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Ecosystem Effects of Collecting Marine Aquarium Fish from the Wild

This is an excerpt from Pacific Fisheries Coalition's April 2004 publication, "The Marine Aquarium Trade in the Western Hemisphere and the Indo-Pacific Region - Impacts on Coral Reef Ecosystems and a Summary of Governing Legal Instruments and Policy Options" by Kim Boggiatto and Alison Rieser of the University of Maine School of Law, and Kim Moffie and Linda Paul of Hawaii Audubon Society's Pacific Fisheries Coalition. Copies of the entire publication will soon be available by contacting the HAS office.

Coral reefs provide habitats for a wide range of marine organisms with complex life histories linked together in complicated food webs (Alcala 2001 at 42). Even the smaller reef species taken for the aquarium trade may be long lived and late maturing, with slow growth and low reproductive rates (Sadovy and Vincent 2002 at 407). Preferences for particular sizes, color forms, or rarity can produce extremes in selective harvesting. (Sadovy and Vincent, 2002 at 394) Animals that are between 2-10 cm in length are the most popular (Id.). Taking juvenile fishes or male wrasses because of their distinctive coloring can cut off the reproductive cycle. Removal of significant numbers of particular species of sub reproductive reef fish for the aquarium trade can interrupt food chains, cause reproductive failure and alter habitat. Because of this there is a concern that the continued removal of marine ornamental organisms will not only impact target species, but will also have irreversible effects on components of the entire ecosystem (Friedlander, 2001). For example, removal of large numbers of herbivores such as the yellow tang can cause reef areas to be overrun and smothered with algae. The removal of cleaner fishes may result in higher parasite load on other reef fishes. The removal of coral and live rock can destroy reef habitat.

Yellow tangs, longnose butterfly, multiband butterfly, ornate butterfly, and goldring surgeonfish found in a dumpster in Kona, Hawai'i. Evidence of high mortality rates after collection.

In addition to the ecosystem effects of harvesting fish for the aquarium trade, there has been considerable concern about destructive practices associated with this harvesting. These include the uses of poisons and explosives to harvest fish, and damage to coral during collecting (Lubbock and Polunin, 1975; Wood, 1985; Randall, 1987; Johannes and Riepen, 1995; Young, 1997). Corals are often broken off to harvest aquarium species and the use of cyanide to capture these species can also lead to the eventual collapse of reef structure necessary to many reef organisms. Another concern is the alien introduction of aquarium species as a result of accidental or intentional release outside their original geographical range (Sadovy and Vincent 2002). The two major ecological problems with the current regulation of marine ornamental collection in Hawai'i are the lack of information on the impact of the collection of rare and endemic organisms, many of whose populations have been decimated by over-collection and are in strong need of protection (Gulko, pers. comm.), and the complete lack of recognition of trophic significance and life history stages in regulations regarding take of marine ornamentals. In 1998, a group of Hawaiian reef experts were brought together by the DLNR to discuss the state of Hawaiian reef species and recommend those that should be investigated as to the need for increased protection. This group came up with a list of twenty-six species, most of which were endemic, that they felt needed some form of immediate protection. The majority of species on this list were targeted by the marine ornamental trade; in fact, for a number of the species, the only known impact was marine ornamental collection. With overall coral reef endemism rates approaching 25% (Gulko, 1998), there is no replacement pool for many of the targeted species should over collection or a habitat shift occur as a result of the marine ornamental trade.

