



Birds in Hawai'i Volcanoes National Park: Summary of the 2010 Inventory and Monitoring Program Survey

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The National Park Service (NPS) created the Inventory and Monitoring (I&M) Program in 1998 to establish baseline information and assess long-term trends in "vital signs" or key abiotic and biotic elements of National Parks (Fancy et al. 2009). The Pacific Island Network of the I&M Program developed a Landbirds Monitoring Protocol (LMP; Camp et al. 2011) to estimate species-specific status and monitor long-term trends in landbird distribution and abundance. Parks included in the LMP that harbor habitat critically important to native forest birds are Haleakala National Park (Maui Island), Hawai'i Volcanoes National Park (HAVO; Hawai'i Island), and the National Park of American Samoa (American Samoa). In 2010, the LMP was implemented in HAVO to survey landbird density and abundance. This implementation was the first anywhere in the Pacific Islands by the I&M Program, and continued monitoring is planned every five years in all three parks.

HAVO was established in 1916 to protect and preserve cultural, geological and natural resources on Kilauea and Mauna Loa volcanoes. The Kahuku Unit was added to the original park unit in 2003 (Fig. 1), resulting in the combined protection of over 134,750 ha. The park ranges from sea level to the summit of Mauna Loa (4169 m) with a diverse array of habitat types, ranging from native rainforest to arid desert environments, with several active volcanic sites. Some portions of HAVO have been surveyed extensively for forest birds (Camp et al. 2009), and the Hawai'i Forest Bird Survey (Scott et al. 1986) established the basis for long-term monitoring. Bird surveys in HAVO were last conducted in either 1994 or 2005 (Camp et al. 2009). Between March and May, 2010, 665

stations spaced 150 m apart on 58 transects were surveyed in eight tracts in HAVO (Fig. 1). Sampling covered 19,220 ha, or 14% of the park, and occurred in the major native landbird habitats (the intervening areas were non-forest habitats and not suitable for forest birds).

Details of the methods and results from the 2010 HAVO survey are provided in Judge et al. (2011), and are summarized herein. In brief, all of the surveys used the point-transect sampling method, and density estimates (birds/ha) by tract were calculated using program DISTANCE, version 6.0, release 2 (Thomas et al. 2009). To improve the estimates, sampling covariates were incorporated in the multiple covariate distance sampling engine of DISTANCE (Thomas et al. 2009). Covariates included habitat, observer, sampling conditions, tract, and year of survey. Population estimates were the product of the density estimate times the area of the tract.

Change in population densities between the 2010 survey and the most recent survey (either 1994 or 2005) were compared using end-point z-test by tract in an equivalence testing framework (see Judge et al. 2011). Changes in population density, or trends, were defined as increasing, decreasing, negligible trend (i.e., stable population), or an inconclusive result.

In addition to collecting bird data, habitat characteristics for tree canopy cover, height, and composition (dominant and codominant overstory and understory) within 50 m of each point-transect station were described and recorded. Ohia (*Metrosideros polymorpha*) was the dominant canopy tree in five of the eight tracts. Ohia was co-dominant with koa (*Acacia koa*) in the Mauna Loa Strip, mamane (*Sophora chrysophylla*) in the Northwest Kahuku, and olapa (*Cheirodendron trigynum*) in the Olapa tracts. The canopy predominantly consisted of tall trees in all tracts, but canopy closure was about evenly divided among scattered, open, and closed cover classes. The understory was comprised mainly of native shrubs and bare ground, and was mostly open with almost three-fourths of the stations having less than 50% understory cover. Introduced understory plants included bamboo grass (*Microstegium vimineum*), banana poka (*Passiflora mollissima*), and blackberry (*Rubus* spp.). Pig (*Sus scrofa*) and mouflon sheep (*Ovis gmelini musimon*) and sign of both animals were only observed in the Kahuku Unit tracts.

