated from her four day old pup. We did not know if the Tern Island pup belonged to female W28, but we considered it likely. Finding any young pup on Tern Island was a rare event, so finding a separated pup of just the proper size right after female W28 had lost her pup was a highly unlikely coincidence. Moreover, on other occasions we have seen young pups, who are weak swimmers, swept away by currents. Since prevailing winds blow from Whale-Skate toward Tern, W28's pup could have been carried in that direction. We picked up the pup, took it by boat to Whale-Skate Island, and placed it with female W28. She seemed to reject the pup at first, but the next day the pair was nursing normally. The pair continued to be seen together over the next month until the pup weaned about 15 July.

Discussion

Alloparental care (care of young by helpers other than the biological parents) occurs in a wide variety of mammals and birds (Riedman 1982). Such behavior seems to be reproductively costly and unlikely to evolve under classical natural selection. However, there are several possible ways that altruistic behavior such as alloparenting may evolve (Krebs and Davies 1987). By helping raise another's young, a helper may increase its own survival rate, obtain a breeding territory, and gain valuable parenting experience, all of which may contribute to greater production of its own offspring later in life. This appears to be the case among some birds (Emlen 1978) and primates (Lancaster 1971, Hrdy 1976). Riedman and Le Boeuf (1982) suggest that fostering behavior may be beneficial in northern elephant seals by continuing a regular reproductive cycle after losing a pup. This is based on the assumption that lactation and continued nursing help induce ovulation and copulation, and therefore increase the chance of giving birth the next year.

Fostering behavior may also have evolved through kin selection, in which the helpers are related to the young they care for. The theory of kin selection (Hamilton 1964, Michod 1982) postulates that the costs of helping are balanced by the benefits of genetic relatedness. By increasing the probability of survival of relatives, the helpers increase the probability of passing on some of their own genes. However, Boness (1990) did not find any reproductive costs associated with pup exchange behavior in the Hawaiian monk seal. Also, we do not know if Hawaiian monk seal pups involved in pup exchanges are related, or if females tend to foster pups related to them. Genetic studies in progress may allow us to answer some of these questions.

Among pinnipeds, fostering is more common in phocids (true seals) than in otariids (sea lions and fur seals), but most instances have occurred after human disturbance at the pupping colonies (Stirling 1975). In Hawaiian monk seals, an early instance of nursing an alien pup after human disturbance was described by Kenyon and Rice (1959). However, exchange of pups can also occur repeatedly under natural conditions (Boness 1990). Mother-pup recognition seems to involve visual, olfactory, and auditory cues (Eliason et al. 1990), but "mistakes" occur frequently, at least at some locations.

For several years the National Marine Fisheries Service has conducted a successful rehabilitation program for prematurely weaned female monk seal pups at French Frigate Shoals (Gerrodette and Gilmartin 1990). In this rehabilitation program, weaned female pups less than 90 cm in girth are transported to Honolulu for intensive care and feeding, then released as yearlings back into the wild the following spring. However, the weaned pups taken for rehabilitation are much larger than the young pups in the human-assisted fostering cases described above. Rehabilitation of very young pups has not yet been attempted with the Hawaiian monk seal. The remote location makes it difficult and expensive to transport seals, and the chances of successful rehabilitation from such a young age are unknown. Two young Mediterranean monk seal pups (*M. monachus*) were successfully reared in 1988 at the Seal Rehabilitation and Research Centre, Pieterburen, Netherlands, and released into the wild in 1989 ('t Hart and Vedder 1990).

The cases of human-assisted fostering described above offer an alternative to captive rehabilitation that is preferable from several points of view. It is less expensive and involves less handling of the pup. The pup does not risk exposure to exotic diseases which might be carried back into the wild population. Possible long-term effects of hand-rearing in captivity are unknown, but it seems unlikely that removal of an otherwise healthy pup from natural conditions will be better than foster maternal care in the wild, especially when fostering is known to occur naturally.

However, there are stringent requirements that will limit the application of such a procedure. First, abandoned pups must be discovered promptly. Field observations suggest that newborn pups will become too weak to suckle if abandoned for more than a few days. Older pups can survive somewhat longer periods of fasting. Because of intensive field work, we were able to act promptly when the situation arose in these four cases.

Second, successful fostering of an abandoned pup requires the availability and identification of a lactating female without a pup. Unless parturient females have been individually identified and closely followed during the pupping season, it usually will not be known which females are lactating when an abandoned pup is found. In each of the cases above, we either knew that a particular female had recently lost a pup, or saw a female exhibiting a characteristic pup-searching behavior.

Third, there may be other factors affecting successful fostering that we do not understand. An attempted fostering at Laysan Island in 1988 was not successful (Johanos et al. 1990). An attempted reunion of an abandoned pup with a lactating female at East Island in 1983 was not successful (W. G. Gilmartin, pers. comm.). The lack of success in the latter case may have been due to the older stage of the pup (P3), but older pups have also been known to be adopted by lactating females, either with or without their own pup (Alcorn and Henderson 1984, Boness 1990).