While strong rules protect against the use of destructive gear and methods for food fishing in Hawai'i (DLNR, 2003), such controls are minimal in the marine ornamental trade; for example, many of the benthic invertebrates collected (featherduster worms, crabs, shrimp, brittle stars, sea urchins, anthozoans, etc.) involve destruction or alteration of live rock and coral to gain access (something which is against existing Hawai'i State law), but is completely ignored when considering limits on collection

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Field Trips for 2004

All trips with an * are still in the process of being planned. Details will be provided as the scheduled dates get closer. A donation of $2 per participant on all field trips is appreciated. Field Trip information is also available on the HAS office answering machine (528-1432) and on our website, <www.hawaiiaudubon.com>

Sunday, May 16th 10:30am Ka'ena Point hike. See Laysan Albatross chicks and other seabirds, lots of wild beauty, and Native coastal plants. Wear shoes appropropriate for hiking and bring binoculars, sunscreen, lots of water, and lunch. We will meet at the parking lot at the end of the road on the Mokuleia side. Remember not to leave anything valuable in your car or trunk. Call the HAS office to register – 528-1432.

Saturday, June 12th Sierra Club Service Trip at Marine Corps Base Hawaii. Remove invasive mangrove trees in fish ponds and improve habitat for Hawaiian stilt nesting. In addition to seeing wetlands birds as you work, there's a good possibility of a birdwatching treat trip afterwards. Call Annette for information and reservations at 235-5431. Must be registered before June 10th due to MCBH security procedures.

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June 21st Program Meeting: Introduced Parrots, Part II

Nick Kalodimus returns to speak on introduced parrots - further information on research and observations of feral parrots on O'ahu. Nick is a graduate student in geography at University of Hawai'i Manoa and is also an avid birdwatcher.

Program meetings are held from 7:30 to 9:30pm at Henry Hall Room 109 on the Chaminade University campus, 3140 Wai'alae Avenue, Kaimuki. Refreshments are served, and HAS products and publications are available for purchase.

Kilauea Point Natural History Association Dan Moriarty Memorial Scholarship 2004 – 2005 Application

The Kilauea Point Natural History Association annually awards a scholarship in the memory of Dan Moriarty, an outstanding environmental educator and conservationist. Dan played a major role in fostering a strong conservation ethic in the community, an ethic which continues to this day. The award, up to $3,000, is applied directly to college or university expenses.

Students studying in the broadly defined fields of botany, zoology, natural history and related subjects concerning the Hawaiian environment are encouraged to apply. The fields of wildlife management, interpretation, conservation and environmental education are also included.

To be eligible, the student must have been a resident of Hawai'i within the last five years, be accepted or enrolled in a four-year college or university, and have maintained a grade point average of 3.0 or better.

Preference will be given to upper-level undergraduates (junior or senior), although both lower level and graduate student applications will be accepted. The preferred student would be from Kaua'i (not a requirement) and have demonstrated community service in environmental projects and/or participating membership in environmental clubs or organizations.

Please contact the HAS office for an application (808-528-1432 or hiaudsoc@pixi.com or write to Kilauea Point Natural History Association, P.O. Box 1130, Kilauea, HI 96754-1130.

Photo Exhibit at Bishop Museum

"The Hulahula Arctic Birthlands, A photographic journey" by Subhankar Banerjee and Robert Thompson on display in the Hall of Discovery. Photos from a 4,000 mile trek across the Arctic National Wildlife Refuge in Alaska. The refuge is home to some of Hawai'i's migratory birds. The photos will be at Bishop museum from April 24 through August 1.

There is also a talk at Bishop Museum on May 13 at 4:00 pm at the Paki Conference Room on Zoological Taxonomy. Dr. Neal Evenhius will astonish the audience with a presentation on the profession of naming the world's animals.

of these organisms. From a benthic perspective, many of the fishers collect a wide range of organisms from a wide variety of habitats employing a wide variety of techniques, many of which are specific to the organisms being targeted. Furthermore, minimum sizes are used for collection of a wide variety food fish species in recognition that removal of pre-reproductive fish and invertebrates can severely affect viability of the population as a whole, yet such standards are completely absent for over 350 species of Hawaiian organisms collected for the marine ornamental trade. The result is that the Hawaiian marine ornamental trade represents a relatively small fishery that has wide ranging impacts across a wide spectrum of trophic levels and habitats disproportional to either its economic value or its number of participants.

