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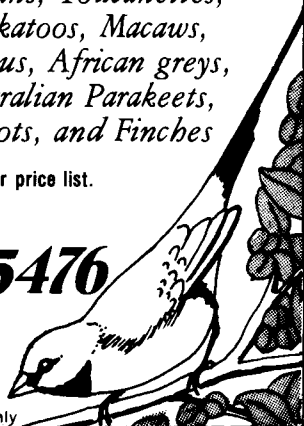
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trouble in paradise the Hawaiian crow

By Kristin Buhl
Scottsdale, Arizona

The Hawaiian Islands arose from the sea through volcanic action and were subsequently inhabited by unique flora and fauna over a period of 10 million years. The delicate balance of the islands' small ecosystems was disrupted, however, when the first humans arrived, about 1,000 A.D. These Polynesian settlers began the decline of many Hawaiian birds by altering the environment through farming and the introduction of exotic plants, animals and insects.

As small numbers of settlers arrived sporadically their disturbance to the insular ecology was relatively minimal. As the population grew, however, human activities and impact increased, causing drastic and irreversible alterations. Edible plants naturally occurring on the islands were few, so tracts in the lowlands were cleared by fire for agriculture and habitation. Streams were diverted for irrigation. Domestic animals (dogs, pigs, and junglefowl) and plants such as yams, bananas, breadfruit, and taro were brought with the settlers. Others were also established inadvertently, such as weed seeds, lizards, and insects. Many of the colorful species of forest birds were hunted for their feathers to adorn capes and helmets for Polynesian cultural traditions.

In the world today species are threatened most commonly by habitat destruction, such as forest clearing, wetland drainage, livestock grazing, etc. Hawaii's birds face not only these problems but a myriad of others as well. Hundreds of introduced plant species have become widespread pests competing with native plants; some, such as Fountain grass, create fire hazards to forests as well. Man introduced exotic birds that became established and now compete with the indigenous populations for territory, food and nest sites. More incidiously, they are carriers of disease. Mammals and mosquitoes, however, have caused the most devastating effects by far.

Only two mammalian species are endemic to Hawaii—the Monk seal and a

species of hoary bat. All mammals currently inhabiting the islands were introduced deliberately or accidentally, and thus have no natural predators. The list is long: rats, pigs, goats, cats, mongooses, dogs, deer, sheep, wallabies, horses, and cattle. European sailors on early visits to the islands released sheep, goats, rabbits, and pigs so that on return visits they would be able to hunt and have fresh meat. Rats were unintentionally introduced; they vacated sailing vessels when in port. Rats quickly became serious agricultural pests, particularly in sugar cane fields. To save his crops, man intervenes with a scheme to introduce another mammal—one that would prey on the rats. The Indian mongoose was thus introduced from Jamaica. There was, however, a serious flaw in the plan: the mongoose is diurnal; the rats basically nocturnal. The mongoose does particularly relish birds and their eggs in its diet.

Introduced birds carrying avian pox and malaria were not a direct threat to native species until mosquitoes, vectors of those diseases, were introduced from ships' water barrels.

Evolving over millions of years without mammalian predators, native populations of many species of birds continue to be devastated by the introduced predators: mongooses, rats, pigs, dogs, cats and man. Grazing mammals destroy the native flora, often devouring seedlings of established plants, interfering with the natural cycle of reproduction; the mature plants are not being replaced by new generations. Pigs living in the forests disturb the vegetation when rooting about for edibles. In their foraging they leave tree fern stumps, which collect water and serve as ideal mosquito egg sites. Unfortunately ground-nesting birds and their eggs are also items in the pigs' diet.

Birds inhabiting islands generally have small populations and restricted ranges, and so are particularly vulnerable to outside disturbances and introductions of alien animals and plants. This is a com-

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One of the crow pens at the Endangered Species Project at Pohakuloa, Hawaii: 25' x 50' x 12'.

mon situation for insular environments universally. By the time the first European arrived in the Hawaiian Islands (Captain Cook in 1778) 25 species of birds had already become extinct; 29 species or sub-species are currently endangered.