Finally, because the Hawaiian monk seal is an endangered species, human intervention during the nursing period is not to be taken lightly. Some of the recent declines in monk seal population size are related to past disturbance at the pupping sites (Gerrodette and Gilmartin 1990). Moreover, disruption of normal maternal care has been a factor in the decline of many threatened and endangered mammals (Oldfield 1988). In the cases described above, we intervened only when the situation seemed serious, and we attempted to minimize our presence. In all four cases, the adopting female was aware of humans, probably through both sight and smell, but that did not preclude successful fosterings.

Under the right circumstances, therefore, human assisted fostering of abandoned monk seal pups appears to be an effective means of "rescue." To date, alloparental care has been exploited as a conservation strategy mainly in birds, most notably in the case of Sandhill Cranes (*Grus canadensis*) incubating and raising young Whooping Cranes (*G. americana*) (Doughty 1989). The success of the attempts described above suggests that natural fostering behavior could also be exploited as a limited conservation strategy in the Hawaiian monk seal.

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[1]*National Marine Fisheries Service*
Southwest Fisheries Science Center
P.O. Box 271
La Jolla, CA 92038

[2]*National Marine Fisheries Service*
Southwest Fisheries Science Center
Honolulu Laboratory
2570 Dole Street
Honolulu, HI 96822

A Wartime Naturalist in Hawai'i

by Dean Amadon[1]

In early 1944, I found myself on a troop ship headed west, first stop Hawai'i. There I was assigned to a sanitation unit quartered across the street from Tripler General Hospital. Soon the new wonder drug DDT arrived and killed the hitherto impregnable ranks of bedbugs in our old wooden quarters. We were sent out to try it on mosquitos and sometimes were soaked to the shoulders in an oil emulsion of DDT.

Fearful that I would be transferred elsewhere before seeing a single Hawaiian honeycreeper, I searched in vain in the shade trees and parks of the city. Then I was told that it was necessary to scale the long hot ridge back of Tripler, through thickets of lantana and guava, to the forest above. There I saw 'Apapane, 'Amakihi, and, of course, 'Elepaio.

Whenever possible, I visited the Bishop Museum. The eminent entomologist and evolutionist, Elwood C. Zimmerman, put the collection of birds at my disposal. I wrote a little article on its extinct treasures (*'Elepaio* 1945:38-40). Later, I met Sir Peter Buck, the part-Maori director of the Museum, and he had it reprinted in the museum "Bulletin." Miss Margaret Titcomb, librarian at the Bishop Museum, had once been employed at the American Museum in New York, and we had much to talk about. C. Montague Cooke of the famed Hawaiian family was present now and then studying seashells. I also met Edward Y. Hosaka, an agronomist, and reviewed his book *Sport Fishing in Hawai'i* (1945 *Natural History Magazine*: 149). One dark night, Hosaka invited me to accompany his fishing party to a remote shore. The only catch, as I remember, was a horrid, writhing moray eel, which hopelessly tangled the lines.

Bubonic plague was endemic in the Hawaiian Islands in the three species of rats that lived in the sugarcane fields. There was concern it might spark over into plague proportions in the crowded military camps. I was assigned to stalk around the outskirts of Honolulu with a shotgun, blasting tree nests of roof rats. My guide was a Japanese-Hawaiian who, as such, was not permitted to handle a firearm. Sometimes dead rats would fall from shattered nests; sometimes a hail of baby rats would fall from shattered nests; sometimes a hail of baby House Sparrows!

Having thus become an expert on *Pastuerella pestis*, I was promoted to private first class and sent on detached service to a bubonic plague control lab on the Big Island at Honoka'a. The lab was a modest two room concrete building. There were three of us servicemen and an old Hawaiian. One of the men had actually had a course in bacteriology; the Hawaiian at least knew what a plague-killed rat looked like! Each day, trappers would bring in a sack of 50 or so trapped rats from the cane fields and dump them on a table. We would then examine their no longer vital organs for signs of plague. No luck, until one day a dessicated, flattened rat (we though it was a road kill) was pronounced by the Hawaiian as looking suspicious because of the pale color of the soles of its feet! By breaking its thigh bones, he obtained enough moist tissue for a culture. When duly injected into guinea pigs, they keeled over dead after a day or two. Now we had a live culture of plague but didn't know what to do with it.

There was no forest near Honoka'a, but in the pastures above, with scattered big trees (koa?), I did have some nice views of the Hawaiian Hawk and a few other birds (*'Elepaio* 1945:55-56). But the highlight of my month and a half on Hawai'i was a visit to the National Park. There I met the park naturalist, Paul Baldwin, who took me on a strenuous walk. Under his expert guidance, we had glimpses of three rarities: 'O'u, 'Akepa, and 'Akiapola'au.

Paul's wife painted; she gave me a nice watercolor of the 'I'iwi and one of the 'Akiapola'au. These I have recently presented to the Archives of the Bishop Museum. Paul, like me, wrote his doctoral thesis on the Hawaiian honeycreepers. He recently retired after a career of teaching at Colorado State University and lives in California.