Because aquarium fish collectors are highly selective and often capture large quantities of individuals of high value, the potential for overexploitation is high (Wood, 1985). Species of interest to the aquarium trade are often absent or in low abundance in areas frequented by collectors (Albaladejo and Corpuz, 1981; Wood, 1985; Tissot and Hallacher, 1999) The enormous increase in the trade of marine aquarium species has led to questions about the long term sustainability of this industry (Friedlander, 2001). If harvesting effort continues to increase, growth and recruitment will not be able to keep up and aquarium stocks will decline, just like any other fishery.

A black longnose butterfly, endemic to the island of Hawai'i in the Hawai'i Island chain. Vulnerable to becoming overexploited.

Furthermore, there is a common misconception that fish populations will always recover when fishing pressure is released. Recovery has occurred in many cases, but in other cases it has not, even after many years. Over a hundred tons of black-lipped pearl oysters were removed from Pearl and Hermes Reef in the Northwestern Hawaiian Islands in 1927 and then harvesting ceased. The population has never recovered. A newly discovered pinnacle (Hauto Reef) off the northwest coast of Guam was fished down in 1967 and it has yet to recover. Even effectively enforced no-take marine reserves may not bring back a population if so many individuals were taken that the species can no longer successfully spawn (Birkeland and Friedlander 2002).

Marine Reserves

Marine reserves have been defined by the National Center for Ecological Analysis and Synthesis (NCEAS) as "areas of the sea completely protected from all extractive activities" within which "all biological resources are protected through prohibitions on fishing and the removal or disturbance of any living or non-living marine resource, except as necessary for monitoring or research to evaluate reserve effectiveness" (NCEAS 2001 Consensus Statement). In February 2001 the members of the NCEAS Working Group on Marine Reserves issued a Scientific Consensus Statement on Marine Reserves and Marine Protected Areas. The Statement was signed by 161 leading marine scientists and experts on marine reserves, all of which held Ph.D. degrees and were employed by academic institutions. They achieved consensus on following ecological effects within reserve boundaries:

1) Reserves result in long-lasting and often rapid increases in abundance, diversity and productivity of marine organisms.
2) These changes are due to decreased mortality, decreased habitat destruction and to indirect ecosystem effects.
3) Reserves reduce the probability of extinction for marine species resident within them.
4) Increased reserve size results in increased benefits, but even small reserves have positive effects.
5) Full protection (which usually requires adequate enforcement and public involvement) is critical to achieve this full range of benefits.

Reserves are particularly well suited to restoring populations of fish in areas where multiple species have been harvested (Conover, Travis and Coleman 2000). Since a variety of marine aquarium species are collected from a given area, reserves seem to be well suited to restoring populations of these species. The benefits of marine reserves to protect coral reef biodiversity have been documented in the Netherlands Antilles, Belize, St. Lucia, the Philippines, Ecuador, Kenya, Florida, and Hawai'i, to name but a few (Russ 2002; Alcala 2001; Friedlander 2001; Roberts and Hawkins 2000). A ban on aquarium fish collecting in new marine reserve areas on the Kona coast of the island of Hawai'i has led to an increase in their populations, including yellow tangs, the most sought after Hawaii aquarium species (William Walsh pers. com. 2003). Yellow tangs may live for as long as 20-30 years, but like most long-lived fish, may not begin to reproduce until they are several years old. In fact, very little is known about the reproductive life history and size-at-first-reproduction for most of Hawai'i's aquarium fishes (Longenecker 2003) (See Annex 1 of this report.