A total of 9,803 birds of 29 species was detected, of which one-third (10 species) were native, and two-thirds

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Species	Origin	East Rift Zone	Honomalino	Kahuku	Mauna Loa South Flank	Mauna Loa Strip	Northwest Kahuku	Olaa	Papa
Hawaiian Goose <i>Branta sandvicensis</i>	E			2					
Io <i>Buteo solitarius</i>	E		1			5		3	
Hawaii Elepaio <i>Chasiempis sandwichensis</i>	E		7	15		64	10	8	
Omao <i>Myadestes obscurus</i>	E	51	298 ?	2077 ?	28	4861 ?	179 ?	485 ?	9
				142		26	14	22	
Hawaii Amakihi <i>Hemignathus virens</i>	E	5344 ▲		12042 ?	1620 ?	1007 ▲	140 ?	842 ▼	166 ?
		9	514	356	408	267	615	3	114
Akiapolaau <i>Hemignathus munroi</i>	E	2094 ?	33272 ▲	60279 ▲	54543 ▲	26558 ▲	13614 ▲	253 ?	4458 ▲
Hawaii Creeper <i>Oreomystis mana</i>	E		3	22					1
Hawaii Akepa <i>Loxops coccineus</i>	E			19	1				
Iiwi <i>Vestiaria coccinea</i>	E		17	109		31	1	13	2
			767 ?	15078 ?		2043 ?	22 ▼	816 ?	77 ?
Apapane <i>Himatione sanguinea</i>	E	211	562	2025	387	404	205	416	148
Erckel's Francolin <i>Francolinus erckelii</i>	Nn	44030 ▲	30795 ▲	331800 ▲	44889 ▲	32257 ▲	3158 ?	32146 ▲	4066 ▲
Kalij Pheasant <i>Lophura leucomelanos</i>	Nn		16	1	2	7	12		1
Common Peafowl <i>Pavo cristatus</i>	Nn		1	5				9	
Wild Turkey <i>Meleagris gallopavo</i>	Nn			2	5	2			
California Quail <i>Callipepla californica</i>	Nn					1	6		
Spotted Dove <i>Streptopelia chinensis</i>	Nn				8				
Zebra Dove <i>Geopelia striata</i>	Nn							1	
Sky Lark <i>Alauda arvensis</i>	Nn			2	1		44		7
Japanese Bush-Warbler <i>Cettia diphone</i>	Nn			5					
Hwamei <i>Garrulax canorus</i>	Nn	1			7	6		1	
Red-billed Leiothrix <i>Leiothrix lutea</i>	Nn	2	3	71	15	27		49	
		315 ?	148 ?	8750 ▲	1120 ?	1919 ?		2757 ▲	
Japanese White-eye <i>Zosterops japonicas</i>	Nn	152	110	120	472	242	12	558	3
		53691 ▲	12063 ▲	33411 ?	102570 ▲	38417 ?	390 ▼	79398 ▲	243 ▼
Northern Mockingbird <i>Mimus polyglottos</i>	Nn						13		
Common Myna <i>Acridotheres tristis</i>	Nn				12				
Saffron Finch <i>Sicalis flaveola</i>	Nn				3				
Northern Cardinal <i>Cardinalis cardinalis</i>	Nn	7	56	3	99	19	21	62	2
		509 ?	964 ?	181 ?	3673 ▲	475 ~	106 ?	1582 ?	30 ▼
House Finch <i>Carpodacus mexicanus</i>	Nn		61	3	119	7	35		6
			1790 ?	280 ?	7929 ▲	243 ▼	289 ?		112 ?
Yellow-fronted Canary <i>Serinus mozambicus</i>	Nn				15				
Nutmeg Mannikin <i>Lonchura punctulata</i>	Nn				36				

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were non-native (19 species; Table 1). Half of the native birds were endangered—the Hawaiian Goose (Nene, *Branta sandwicensis*; 2 detections), Hawaiian Hawk (Io, *Buteo solitarius*; 9 detections), Akiapolaau (*Hemignathus munroi*; 4 detections), Hawai'i Creeper (*Oreomystis mana*; 26 detections), and Hawai'i Akepa (*Loxops coccineus*; 20 detections). All endangered bird detections were in high elevation portions of the Kahuku Unit, above 1,500 m elevation. It is likely that these endangered birds are restricted to high elevation forests because of their susceptibility to introduced avian diseases (Atkinson and LaPointe 2009).

The most striking change in the native birds was that the Omao (*Myadestes obscurus*), which was extirpated from the leeward side of Hawai'i Island, including the southwestern region of Mauna Loa since the 1970s (van Riper and Scott 1979, Gorresen et al. 2009), was detected in two high elevation tracts of the region—Northwest Kahuku and Papa tracts. Omao were detected in modest abundances in both tracts (140 and 166 birds, respectively). Omao are dispersers of native seeds and their reappearance could be important to the natural restoration of native forests and pastures of Kahuku. Omao were not detected in the Honomalino Tract, which is at lower elevation than the former tracts. Omao were detected in all four windward tracts, but their trends were mixed with increases in two, decrease in one, and one inconclusive result.