But I haven't mentioned George Munro, then 79, and author of the *Birds of Hawai'i.* On my first visit he, with steady hand, was mounting an exquisite little Australian Fairy Blue Wren. Collecting for Lord Walter Rothschild in the 1890s with H.C. Palmer, they discovered vanishing species such as the Lesser Koa Finch, never to be seen again. Unfortunately, by the time George wrote his book a half century later,

Greenprint
Audubon Hawai'i Conservation News
Volume 4 No. 4 • July/Aug 1992

The Endangered Species Act: Will It Survive?

by Dana Kokubun

Originally enacted by Congress in 1973, the Endangered Species Act provides the most comprehensive and stringent protections for the nation's rare species of plants and animals. One of the provisions of the ESA requires that Congress reauthorize the law every 5 years. The ESA has been reauthorized several times and changes have been made to the law on each occasion, but the strength of the ESA remains basically unchanged. This time, however, things may be different.

A vocal and active minority of anti-environmentalists has emerged throughout the country. Particularly strong in the western states with many acres of public lands, the self-described "Wise Use" movement has called for gutting the ESA by removing protections for some species that do not meet economic tests. Also high on their radical agenda is clear-cutting all ancient forests, closing the courts to environmental lawsuits, and opening up the Arctic National Wildlife Refuge

Species Act in Hawai'i. The Hawai'i State office of the National Audubon Society presented testimony at the hearing on May 11th.

James Waltman, wildlife specialist for Audubon spoke on behalf of Dana Kokubun, director of the Hawai'i State Office. Waltman pointed out that the timing of the hearing was "extremely appropriate" as Congress begins to deliberate the reauthorization of the Endangered Species Act.

Audubon and other witnesses testifying at a hearing decried the lack of funding provided to the Fish & Wildlife Service, which has principal responsibility for carrying out the policies of the ESA.

Arguably, the ESA means more to Hawai'i than any other state. With more than one-quarter of the nation's endangered plants, and a full 40 per cent of its endangered birds, Hawai'i is

"The field personnel are

Picture of Maui Parrotbill by artist Kathlyn Hill.

of "recovery plans" and designation of "critical habitat."

While recognizing the professionalism of the men and women in the field working for the FWS, Michael

What You Can Do

The Hawai'i State Office of the National Audubon Society needs volunteers for an activist phone tree for the Audubon Ark project, a campaign to reauthorize the ESA. Call 522-5566 if you want to join the phone tree, or can help in some other way.

Endangered Species Act Facts*

104 Hawaiian plants and

to oil and gas development.

The anti-environmentalists include ranchers, loggers, mining interests, fishermen, landowners, farmers, and others. Ron Arnold of the Center for Defense of Free Enterprise of Bellevue, Washington is a self-proclaimed spokesperson for the movement. Arnold says their mission is "to destroy, to eradicate the environmental movement."

Anti-environmentalists have visited every member of Congress, and their vocal presence has been keenly felt on the Hill. It was against this volatile backdrop that Senator Akaka conducted his hearing on the ESA as chair of the Ad Hoc Subcommittee on Consumer and Environmental Affairs.

SenatorDaniel Akaka hosted the hearing to examine the record of the U. S. Fish & Wildlife Service in implementing the federal Endangered

uniformly dedicated, competent, and eager to do the right thing for Hawai'i's endangered species if only they had the resources, the official support, encouragement and permission to do so."

Michael Sherwood
SCLDF

sadly the endangered species capitol of the United States.

The ESA includes a procedure for determining which species are threatened with extinction or endangered and placing them on official lists. For listed species, there are provisions providing for their recovery through the development and implementation

Sherwood of the Sierra Club Legal Defense Fund sharply criticized the administration for their the lack of support for the wildlife agency. Sherwood argued that the field personnel "are uniformly dedicated, competent, and eager to do the right thing for Hawai'i's endangered species if only they had the resources and the official support, encouragement and permission to do so."

Despite the dual problems of low funding and weak support for the Fish & Wildlife Service from the Bush administration, the Endangered Species Act remains the most far-reaching wildlife law ever enacted in this country or any other. It remains to be seen whether or not the ESA will survive unscathed during the reauthorization process in the face of organized attacks by anti-environmentalists.

animals are officially listed as threatened or endangered (and more plants are scheduled to be listed this year and next)

None of the listed Hawaiian species has recovered to the point of being removed from the lists

At least a dozen bird species may have become extinct in the last ten years.

Source: testimony of Michael Sherwood, Sierra Club Legal Defense Fund, before the Ad Hoc Subcommittee of Consumer and Governmental Affairs, 11 May 1992.

Kellie Ann Takenaka, Sharon Williaford, and Geoffrey Rapp of Punahou High enjoy a win in the preliminary rounds of Paradise Pursuits. The three students went on to win the finals on May 24, and earned a two--day camping trip to the Kamakou Preserve on Moloka'i.

Environmental Trivia

Paradise Pursuits: An Educational Success

by Sheila A. Laffey

In the beginning it was only an idea. A year ago Kersten Johnson, then chair of the Hawai'i Audubon Educational Committee, and her boyfriend were sitting around wondering what kind of special activity they might enjoy that would be fun, relaxing and meaningful. Why not a board game about Hawai'i's environment?