Although reserves are relatively new to the fishery management literature, the idea of fishery closures, or kapus, is not new to the traditional resource management practices of Hawaiians (Gulko et al. 2000, 36). Restrictions on harvesting were based on times and places so as not to interfere with important processes such as spawning (Titcomb 1972; Friedlander et al. 2001) When fishing is effectively controlled by a traditional Hawaiian community, the catch is well over twice that of unprotected or partially protected areas and equal to that of fully protected reserves (Birkeland and Friedlander 2002). A number of Marine Life Conservation Districts (MLCDs) in Hawai'i, where fishing is prohibited, have been shown to be effective at increasing fish stocks, while Hawaiian MLCDs with less restrictive management have not significantly benefited fish stocks. In 2000,

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"functional no-take areas account[ed] for only 0.3% of coastal areas in state waters" (Gulko et al. 2000). Section IV.M. of this report discusses the Fishery Management Areas(FMAs) established by Act 306 and the West Hawai"i Aquarium Project study of these FMAs.

Aquaculture

Aquaculture may provide a partial solution to the environmental problems associated with the collection of wild marine aquarium species. Currently, approximately 98% of the marine aquarium organisms traded is collected from the wild (MAC 2003d). In international trade, 90% of freshwater species are farmed compared with 10% collected in the wild. (Oliver 2001). Marine aquarium fish are considerably more difficult than their fresh water counterparts to successfully culture (Wood 2001, 45). The difficulty begins with inducing marine aquarium fish to breed in captivity and continues until the larvae become juveniles (Id.). Once the juvenile phase is reached, most fish are relatively hardy (Id.). The price of cultured fish is higher than wild-caught fish, but the life expectancy and quality are also higher for cultured fish (Oliver 2001, 19). They rarely have parasites or diseases found in the wild and are easier to feed because they are accustomed to artificial chow. These qualities make cultured fish better able to thrive in the aquarium setting and during transfer and transport along the chain of custody. Researchers now know how to reproduce in captivity more than 30 species of marine aquarium fishes and the number is growing.

Potter's Angelfish, endemic 46% decline natural # fish/acre:76 #fish/acre collected:35

While aquaculture will help reduce the ecosystem-altering effects caused by harvesting masses of aquarium fish from the wild for the home aquarium trade, there are some potential problems that can stem from this industry. One of the unexpected environmental problems with such aquaculture efforts has been the impact of alien species aquaculture done in areas with native coral reefs. Cultured non native species or genetically-altered species can escape into coastal ecosystems where they can breed with native species, introduce pathogens and parasites into wild populations, alter ecosystems and affect water quality. In 2003 the Pew Oceans Commission recommended the adoption and implementation of new national and regional marine aquaculture standards to limit the negative impacts of aquaculture activities on marine ecosystems. They also recommended expanding and improving marine aquaculture research with a focus on ecologically sustainable aquaculture practices. In addition, they recommended a moratorium on the cultivation, marketing, and importation of live, genetically engineered marine or anadromous species until an adequate regulatory review process is in place (Pew Oceans Commission 2003).

The viability of commercial culture of a fish species requires a high value, a high demand and it must be relatively easy to culture the species in large numbers (Oliver 2001, 19). The clownfish, a damselfish also known as the anemonefish made famous by the Disney-Pixar movie "Finding Nemo," is the best example of successful culture of a marine aquarium fish, but also dottybacks, jawfish, basslets, and a few species of gobies are also being commercially cultured (Id.). Research has been undertaken to culture yellow tang, flame angel and clown coris as well as invertebrates in high demand such as the feather-duster worm (Id.). A Taiwanese company has cultured the yellow-banded angelfish and the Arabian angel in sufficient numbers to be potentially commercially viable (Id. at 46).

The number of marine aquarium species that can be economically produced on commercial farms today is limited, but growing. Although there are a number of small-scale culturists (Moe 2002), there are only about five aquaculture "farms" mass producing marine aquarium fish (Oliver 2001, 19). Aqualife Research, the first farm to produce marine aquarium fish commercially, was established in 1973 (Id.) by Martin Moe in Florida (Ogawa and Brown 2001, 154). It relocated to the Bahamas in the 1980s (Id.), and is producing over 100,000 marine aquarium fish each year for export to the United States (Id.). This company cultures several species of clownfish and gobies (Id.). C-Quest, located in Puerto Rico, is the largest aquaculture facility for marine aquarium fish in the world with the capacity to produce approximately 1 million fish per year (Id.).