Realizing the precarious situation of many Hawaiian birds, the Territorial Government of Hawaii set up a captive breeding facility in 1949 at Pohakuloa on the "Big Island" (Hawaii), which has since become a large complex of pens on 5 acres of land. The Endangered Species Project is located half-way up Mauna Kea, a 13,784' snow-capped mountain opposite Mauna Loa a 13,680' mountain and active volcano. The Project is manned by a staff of two full-time State employees, Ah Fat Lee and Clyde Saragosa. Three species of endangered native waterfowl are being propagated there: the Koloa duck, Nene goose, and Laysan teal, as well as a severely endangered passerine known as the 'Alala (Hawaiian crow). Prior to their establishment at Pohakuloa, captive 'Alala, were maintained at Volcanoes National Park under the auspices of the United States Fish and Wildlife Service.

A little smaller in size and browner in color (as opposed to purplish feather gloss) than the common North American crow, the 'Alala (*Corvus tropicus*) is now found only in limited segments of its original ranges of montane rain forest on the Big Island. The estimate for the wild population of crows is 30 to 40 individuals. Unfortunately, the factors causing their decline are still actively affecting them or even accelerating. Much of their dense forest habitat continues to be converted to grazing land by logging, bulldozing, and burning. Pigs, rats,

mongooses, and feral dogs and cats prey upon nestlings which have fallen from the nest and fledglings that tend to sit placidly on the ground or low perches.

The once numerous 'Alala has also been shot and occasionally still is. When encountered in the wild, the 'Alala is typically heard before it is seen; being curious and relatively unwary it doesn't always flee from human presence.

There is currently no habitat set aside as sanctuary for the crow. Much of the remaining 'Alala habitat not privately owned is under lease for cattle grazing. Rather paradoxically, the land is rented from the State of Hawaii's Department of Land and Natural Resources (DLNR), the same organization running the Endangered Species Project. The DLNR is also responsible for game management,



Sometimes the instinctual attraction to a red mouth prompts one sibling to feed another. Begging behaviors continue in young 'Alala up to one year of age and (modified) in adult breeding females.



Although Kolohe was salvaged from the wild she seems more imprinted on humans than the 3 crows hand-raised from the egg. Full of curiosity, she always follows the keeper; if the keeper stops abruptly Kolohe rolls onto her side and "boxes" wildly with her feet.

Photo by Paul Banko



Wild 'Alala nestlings. Wild 'Alala nests are constructed of twigs and lined with grasses, built usually in Ohia trees.

providing hunters with sustained huntable populations of pigs, goats, sheep, deer, and many introduced species of game birds, such as Chukar, California quail, Kalij pheasant, and Turkey.

The DLNR is currently the only organization maintaining captive 'Alala and is actively trying to propagate them. The cooperative efforts of the Pohakuloa staff, field biologists, concerned DLNR employees, and various federal agencies may not be enough for successful propagation of the 'Alala. Such critical issues as sanctuary establishment and increasing the captive breeding population need immediate resolution.

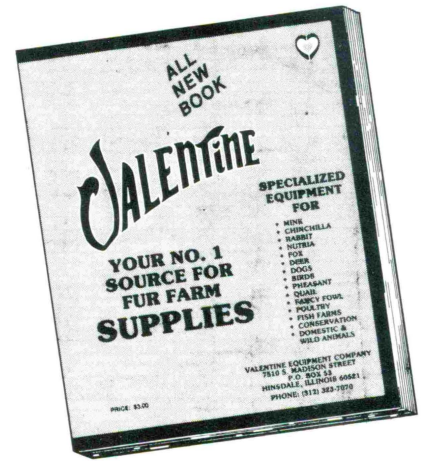
The Phoenix Zoo is embarking on a small research project complementary to Hawaii's Endangered Species Project. Studies will be made of the reproductive cycles and habits of captive North American crows to test the possibility of using them as surrogate parents in preference to hand-rearing 'Alala (to reduce the possibility of imprinting).