About the same time I was wondering how Audubon's Alien Species Alert Program (ASAP) could let high school students know that prevention is the best cure for alien species. I had heard that Hawai'i's students' were frustrated about the state of the environment, but also that environmental clubs

See Trivia, Page 2

Environment Is No Trivial Matter For Students

by Suzanne M. Palmer

Working with ASAP Coordinator Sheila Laffey on Paradise Pursuits has allowed McKinley High School seniors David Pai and Michael Ho to get more involved in learning about the environment.

"Here (at National Audubon), I know I'm making a difference," said Pai, 18. "This is the best place to get more involved with saving the environment."

Paradise Pursuits was designed by Laffey to help teach students about the environment in a fun and educational way. It took a great deal of time to organize and prepare for the competition, of which Pai & Ho invested much of their time.

"Paradise Pursuits promotes environmental education among high school students," said Pai. "It involves the whole island and makes me feel proud to be a part of it."

Despite the hard work of following up on phone calls, doing computer work, and sorting prizes, the two seniors highly recommend other students to help with Audubon. Pai even suggested having a whole class get involved in helping with the Paradise Pursuits fall competition.

Zip students Michael Ho, left, and David Pai learned more about Hawai'i's precious environment through Paradise Pursuits.

> *"This is the best place to get more involved with saving the environment."*
>
> *David Pai*
> *ZIP Student*

"Sheila is fun to work with, and kept us busy," said Ho, 17. "At first it seemed like the work didn't end, but everything worked out and we were like one big family."

"I don't know how we could have done it without them," said Laffey of the two seniors. "I really appreciated their input into the program."

Now that the semester is over and graduations are in order, both Pai and Ho are setting their minds towards college.

Pai hopes to use what he has learned here at Audubon to possibly start his own group. He plans to major in International Peace Studies at the University of Hawai'i and spread the word that the environment should be the biggest concern for everyone.

Business Management is in the future for Ho as he heads off to the Kapiolani Community College this fall. By working with Audubon, Ho has learned to pay more attention to our environment.

Pai and Ho worked for the National Audubon Society's Hawai'i State Office in coordination with the Zoo Instructor's Program (ZIP) through the McKinley High School Science Department.

Audubon Focuses On Oiled Wildlife Courses

Blue-Ribbon Panel Issues 'Alala Report

by Dana Kokubun

The National Research Council, an arm of the National Academy of Sciences, released their report, "Scientific Bases for the Preservation of the Hawaiian Crow," on May 6. A small working group of highly regarded scientific professionals authored the study at the request of the U.S. Fish & Wildlife Service. The report contains recommendations for actions which must be taken to recover the imperilled 'Alala, a species of crow unique to Hawai'i which has declined to less than 25 birds.

The NRC report states that the most important recovery action is to rapidly increase the size of the population, both in the wild and in captivity. To accomplish this they recommend taking the first clutch of eggs from the wild 'Alala, rearing them in captivity, and then releasing some fledglings back to the wild. (Crows will typically lay a second set of eggs if the first is taken within 5-7 days of the start of incubation.)

If the wild population fall to two pairs of birds or less for two seasons, these birds should be brought into captivity, according to the NRC report. The report's authors do not recommend bringing in adult birds under any other circumstances. Audubon fully supports this recommendation, as well as the others contained within the report, which address improvements at the captive breeding facility at Olinda on Maui and measures to increase 'Alala productivity in the wild.

If collection of the first clutch of eggs is not permitted by McCandless Ranch, and if other recovery actions are not carried out, the 'Alala will probably become extinct within the next ten to twenty years, according to the National Research Council's report. Known historically only from the Big Island, the 'Alala's range has shrunk to eleven known birds on the private McCandless Ranch in Kona.

A decision in the legal action brought by Audubon against the U.S. Fish & Wildlife Service for their failure to carry out their own recovery actions for the 'Alala is still pending.

Meanwhile, the State Department of Land and Natural Resources recently announced the birth of an 'Alala chick in captivity, the first offspring of a captive-born male and female.

by Suzanne M. Palmer

Black, oily beaches…tar-like waves oozing up to the shores…birds washed up along the coast, covered in oil…

A grim and bleak picture, indeed, yet an accident of catastrophic proportions could become a reality given Hawai'i's major dependence on imported oil.

Imagine a drop of oil the size of a dime. Although a seemingly miniscule amount, it is more than enough to kill a bird.

How, you ask? A bird is naturally waterproofed by the constant overlapping of its feathers. A substance such as oil causes the feathers to mat, which results in hypothermia and loss of bouyancy. Oil on the feathers prompts the bird to preen itself constantly and ingest toxins, creating a potentially fatal hazard.

If just one drop of oil can create this problem, imagine what could arise out of a major oil spill where birds are completely drenched in sludge.

Hence, with Hawai'i being the leading state in endangered species, the National Audubon Society (in cooperation with the Clean Islands Council, Oceania Regional Response Team, USFWS, and Sea Life Park), has taken the lead in organizing the Oiled Wildlife Rescue & Rehabilitation program. Through this new program, volunteers are trained in handling, cleaning , rehabilitating and eventually releasing oiled birds and other wildlife in the event of a major oil spill.