In Hawai'i the scientific and economic feasibility of culturing both marine and freshwater aquarium fish have been studied since the 1970s (Id. at 163-64). The Oceanic Institute, the Hawai'i Institute of Marine Biology and the Waikiki Aquarium have experimented with ornamental reef fish aquaculture. The Waikiki Aquarium maintains 74 species of stony corals from Fiji, Solomon Islands, Palau, Guam, and Hawai'i. "Cuttings" from these corals are available to other public aquaria and researchers. In 2002 the Oceanic Institute succeeded in raising the ornamental flame angelfish in captivity. The Institute is also working on culturing the yellow tang and the Potter's angelfish. All three species are native to Hawai'i. On the island of Moloka'i live rock is being cultured in an ancient Hawaiian fishpond (Ritte, pers. com. 2003). On the island of Hawai'i, one commercial company is culturing and selling non native Hippocampus spp. seahorses (all Hippocampus spp. are now listed on Appendix II of CITES), Banggai cardinalfish native to Indonesia, and red volcanic shrimp (Halocaridna rubra) (Ocean rider, inc.). Another is selling cultured marine mollusks, brittle stars, bristle worms, spaghetti worms, and algae, including gracilaria spp, caulerpa spp., halimeda sp., ulva sp., and coralline algae cultures (Indo-Pacific Sea Farms). A third company is working on culturing non native soft corals.

One of the major impediments to successfully culturing marine aquarium fish is the lack of an adequate food source for larval rearing (Id. at 166). Another impediment is the lack of methods that adequately maintain water quality during larval rearing (Id.). In addition more research is needed regarding natural and artificial methods of spawning (Id. at 167).

The mild climate and good water quality of Hawai'i provide ideal conditions for establishing an ornamental aquaculture industry. Year-round culture of tropical ornamentals can be accomplished in Hawai'i without the threat of winter frost that occasionally occurs in Florida. The availability of broodstock, shipping and distribution considerations, and interest in both the business and technology of marine ornamentals favor the devel-

opment of marine ornamental fish aquaculture (Id.). Hawai'i has the potential to become not only a major producer of commercially-cultured marine aquarium organisms but stimulate the growth and development of a new market in the aquarium fish industry as well (Id. at 157).

While the aquaculture approach may be beneficial because it may reduce the collection of species from the wild, evidence exists both from Hawai'i and elsewhere as to wide-ranging negative impacts if aquaculture activities end up introducing non native organisms into coastal ecosystems (Gulko & Montgomery, in prep). With the relatively recent increase in national funding supporting the aquaculturing of marine ornamental species in Hawai'i, this funding should not be used to support the culturing of organisms alien to Hawai'i's marine environment. As of 2003 there were already over 350 alien aquatic organisms established in Hawai'i's marine and fresh water ecosystems.

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Wild Bird Rehab Haven

Wild Bird Rehab Haven, a newly formed non-profit dedicated to the care and release of Hawai'i's injured, sick and orphaned wild bird population is seeking funding and volunteers to help found Hawai'i's first wild bird rehabilitation center. Volunteers are needed for fundraising, wild bird care (State and/or Federal Wildlife Rehabilitators' licenses must be obtained by each individual), grant writing and research, and publicity. Individual members who for years have been networking and caring for birds in their own homes recently located a house rental on 1.8 beautiful acres in Wai'anae formerly used as a veterinarian clinic. Wild Bird Rehab Haven hopes to begin operations in late Spring. Recommendations for other potential sites (a private house with yard and supportive neighbors) closer to Honolulu are also welcome. Donations are appreciated (and tax deductible). Checks can be made payable to Wild Bird Rehab Haven, 2462 Kuhio Ave., #411, Honolulu, Hawai'i 96815. For more information, please call Linda Leveen at 808-923-6034.