Common native birds generally increased since the last survey; however, many of the changes were small and statistically inconclusive. The native Hawai'i Amakihi (*Hemignathus virens*) and Apapane (*Himatione sanguinea*) were detected throughout all tracts and at the highest abundances (195,000 and 523,000 birds, respectively). Apapane densities increased in all eight tracts in HAVO, and amakihi increased in six tracts. The amakihi trends were inconclusive in the other two tracts. Amakihi and Apapane remain widespread and common, and exhibit increasing trends throughout much of their ranges (Gorresen et al. 2009).

Hawai'i 'Elepaio (*Chasiempis sandwichensis*) were detected in five of the eight HAVO tracts, and numbered slightly less than 8000 individuals. In the original unit, elepaio occurred in two of the three tracts. Densities were greatest in the Mauna

Loa Strip Tract, and elepaio have reoccupied the Oloo Tract; however, in low numbers. Elsewhere in the wet, mid-elevation habitats of the Central Windward region elepaio densities have declined (Camp et al. 2009). It may be that elepaio are now increasing in wetter habitats because of a climactic warming and drying trend (Chu and Chen 2005, Giambelluca and Luke 2007). 'Elepaio were not observed in two of the five Kahuku unit tracts either in 2005 nor 2010. All of the trends for elepaio were statistically inconclusive.

Similar to the elepaio, results for Iwi (*Vestiaria coccinea*) were mixed. Iwi were detected in six of the eight tracts. As expected, Iwi were not detected in the East Rift and South Flank tracts. Iwi are extremely susceptible to avian malaria (Atkinson et al. 1995) and malaria is likely widespread in both of these low elevation tracts (Atkinson and LaPointe 2009). In addition, forests in the upper portion of the South Flank Tract were cleared for cattle ranching and the remaining forest habitat is degraded. In the six tracts where Iwi were detected, which were all at high elevations, the only conclusive trend was a decline in the leeward dry sub-alpine Northwest Kahuku Tract. Seasonal movement of Iwi following fluctuations in ohia bloom may account for the apparent decline of this predominantly nectarivorous bird. Although trends in the other five tracts were inconclusive, it is worth noting that Iwi densities have increased slightly although not significantly. Iwi have experienced range contractions and downward trends in many parts of their range (Gorresen et al. 2009), and the species has been petitioned for listing under the Endangered Species Act.

Too few detections (<100) were recorded for 16 of the 19 non-native birds to estimate densities, although they were present in one to six tracts. The remaining three non-native birds—Japanese White-eye (*Zosterops japonicus*), Northern Cardinal (*Cardinalis cardinalis*), and Red-billed Leiothrix (*Leiothrix lutea*)—were detected in both the original and Kahuku units (8, 8, and 6 tracts, respectively) and in sufficient numbers to estimate densities. Of the non-native birds, Japanese White-eye were the most abundant (320,190 birds in the eight HAVO tracts), and second only to Apapane for all bird species. Japanese White-eye densities increased in half of the eight tracts, decreased in two, and were inconclusive in the

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Table 1. List of birds and their origin (E-endemic and Nn-non-native) detected by tract in Hawai'i Volcanoes National Park between March and May 2010. The survey was conducted by National Park Service's Inventory and Monitoring Program, Pacific Island Network. For species with sufficient detections (> 100 total) we estimated abundance (shaded row; variance and 95% confidence intervals are available in Judge et al. 2011) and included interpretations of trend (increasing = ▲; stable = ~; decreasing = ▼; and inconclusive = ?). Species are ordered taxonomically within origin.