Audubon strives to make the general public aware of the effects on wildlife from an oil spill catastrophe, and encourages volunteers to take part in wildlife rehabilitation workshops.

The first OWR&R workshops took place May 9 - 12 in downtown Honolulu and also at Sea Life Park with more than 80 volunteers attending. The Clean Islands Council invited expert Jay Holcomb of the International Bird Rescue Research Center in Berkeley to teach an introductory course on oiled bird rehabilitation.

Bird rehabilitation classes are only part of the training required to become a fully qualified volunteer capable of working on-site at an oil spill. Volunteers must also have a minimum of 4 hours of hazardous waste material training. Courses for the hazardous waste training are planned for July 7 - 11.

This summer Audubon hopes to organize hands-on training for both supervisors and volunteers. Holcomb suggested a two day workshop in which people working in pairs would practice the entire process of cleaning, feeding and taking basic care of birds.

Alongside hands-on summer training, Audubon is striving to organize bird rehabilitation classes on the neighbor islands later this year. Kaua'i and the Big Island will most likely hold the first training sessions.

What You Can Do:

- Act as a volunteer for the Oiled Wildlife Rescue & Rehabilitation program. Call Suzy Palmer at 522-5566 for more information.
- If you are already a volunteer, tell your friends and family to join us in our crusade to save Hawai'i's precious birds and wildlife in the event of a major spill.
- Attend one of the following hazardous waste training classes*

July 7, 1992 (Tuesday)
6:00 - 10:00 p.m.
Sea Life Park

July 9, 1992 (Thursday)
6:00 - 10:00 p.m.
Clean Islands Council
Training Rm.

July 11, 1992 (Saturday)
8:00 a.m. - 12:00 p.m.
Clean Islands Council
Training Rm.

July 11, 1992 (Saturday)
12:30 p.m. - 4:30 p.m.
Clean Islands Council
Training Rm.

To register, please call the Clean Islands Council at 528-4449, state your preferred date and leave your phone number.
The Clean Islands Council is located at Pier 8, Gallery 5, Aloha Tower.

Trivia, *From Page 1*

enjoying a resurgence in popularity on campus.

Kersten's idea for a board game and my concern over how to reach high school students continued to simmer separately until a fateful meeting of the Hawai'i Audubon Educational Committee. Suddenly we realized that since students are competitive, a quiz show should generate some interest and enthusiasm for environmental challenges in Hawai'i, including protecting the islands from alien species.

Discussions with the Hawaiian Electric Company led to generous funding for our idea. Suddenly, Paradise Pursuits, an environmental quiz competition, was a reality.

Finally, everything was in place — 500 questions, plans for the television broadcast, competition rules and twelve O'ahu schools.

The first rounds were held at Roosevelt High School and Punahou. Paradise Pursuits came alive when the students started throwing out their answers, right or wrong.

During the preliminary rounds, hosts Randy Scoville and Kauanoelehua Chang asked the team captains how they picked their native species' mascots, also their team name. Castle High School's parallel of the 'Ahinahina (silversword) growing at the summit of Haleakala and their own quest for the top drew smiles, as did Moanalua's briefing on the Mano (shark), predator of the reef.

With their coaches enthusiastically rooting from the sidelines, the teams surged ahead one minute or ran neck and neck in the next. The tension of competition was often relieved with humor by the hosts and the participants.

Four semifinalists — Punahou, Kamehameha, Castle and Moanalua — were videotaped by KHNL-TV at Castle High School on May 25th.

With friends and family cheering them on, Moanalua slipped past Castle, and Punahou edged Kamehameha. The final round between Punahou and Moanalua was filled with suspense. The finalists tied twice and extra questions had to be written so the tie could be broken. Finally, Punahou emerged the victor in a very close contest by correctly answering that koa was a native tree. Both top teams happily claimed their prizes. In fact, thanks to the generosity of many donors, students and coaches in all rounds won prizes.

All the teams who participated in Paradise Pursuits were winners, for they helped to increase our understanding and appreciation of the environment. Said Moanalua coach Vince Mahoney, "They're still getting excited by (learning) new things. These kids are the ones who I hope will make a difference for the future."

The competition will expand statewide this fall. Audubon needs volunteers for coordinating and publicizing on all islands. Call Sheila Laffey at 522-5566 if you would like to be involved.

Greenprint *is published bimonthly by the National Audubon Society, Hawaii State Office. Dana Kokubun, Director. Telephone 522-5566. In conjunction with the Hawaii Audubon Society, Telephone 528-1432. 212 Merchant Street #320, Honolulu, Hawaii 96813. Page Layout & Design By Suzanne M. Palmer.*

he could provide few details about the habits of these long extinct birds. A single puzzling specimen he later obtained on Lana'i was thought by most of us to be an aberrant 'O'u. Dr. Storrs Olson of the Smithsonian recently decided that it was a perfectly valid and now extinct honeycreeper; it is named *Dysmorodrepanis munroi.*

Munro was living with a daughter when I visited him during the war. Outside his bedroom window was a small pool. His daughter told me her father, disturbed by the croaking of toads, would carry them by hand down the hill, but they returned. I believe it was the introduced, misnamed, *Bufo marinus.* Mr. Munro returned to his original home, New Zealand, a few years later and came back with a new wife, a lady he had known decades before.