HAS Awards for Student Research

By Wendy Johnson, Education Committee Chair

Hawaii Audubon Society presented two awards for outstanding research relating to Hawai'i's natural history at the 47th Hawai'i State Science and Engineering Fair. In early April representatives of Hawaii Audubon Society's Education Committee joined other agency judges in studying the exhibits and interviewing students on the subject of their original research.

Brandon Estrella from St. Joseph High School in Hilo received the HAS Senior Division Research award for his project entitled "The Biodiversity of Endophytic Fungi in a Kipuka." Working in an isolated kipuka off the Saddle Road at the 2,000 foot elevation on Mauna Kea, Brandon collected leaves from nineteen different endemic and indigenous Hawaiian plants. Experimental investigations took place in the laboratory where Brandon cleaned and cut open the leaf stems, removing plant tissue which was then carefully cultured in media favorable to the growth of endophytic, or internal, plant fungi. After allowing the cultures to grow, Brandon identified four dominant species of fungi and over forty total species growing inside native plant tissues. Few studies on this topic have been conducted on Hawaiian plants, but in comparison to botanical studies from other locales, Brandon found that the number of endophytic species in Hawaiian plants indicates a very high rate of fungal biodiversity. These unique findings add another important factor in support of the conservation of Hawai'i's native plants.

The HAS award for outstanding Junior Division Research relating to Hawai'i's natural history went to a project submitted by Keala Martins-Keli'iho'omalu, a seventh grader at Kamehameha Schools in Kea'au on the island of Hawai'i. Keala designed a series of tests to answer the experimental question: "Do Stinging Nettle Caterpillars Have Predators in Hawaii?" Stinging nettle caterpillars from Asia have been found in the Hilo area since 2001 and are already doing significant damage to nursery plants and food crops there. Keala introduced possible predators to the caterpillars under controlled conditions and discovered that most predators were hurt and repelled by contact with the insects' spines. Only the coqui frog, another alien pest species, was able to prey on the caterpillars. Keala's work clearly illustrates the complexity of dealing with introduced pest species. She developed a first-hand understanding of the fact that most control mechanisms, from predators to poisons, present new problems for Hawai'i's ecosystems.

The HAS award for outstanding research in the Junior Division went to Keala Martins-Keli'iho'omalu.

Brandon J. Estrella received the HAS award for outstanding Senior Research relating to Hawai'i's natural history.

Kamehameha Schools Tests Aerial Rodenticide Drop

Kamehameha Schools tested an experimental aerial application of rodenticide pellets in the Keauhou, Ka'u forest in August to study the feasibility of controlling feral rat populations in hard-to-reach sections of one of Hawai'i's most pristine native forests.

Rats are a primary culprit in the decimation of Hawaii's native bird populations and the extinction of several species. As part of the study, wild pig populations in the area were also monitored.

After the Keauhou drop – which consisted of a single application over an area of roughly 750 acres of Kamehameha Schools land – 240 rats and 71 mice were confirmed killed by the rodenticide within the first two days of the drop. In addition, 12 wild pigs were found dead in the test area. The inadvertent animal deaths were immediately reported to health, forestry and wildlife officials.

"Kamehameha Schools regrets the inadvertent loss of the pigs in this situation," said Robert Lindsey, Kamehameha's Hawai'i Island Region manager. "While we do work with the local hunting community to control wild pig populations on our land, our target in this case was the rat. The lessons we learn from this incident should be of value to all of us as we develop safe and effective tools to help control pests, and to manage our forests to the benefit of future generations."