I was fortunate to be hired by the DLNR to work at Pohakuloa from March through July, 1982. The purpose of my employment was to artificially incubate eggs and hand-raise any crows hatched at the Project or salvaged from the wild as well as advise on any overall improvements. Of the eight crows housed there, only one pair (Umi and Luukia) were

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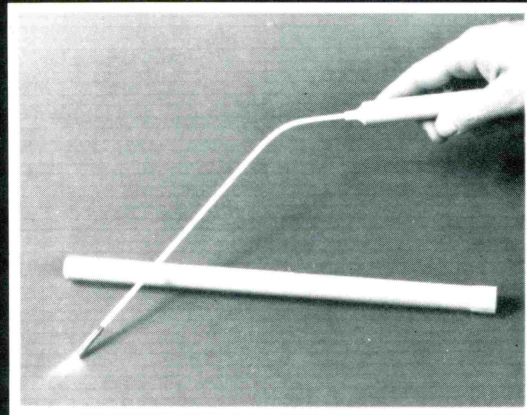
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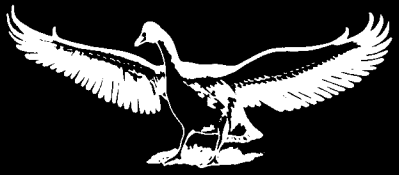
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potential breeders. Mana and Hiialo were adult females whose mates had died in previous years. Kolohe, Keawe, Lani and Kelii were hatched in 1981, and so not yet old enough for breeding.

Kolohe was one of two fledglings with avian pox that had been salvaged from a wild nest (only Kolohe survived). Keawe, Lani and Kelii were Umi and Luukia's 1981 offspring. Their eggs were transported to the Honolulu Zoo on Oahu where they were artificially incubated. The hatchlings were hand-raised by Peter Luscomb, Zoo animal technical/bird section of Honolulu Zoo, then returned to Pohakuloa.

PRONUNCIATIONS

Umi Oo mee
Luukia Loo oo key ah
Mana Mah nah
Hiialo Hee ee ah low
Keawe Kay ah vay
Kelii Keh lee ee
Lani Lah nee
Kolohe Koh low hay

The eight crows at the project are housed in four aviaries of heavy gauge poultry netting, 25' x 50' x 12' with visual barriers and wind breaks on certain sides. The two single females are housed separately, the pair occupies one aviary, and the four youngsters are together in another aviary.

Being omnivorous, they are fed a high protein smorgasbord in the morning, consisting of trout and puppy chows, mealworms, goat meat, hard-boiled egg, panini (prickly pear fruit), papaya, peas, grapes, cherries, ohelo berries, apple, grated carrot, watermelon, and kukaine berries. Day old chicks are fed in the afternoon. Meat items, egg, and panini were favored. The diet is to be revised for seasonal variations and to avoid any excess of protein. In the wild adults commonly prey upon passerine nestlings, but only during breeding season. A nectar substitute is being considered, as nectar forms a large portion of their diet in the wild.

Umi and Luukia began nest construction in April, using a wire basket in a secure corner of the cage (same as used in 1981). Fresh-cut Ohia trees were placed in various locations about their aviary; both male and female tore off branched twigs and constructed a nest in the basket, then lined it with fine grasses. Even from the beginning of construction, with nearly each new visit to the nest the female shaped the cup of the nest by pushing her breast against the edge and "treading" the twigs behind and under her while rotating her position. We were able to observe the pair's

activities at the nest without disturbing them by using a closed circuit TV camera, fixed about 4 feet from the nest. Segments of their nesting behavior were also taped to have a record of behavioral patterns.

By mid-May the nest was completed and egg laying seemed imminent, judging by the amount of time the female spent in brooding position. One day, however, Luukia had abandoned the nest and appeared out of sorts. A suspected egg bound condition was disproved upon examination, and so antibiotics were administered for a possible infection. Nesting gradually resumed, but she appeared to be ill again about a week later. She was treated with a different round of antibiotics and within a few day seemed to resume normal health and behavior. On her third bout with the problem a few days later, Dr. Calvin Lum, Honolulu Zoo's General curator/veterinarian was flown over from Oahu to perform a laparoscopy to determine if there was a physiological problem. The laparoscopy revealed that her ovary was adhered to her air sac, with a foaminess surrounding the affected area. Corrective surgery was performed, and the ovary dropped down into a more normal position. Luukia quickly recovered and she and Umi resumed nesting activity. No eggs, however, were produced in the 1982 breeding season.