In 1962, on my way to Australia with a party of naturalists, we stopped for a couple of days in Honolulu. I visited the Bishop Museum and met E. H. Bryan, who had been away in the Navy during my 1944 time in the islands. When I mentioned George Munro, he surprised me by saying, "Would you like to visit him?" He drove me down but had to leave shortly. I chatted with George and his wife. As I said in a memorial I wrote in the *Auk* (1964:256), George was then 96 but still retained his hearty laugh. When I left, he walked me to the corner, "chugging along with a cane in either hand." He died a few months later, but the program he had started to save endangered dry country endemic plants of Hawai'i continued.

Although my hopes to visit Hawai'i again have not as yet come to pass, one rewarding incident did occur. In 1973, my wife and I arrived at a farm in western New York to visit relatives. I was out relaxing after the drive when our host shouted that I had a phone call from Hawai'i. It proved to be a young student, Jim Jacobi who, with a Miss Tonnie Casey and others, had been engaged in a field project in the rain forest on windward Maui. They had found what seemed to be a new species of bird, and yes, they had a specimen. Would I compare it and if new, help them describe it? Of course. It was indeed not merely a new species, but a new genus; described by Jacobi and Casey (1974, *Occ. Papers Bishop Museum,* 24, no. 12) as *Melamprosops phaeosoma.*

I'm sure it is a somewhat aberrant species of Hawaiian honeycreeper, though others doubt this, partly because of its somber coloration. But, after all, this is the most variable of families of birds, and the Black Mamo on Maui was a close relative of the brightly colored *Drepanis pacifica* of Hawai'i. Both are extinct, and one fears that *Melamprosops* may share their fate as it is rare, local, and apparently decreasing. I expressed views on this and other matters a few years ago (*'Elepaio* 1986:83-84); among them, a strong belief that this group of birds should continue to be known as honeycreepers though the current consensus is that they were derived ultimately from finch-like ancestors and some would now call them Hawaiian finches. But, finches or honeycreepers, let us hope for success in the efforts to save these remnants of wildlife in what Robert Louis Stevenson once called "the loveliest fleet of isles anchored in any sea."

[1]Curator Emeritus
American Museum of Natural History
79th Street and Central Park West
New York, NY 10024

T-shirts for Sale

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

T-shirts bearing the Society's 'Elepaio logo are available in ash (gray) with a black design. We also have a few in aqua, navy, white, and beige. In addition, the "hot" Kolea (Pacific Golden Plover) T-shirts are also available. This T-shirt is white with a three-color design of the Kolea and native hibiscus. Proceeds from the Kolea T-shirt go to help HAS fund research on shorebirds in Hawai'i and elsewhere in the Pacific region.

T-shirts are $12 each, plus $2.00 per shirt for postage. They are available in medium, large, and extra large adult sizes only. When ordering T-shirts, be sure to list size and first, second, and third choice of color. To order T-shirts send your check, payable to the Hawaii Audubon Society, to Yvonne Izu, 2069 California Avenue, #20B, Wahiawa, HI 96786. Don't forget to add $2.00 per shirt for postage. Insufficient postage will delay your order until the proper amount is remitted. T-shirts are not available at the HAS office.

HAS Awards Four Research Grants

by Phil Bruner

In June the Hawaii Audubon Society awarded four research grants.

A $778 grant was presented to Candace Lutzow, for research on genetic variability in Koa trees. This research will greatly aid our knowledge of this valuable native tree. Money for this project came from the George C. Munro Fund, a special HAS fund for dryland forest research and preservation. We encourage others who would like to pursue research in dryland forests to submit applications.

Cindy Lipp received $522. Her research is aimed at a study of the ecology of *Myrica faya* (fire tree). This introduced tree is native to the Azores. It has caused much damage to native forests in Hawai'i. Ms. Lipp hopes to learn what factors can limit its invasion capacity.

Timothy Motley received $500 for reserach on the reproductive biology of the endemic genus *Labordia.* This group of plants contains 15 species scattered on several islands. Mr. Motley will attempt to determine the methods of pollination, size, and sexual composition of the population of each species and morphological variation within and among species.

All three are graduate students in the department of botany at the University of Hawai'i at Manoa.

In addition, John Strazanac received $500 to research the native *Banza* (katydids). His work will focus on the nine endemic species and will attempt to define the speciation patterns of this unique group of native insects. He is a graduate student in the department of entomology at the University of Hawai'i at Manoa.

At part of the requirements for the awards, each researcher will submit a report of their findings for publication in the *'Elepaio.*

Environmental Directory

In celebration of Earth Day 1990, the Hawaii Audubon Society published the Hawai'i Green Pages. The directory lists over 150 environmental efforts in Hawai'i. For a free copy, send a self-addressed stamped #10 envelope to Directory, Hawaii Audubon Society, 212 Merchant Street, Suite 320, Honolulu, HI 96813.

Volunteer Corner

Story and Photo by Rae Alice Hall

A "help wanted" ad in the *'Elepaio* led Christi Moore to what turned out to be the perfect volunteer job.