Use of the rodenticide had been allowed under an Experimental Use Permit (EUP) issued to Kamehameha Schools by the US Environmental Protection Agency in May 2003. Dropping rodenticide pellets by air is a methodology used successfully in New Zealand and on the Channel Islands off the California coast. However, aerial applications are not yet widely allowed in Hawai'i. The aerial application in Keauhou was permitted as part of the EUP. Results from this experiment are of great interest to bird and forest conservation groups and other Hawai'i landowners, including the state and federal governments, as a potentially effective, efficient method of controlling feral rat populations in highly sensitive areas.

The discovery of the pigs came as a surprise to researchers since the active ingredient in the pellets, diphacinone, is considered safe for large mammals. In fact, diphacinone was originally developed – and is still used -- as a blood-thinning agent for humans. Prior laboratory tests of diphacinone on domestic pigs had not resulted in any animal fatalities. Tests and follow-up study have confirmed that the pigs died from eating an excessive amount of rodenticide pellets. Preliminary conclusions are that the consumed pellets were either raided from bait boxes, foraged from the forest after the aerial drop, or foraged from the test staging area.

In addition to the devastating impact rats and other rodents have had – and continue to have – on Hawai'i's native birds, they are also a major contributor to retarding the natural recovery of native forest and grass species. Rats and mice forage on the seeds and young sprouts of native trees and other plants, reducing or eliminating the natural seed stock available for forest and grassland regeneration. Rats are also considered a major vector in the spread of leptospirosis in Hawai'i.

KS Press release dated April 26, 2004. Contact: Kekoa Paulsen, 808-523-6369

Field Trip Report: Kahuku Dunes Shoreline Hike with Phil Bruner

By HAS Board member Arlene Buchholz

A large group assembled in the Kahuku golf course parking lot on Saturday, March 27 to join the Hawaii Audubon Society hike from Kahuku to Turtle Bay led by Phil Bruner. The hiking group included a range of bird and nature watchers from 4 years old to retirees. The weather was sunny with a moderate breeze. We hiked along the coast on the beach and sand dunes. There were many native coastal plants that Phil pointed out including akoko, naupaka, pa'u o hi'iaka, and shorebirds including Ruddy Turnstones, Pacific Golden Plovers and Bristle-thighed Curlews.

The group stopped often to listen to Phil explain the natural history of the coastal plants and birds and to look at tidepools, shells and crabs. We saw several Bristle-thighed Curlews along the sand dunes behind James Campbell National Wildlife Refuge. They were foraging among the sand dunes and spent a long time observing us from fence posts. Everyone was thrilled to see these beautiful large shorebirds with long decurved bills. The group also saw Black-crowned Night Herons, Mallards, Northern Pintails, Northern Shovelers, Hawaiian Coots and Hawaiian Stilts in the ponds at James Campbell National Wildlife Refuge. When we stopped for lunch an adult Hawaiian monk seal was spotted resting on the beach in a quiet area. We watched for Humpback whales off shore and saw several breaching, tail slapping and fin waving near Turtle Bay. Later in the afternoon, we reached Turtle Bay and rode the bus back to Kahuku to return to the cars. It was a great opportunity to see wildlife and learn about the natural history of the O'ahu coast line. Many thanks to Phil Bruner for leading this fun and educational field trip!

2004 Membership in Hawaii Audubon Society

Regular US Member

(via bulk mail, not forwardable)	$ 15.00
First Class Mail	$ 21.00
Junior Members (18 and under)	$ 10.00
Supporting Member	$100.00

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Calendar of Events

Monday, May 17, Board Meeting: Open to all members, 6:30 to 8:30 p.m. at the HAS office. Education and Conservation Committees meet at 5:45 p.m. before Board meetings.

Sunday, May 16, Field Trip: Ka'ena Point walk to see Laysan Albatross chicks. See page 26.

Monday, June 21st Program Meeting: Nick Kalodimus, Introduced Parrots, Part II. See page 26.

Saturday, June 12th Sierra Club Service Trip at Marine Corps Base Hawaii. See page 26.

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