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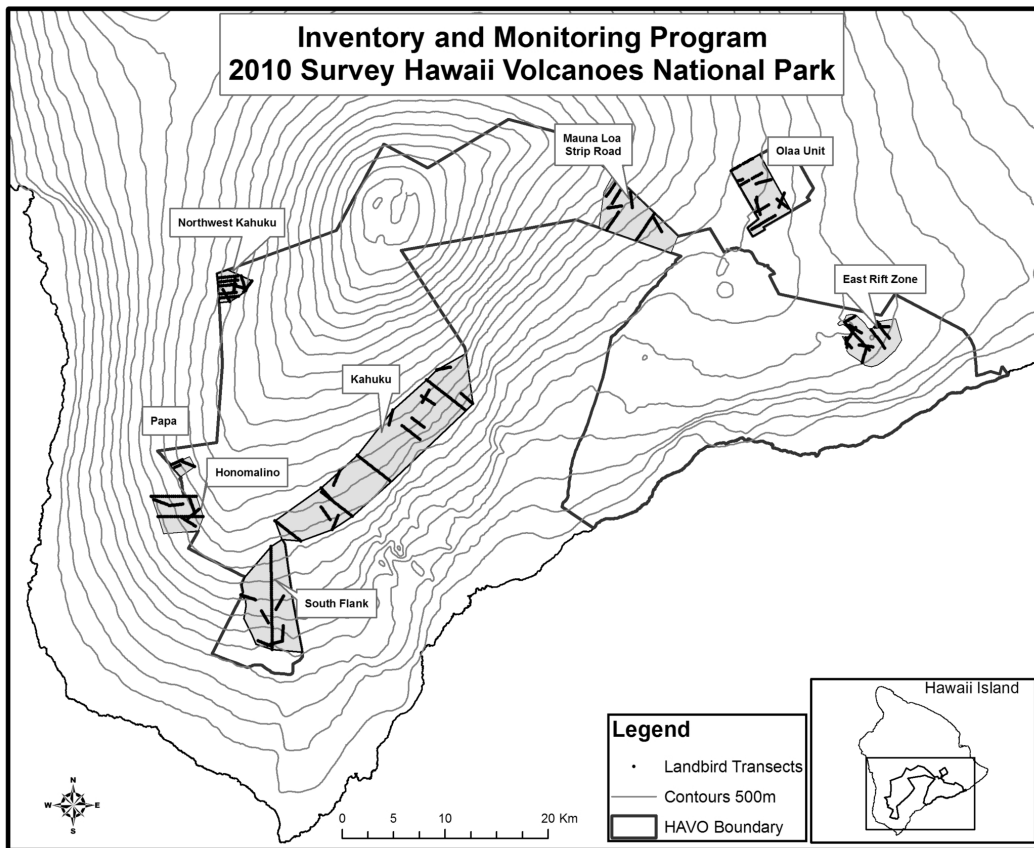


Figure 1. Location of tracts and transects sampled during the Inventory and Monitoring Program 2010 landbird survey in Hawai'i Volcanoes National Park, Hawai'i Island. Kahuku Unit includes the tracts Honomalino, Kahuku, Northwest Kahuku, Papa, and South Flank; and the original park unit includes the tracts East Rift Zone, Mauna Loa Strip, and Olaa Unit (a combination of the Olaa Koa, Olaa Puu and Olaa Small tracts). Sampling was restricted to tracts with suitable forest habitats and the intervening areas were non-forest habitats.

remaining two. Northern Cardinal trends were inconclusive in five tracts, but they increased in one tract and decreased in two. Red-billed Leiothrix densities increased in the Kahuku Tract, decreased in the Olaa Tract, and were inconclusive in the remaining four.

Although apparent increases in native birds are encouraging, our results do not identify the causative factors resulting in population changes because the vegetation data needed to attribute population changes to specific management actions were not collected during the previous survey. It is likely, however, that the HAVO management to improve forest habitats has benefited native birds, and removal of ungulates from the Kahuku acquisition, the unit in which the listed birds were detected, will further facilitate habitat recovery. Continued monitoring will be necessary to track bird populations and assess management; another landbird survey by the I&M Program is scheduled for 2015 in HAVO.

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Kawainui-Hāmākua Marsh Master Plan Update

The Kawainui-Hāmākua Marsh Complex Master Plan will update the 1994 Kawainui Marsh Master Plan and incorporate the Hāmākua wetland and hillside area to provide a comprehensive plan for critical natural and cultural resources in Kailua. The plan will serve as a guide for sustaining and enhancing these resources for existing and future generations to experience. The first of four community meetings was held in December. The public is welcome to participate in the community outreach process. Please check the project website, www.hhf.com/kawainui/index.html, for details on upcoming meetings. This project is being initiated by the State Department of Land and Natural Resources, Division of Forestry and Wildlife, in partnership with the Division of State Parks.