Christi is a word processor for the Bank of Hawaii in downtown Honolulu. The "help wanted" ad was for a word processor to work at the Audubon office, just two blocks away. Then, to make the job even better, Christi's boss at Audubon is Bob Pyle. Mr. and Mrs. Pyle, it turns out, are old friends who knew Christi's family when she was just a little girl (at that time known as Christi McKinney).

Christi signed on as a volunteer just in time to put the local Hawaii Audubon membership records onto an in-house computer system. The transition has been so successful that Christi and programmer Howard Johnston plan to do the same thing in the Fall for the members who belong to both the Hawaii and National Societies.

In addition to her work with the Membership Committee, Christi is also a member of the *'Elepaio* staff. As an editorial assistant, she puts all of the news stories and scientific articles into the computer and later helps with its distribution. She says she really enjoys being part of the publication process and has learned a lot from her work at Audubon.

HAS isn't Christi's only interest. She also has worked with the Special Olympics, charity walks, and litter cleanup campaigns. "I don't have a lot of money to donate," she says, "so I decided to give my time instead. She shows her concern for the environment in other ways, too. At her bank, she helped to establish an office recycling program, recycling paper and phone books. "Having been born and raised mostly in Oregon, recycling (especially of paper) is a project particularly dear to me," she says.

She also likes scuba diving, Hawaiian music, and the hula. She is a member of Halau Hula O Me Ke Aloha Pumehana and The Prince Kuhio Hawaiian Civic Club Choral Group. "Prince Kuhio established the Civic Club in the 1800s to raise money for scholarships for Hawaiian studies," she says. As a member of the choral group, Christi takes part in Hawaiian music and hula concerts all over the state. And that's not all. She also sings and dances hula at the Tahitian Lanai in Waikiki. When it was sold to new owners who planned to tear it down, Christi joined with a group of long-time Hawaiian singers and entertainers lobbying to have it declared an historic site.

Christi is a second generation member of the Audubon Society. Her mother (Lynn Ohm), who lives in Arizona, also is a member. Christi says, "I really like the way that Audubon gets out there and works to protect the environment and am proud to have finally found a way to take an active part."

Help Wanted! Please Sign Up

Hawaii Audubon Society desperately needs help in the following areas:

Phone Tree Coordinator. You will be responsible for maintaining the list of persons participating in the telephone tree and giving information to phone tree participants when calls need to be made. We need a self starter who is a good communicator and who can devote four to eight hours a month for a minimum of a year. This work can be done from home. Some knowledge of environmental issues and legislators is a plus. To volunteer call David Hill, 943-2784 (H).

Phone Tree Callers. We are growing a phone tree—a chain of people who can make calls to decision-makers on environmental issues. This allows the environmental community to respond very quickly with public pressure on important issues. To join our phone tree, call David Hill at 943-2784.

Testimony Presenters. Here we need self-starters who can tactfully and effectively present testimony at the legislature, county councils, and hearings of governmental boards and agencies, usually on weekdays during daytime hours. If you can't write the testimony, we will have someone else do it. A knowledge of Hawai'i, including issues, politicians, and who the players are is a big plus. A minimum of four hours a month is required. To volunteer call David Hill, 943-2784 (H).

Recordkeeper. This position, which requires you to spend one morning or afternoon a week at the office, entails integrating our membership records with our fundraising records and locating telephone numbers for all new members. The work is done manually. To volunteer call Lynne Matusow, 531-4260 (H).

Volunteer Coordinator. This hardworking, gregarious individual will match volunteers with available jobs, see that volunteers are trained, and maintain contact with volunteers to see if they are happy or have suggestions for improving things, and plan volunteer recognition events. This job will take two hours or more weekly. To volunteer call Lynne Matusow, 531-4260 (H).

Office Staff. We would like to have our office open five days a week. People are needed for morning or afternoon shifts Monday, Tuesday, Thursday, and Friday. Among the duties are answering the telephone, distributing the mail, referring problems to the appropriate officer or committee chair, filing, and responding to routine correspondence. To volunteer call Lynne Matusow, 531-4260 (H).

Writers and Editors for *'Elepaio*. If you can write stories, edit copy, and come up with story ideas call Lynne Matusow, 531-4260 (H).

The above is only a partial list. If you have a particular skill or interest, call Lynne Matusow, 531-4260 (H). Who knows, maybe we have the right opening but haven't publicized it yet.

Moving?

Please allow four weeks for processing address changes. Because our records are kept in order by zip code, we need both old and new addresses.

Hawaii Audubon Society

212 Merchant Street, Suite 320
Honolulu, Hawai'i 96813
Telephone (808) 528-1432

'ELEPAIO

ISSN 0013-6069
Managing Editor:
Lynne Matusow, 531-4260
Scientific Editor:
Fern Duvall II
Editorial Assistants:
Donna de Haan, Christi Moore, Robert Pyle
Reporters:
Rae Alice Hall, Niki Lauren
Distribution:
George Campbell, 941-1356 (H), Christi Moore, Robert Pyle, Alan Ziegler

The *'Elepaio* is printed on recycled paper.