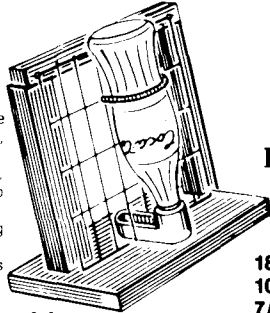
As male and female crows are not sexually dimorphic, except possibly males being somewhat larger, laparotomies were performed by Dr. Lum on the four fledglings so that pairing with unrelates for the 1983 breeding season could be figured. Kolohe and Lani were females; Keawe and Kelii are males. Without more captive specimens, however, the genetic pool is an acute problem. With an estimated population of less than 40 individuals, it is already critical in the wild. Most authorities claim a minimum breeding population of 50 individuals is necessary to prevent inbreeding.

The Hawaiian crows' survival problems are caused by the combination of numerous factors: habitat destruction, predation, disease (fowl pox and avian malaria), parasites, hunting, and natural reproductive failure (infertility and high nestling and fledgling mortality rates). The limited captive population at Pohakuloa is barely a beginning in the efforts to amend this species' situation. Collection of wild nestlings and fledglings, captive propagation, sanctuary establishment, and public awareness are crucial if another of Hawaii's unique birds is not to be allowed to die out from man's inability to co-exist. ●

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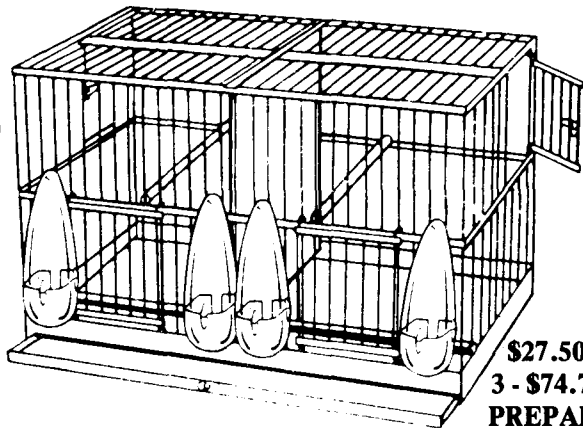
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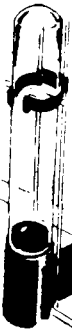


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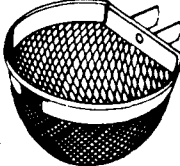
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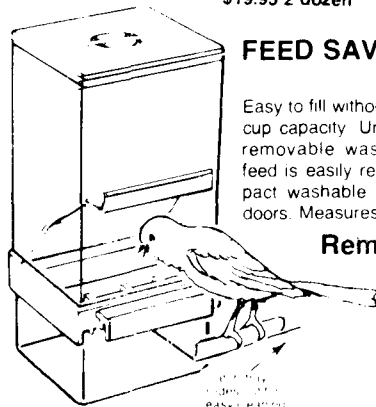
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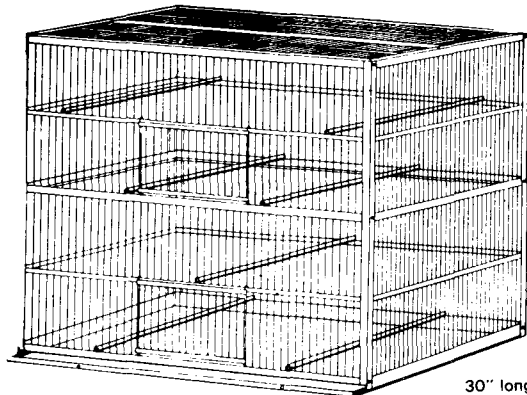
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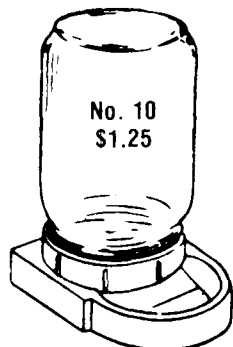
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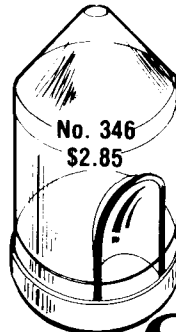
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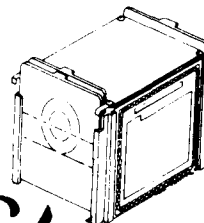
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