Field Trips

James Campbell National Wildlife Refuge
Saturday, January 21 at 3:30 and
Saturday, February 4 at 9am

In 2012 HAS has reserved 2 tour dates for James Campbell National Wildlife Refuge. The dates are January 21 at 3:30pm and February 4 at 9am. Tours last about 1 1/2 hours, walking along a grassy loop trail. Participants should wear comfortable walking shoes and bring binoculars. Driving directions from the North Shore: approximately 2 miles past Turtle Bay hotel, near mile marker 15 and just after the bridge, turn left towards the ocean and turn on to a crushed rock road, park at the James Campbell National Wildlife Refuge baseyard. Coming from windward Oahu turn right just past the sugar mill. Additional information and driving directions can be heard by calling 808-637-6330 ext 3.

Freeman Seabird Preserve Fieldwork Opportunity

Volunteers needed for habitat restoration
Saturday mornings January through March 2012

In November and early December, Wedge-tailed Shearwater adult birds and chicks left the Freeman Seabird Preserve at Black Point to forage at sea for several months before returning in the latter part of March to nest. Volunteers are needed for fieldwork at the site on Saturday mornings from 9 am to noon beginning January 7. Activities will include maintenance of native plants and landscape features introduced over the past two years by Rick Barboza and his dedicated crew from Hui Ku Maoli Ola, along with removal of invasive plants, trash and debris. Please contact the Hawai'i Audubon Society office by phone or e-mail in advance if you would like to participate. We will meet each Saturday at Triangle Park near Diamond Head at 8:45am to carpool to the site. Plan on bringing drinking water, sun and rain protection, gloves, weeding tools, clippers and loppers.

‘Elepaio Update

Beginning in 2012, the ‘Elepaio will be published and mailed to members six times per year. Past and current issues will continue to be available at the Hawai'i Audubon Society website. Members who would prefer to access the ‘Elepaio on-line, or to receive the ‘Elepaio directly via e-mail, may contact the HAS office to cancel their mailed subscriptions.

FREEMAN SEABIRD PRESERVE PREDATOR CONTROL

Lindsey Young, Eric A. VanderWerf, Michael T. Lohr
Pacific Rim Conservation

Background

In September 2011, several Wedge-tailed Shearwater (*Puffinus pacificus*) chicks were killed by cats at the HAS Freeman Seabird Preserve. As a result, HAS decided to initiate cat control in order to protect the remaining chicks, and to educate area residents on the importance of protecting seabirds from predation. Pacific Rim Conservation (PRC), a local wildlife biology and conservation organization, was asked to conduct cat and mongoose control and maintain predator-free status at the Freeman Seabird Preserve until the Shearwaters finished fledging at the end of November. A grant from a member was provided to help fund the project, and provided the following services:

- Setting and monitoring of four live cage traps to capture cats and mongooses, and providing cages with shade and water and checking daily while open
- Replacing bait and water in cages as needed
- Monitoring of infrared cameras and forwarding of relevant photographs
- Removal of all cats or mongooses captured and delivery to the Hawai'i Humane Society
- Scanning of all cats removed with a microchip scanner and providing information on individual cats to HAS
- Regular reporting of captures to HAS

Methods

Four tomahawk live cage traps were deployed on 9 September 2011 and baited with sardines. In the upper area of the reserve there was one trap set against each of the three retaining walls, and a fourth trap set on the makai boundary of the property underneath an Ironwood thicket. All traps were deliberately placed in areas where cats had either been seen, or were likely to use as areas to transit. The traps were also placed under vegetation whenever possible to make them less visible and thus reduce the potential for vandalism. On 22 September 2011, the bait was changed to commercial cat food, and large leaves were used to line the bottom of cages in order to attract animals into the cages without them having to step on the wire grates.

Beginning in October, PRC also began servicing rat bait stations in the preserve every two weeks using bait stored on-site in the storage bin and filling the bait stations per the pesticide label recommendations.

Results

Trapping efficacy

Traps were deployed for a total of 189 trap nights which was 29 more than the initial contract which anticipated 160 trap nights (4/week in Sept; 3/week in Oct/Nov x 4 traps) due to low catch rates. On 23 September 2011, a cat was caught in the trap set against the east wooden fence that borders a

residence, and unfortunately the cat was released by a resident before PRC could bring the animal to the Humane Society. No other mammals were caught for the duration of trapping.