Your Bequest Can Help

A bequest to the Hawaii Audubon Society is an excellent way to help in our conservation efforts. George C. Munro, enthusiastic and tireless field ornithologist and naturalist, provided for a fund to be used exclusively for the protection of native dry forests. Today, the George C. Munro Fund provides money for research projects on such forests.

Although an attorney should be consulted in the drafting of your will, a model clause for bequests is set forth below.

"I hereby give, devise, and bequeath to the Hawaii Audubon Society, Honolulu, Hawai'i, the sum of _____ dollars (or set forth a description of property), to be used for the general purpose of said organization."

For more information and assistance, contact the Hawaii Audubon Society, 212 Merchant Street, Suite 320, Honolulu, HI 96813, (808) 528-1432.

HAS Dues for 1992

All amounts are in U.S. dollars.
Includes delivery of *'Elepaio.*

Life Membership	**$300.00**
Payable in full or three equal installments. (The Board of Directors recently increased the amount of life dues. Those life members who are on the installment plan will be billed for their remaining payments at the old rate.)	
Delivery to U.S. zip code addresses	
Via bulk mail	**6.00**
(Not forwardable to new address)	
Via first class mail	**12.00**
(Hawai'i residents: there is no significant time difference between bulk and first class mail to addresses within the state of Hawai'i.)	
Junior Membership (18 and under)	**3.00**
Delivery to non-U.S. addresses:	
Mexico (airmail only)	**12.00**
Canada (airmail only)	**13.00**
All other countries (surface mail)	**14.00**
All other countries (airmail)	**24.00**
Introductory dues for National and Hawaii Societies:	**20.00**
(Includes delivery of *'Elepaio* and *Audubon Magazine* as bulk or 2nd class mail to U.S. zip codes. Renewal, $30 annually.)	

Scholarships Available

The Hawaii Audubon Society will be awarding four undergraduate one-year tuition scholarships of $1,340 each to Hawai'i residents attending the University of Hawai'i. These scholarships, named the Rose Schuster Taylor Scholarship, are made available by the Yao Shen Trust and are in honor of Rose Schuster Taylor. Terms of the trust require that recipients be Hawai'i residents, attending the University of Hawai'i, whose area of study is related to Hawaiian natural history, especially if it may lead to the better protection of native wildlife in Hawai'i.

Applicants should submit the following information: name, address, telephone number, class year, and explain how their academic major relates to Hawaiian natural history. They should also discuss how they plan to apply their academic degree to further study or work experience in Hawaiian natural history, how their course of study will enable them to contribute to the better protection of native Hawaiian wildlife, and if they have made contributions to the study of Hawaiian natural history, especially to anything that might contribute to the protection of native wildlife.

Applicants should attach a transcript of their college or high school records and three letters of recommendation.

Applications should be sent to Phil Bruner, Chair, Scholarships and Grants Committee, Box 1775, BYU-H, La'ie, HI 96762, telephone 293-3820 (W). The application deadline is 1 August.

Kim Receives Munro Award

Glenn Kim, a 1992 graduate of the Richardson School of Law at the University of Hawai'i, has received the George C. Munro Award for Environmental Law. The Hawaii Audubon Society established the annual award to recognize outstanding students in environmental law at the school. The award carries a cash prize of $250.

In September Mr. Kim will begin his duties as a clerk to Hawai'i Supreme Court Justice Ronald Moon.

Calendar of Events

First Monday of Every Month
Monthly meeting of the Conservation Committee, 6:00 p.m., HAS office. To join or for more information call David Hill, 943-2784 (H).

July 12, Sunday
Board meeting, 1:00 p.m. Call Reggie David on Hawai'i, 329-9141 (W), for details.

July 19, Sunday
Ko'olau Poko Trail. This three mile stretch of trail in Maunawili was recently completed by the Sierra Club for the Hawai'i State Department of Land and Natural Resources. It will be part of a larger trail system along the Ko'olau Mountains' windward side. Come with us and be the first to find out what birds are there. Everyone is to meet at the State Library on Punchbowl Street at 7:30 a.m. For more information call Casey Jarman, 956-7489 (W). Suggested donation: $2.00.

August 17, Monday
General meeting, 7:30 p.m., Paki Conference Room, Bishop Museum. Refreshments will be served. For more details see the August *'Elepaio*.

August 23, Saturday
On this trip for swimmers only, we will escape from the summer heat into the colorful, enchanting undersea world of Hanauma Bay. After learning about the bay's geology, natural history, and marine life, we will don our snorkels, masks, and fins and enjoy the beauty of life on the reef. Meet at the State Library on Punchbowl Street at 7:30 a.m. or the tram stop above the bay at 8:00 a.m. This is a good outing for children as well as adults. Suggested donation: $2.00.

September 12, Saturday
Hakalau Wildlife Refuge, Big Island. For information and reservations call Casey Jarman, 956-7489 (W). This trip is limited to 25 persons. Be sure to clean your boots and daypacks thoroughly to prevent introduction of unwanted plants (e.g. clydemia). Bring lunch, water, binoculars, rain gear, clothing for 50° temperatures. Suggested donation: $2.00.

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