At a similar coastal seabird preserve on Oahu, Kaena Point Natural Area Reserve, cat trapping efficacy was ~7/9600 cage trap nights (0.00004) over the course of a year, making our rate of 1/189 (0.005) comparable. While curious by nature, cats are also very smart and can learn to remove bait from traps quite easily without springing them. Animals that are caught and then released (such as described above) often become trap shy and are very difficult to catch again.

Camera results

The cameras were checked one to two times per week and all photos were downloaded. A total of three unique cats were observed in the reserve, two of them on multiple occasions. The one animal that was captured in the traps was recorded very frequently on the camera, and used the trap it was caught in to jump over the fence on multiple occasions. No other mammalian predators were caught on camera. Aside from people authorized to work in the reserve, only one other person was caught on camera, but they did not appear to be vandalizing the traps.

Observations

During the trapping period, no signs of cat predation were observed on any native birds on the property. One Wedge-tailed Shearwater chick had evidence of either rat or mongoose predation in mid-November, but otherwise the cats that were observed from September- November did not appear to have preyed on the Shearwaters during that time. A nearby resident reported capturing a feral cat immediately after predation had been observed in the preserve and prior to trapping efforts initiated by PRC, so it is possible that the animal responsible was removed already.

A by-product of live trapping for cats was the unavoidable capture of several shearwaters. Since the traps were checked daily, birds were never in the traps for more than 24 hours, and in most cases, were likely in the traps overnight. None of the birds captured were injured, and all flew away immediately upon release.

Summary and recommendations

For future years, cat trapping should be initiated prior to witnessing predation- ideally during May or June when the Shearwaters return and begin laying eggs. This would hopefully prevent any losses such as those that were experienced during the 2011 season. If cage trapping proves ineffective for cats at this site, which appear to be primarily domestic animals compared to feral, other methods of capture should be explored.

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DEPARTMENT OF LAND AND NATURAL RESOURCES News Release

For Immediate Release: December 2, 2011

SHEARWATERS FLEDGE IN RECORD NUMBERS AT KA'ENA POINT FOLLOWING COMPLETION OF PREDATOR PROOF FENCE

KA'ENA POINT, O'AHU -- A native seabird called the Wedge-tailed shearwater which nests in the remote coastal dunes on the northwestern tip of O'ahu, is already realizing the benefits of being protected by the first predator-proof fence of its kind in Hawai'i and the United States.

Biologists conducting a survey of Wedge-tailed shearwaters last week recorded the highest number of chicks since the annual survey began in 1994. This indicates hoped-for successful results due to the fence eliminating predation pressure and allowing more chicks to survive to adulthood.

The project has been a cooperative effort involving the Department of Land and Natural Resources, the U.S. Fish and Wildlife Service, the Hawai'i chapter of The Wildlife Society, and local communities.

The 6.5-foot-high fence was completed in March 2011 at Ka'ena Point Natural Area Reserve, followed by removal of all predators within the 59 acre reserve to allow the native species in this ecosystem to begin to recover.

Ground-nesting seabirds at Ka'ena Point had been the targets of predators including dogs, feral cats, mongoose, and rats for decades, with up to 15% of chicks being lost each year to predation. The full moons in October and November would

bring particularly devastating attacks on the Wedge-tailed shearwater chicks as they left their burrow for the first time at night and would be more visible to predators roaming the area. But all of that has stopped at Ka'ena Point since the fence has been in place.

The same system has been used successfully at over 30 sites in New Zealand coastal and forest projects. The fence includes a combination of features that render it predator-proof, including fine mesh, a rolled hood at the top, and a skirt buried underground, designed to prevent animals from jumping, climbing, squeezing through, or digging their way under the fence and into the protected area.

Post fence construction vegetation and invertebrate surveys will be conducted to monitor ecosystem response to this new, predator free environment.

(News editors may contact DLNR Public information office for photos of the fence and nesting seabirds in the reserve)

For more information news media may contact:
Deborah Ward DLNR Public information specialist
Phone: (808) 587-0320



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Calendar of Events

Freeman Seabird Preserve Fieldwork Opportunity
Volunteers needed for habitat restoration Saturday mornings
January through March 2012

Field Trips
James Campbell National Wildlife Refuge
Saturday January 21 at 3:30
and Saturday February 4 at 9am

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