



When the deceased soul was ready to depart, it was guided to the spirit leap rock, where the soul would make its plunge into the ocean, westwards ... towards eternity.

Leina-a-ka-‘uhane

The Hawaiians called their departing-places leina-a-ka-‘uhane, or leap of the soul.

A white stone on north side of Kaena Point marks the leaping place of the souls into the afterlife – the land of ***po***.



Oahu's Waimanalo Formation (limestone) correlated with last interglacial period based on coral dating: 133 – 119 K yrs.

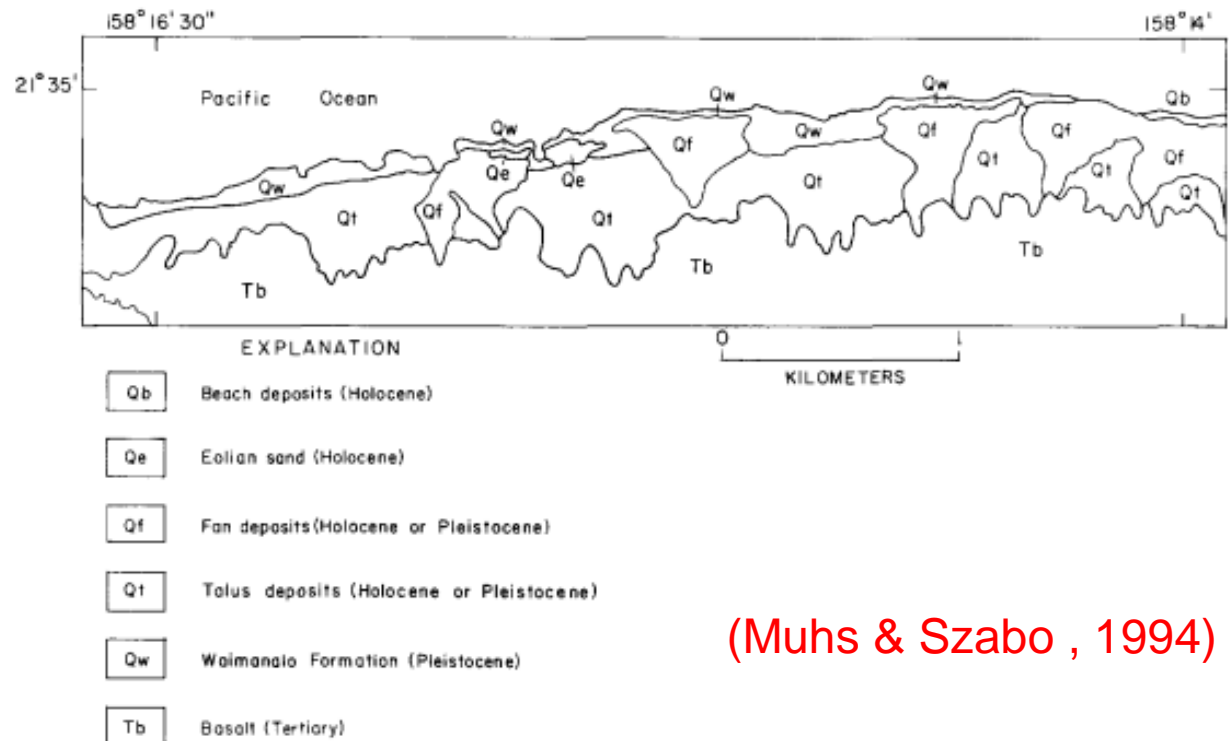
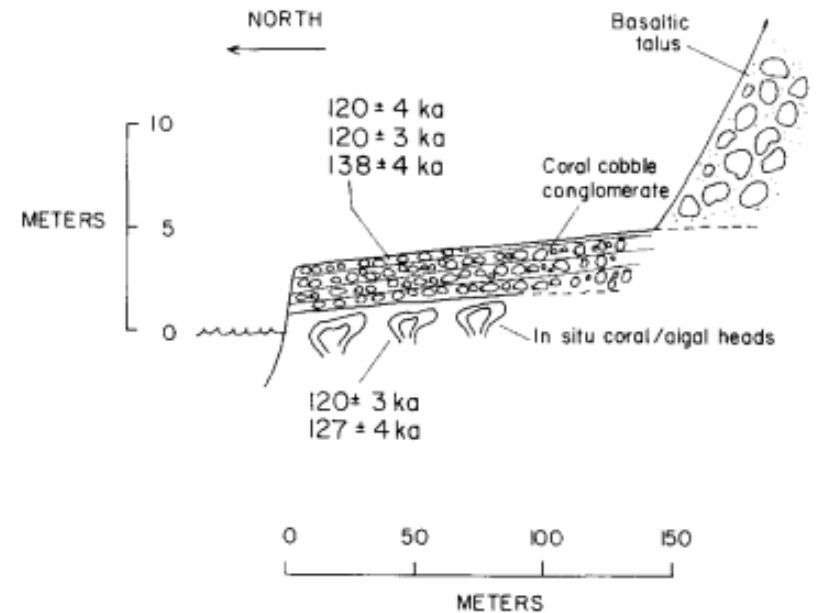
Beach deposits as high as 12.5 m.

Limestone consists of growth-position corals and overlying coral conglomerate.

Two distinct high sea level stands within last interglacial period.

Both growth-position corals and overlying, conglomerate coral occur in outcrop.

Corals consist mainly of Pocillopora and Porites.



(Muhs & Szabo, 1994)

In 1970, Hawaii became one of the first states to recognize the importance of its unique natural resources by establishing the Natural Area Reserves System (NARS).

Kaena Point NAR established in 1983 by Executive Order 3162 to protect threatened sand dune ecosystem and rare native plants.



Endemic Plant Communities of Kaena Point

Two native plant communities present in the Reserve
– with specific indicators:



a Naupaka Mixed
Coastal Dry
Shrubland



an Ilima (Sida fallax) Mixed
Coastal Dry Shrub
and Grassland

Endemic Plant Communities of Kaena Point



Naupaka
Mixed
Coastal Dry
Shrubland



Ilima
Mixed
Coastal Dry
Shrub and Grassland

Patches of naupaka on the top of the point's sand dunes.

In the leeward edge of the dunes, the naupaka canopy is 2-4 feet in height, and opens to a varied cover of low vegetation including:

'aki'aki (*Sporobolus virginicus*)

pohinahina (*Vitex rotundifolia*)

hinahina-ku-kahakai (*Heliotropium anomalum* var. *argenteum*)

pa'u-o-Hi'iaka (*Jacquemontia ovalifolia* ssp. *sandwicensis*)

the rare and endangered 'ohai (*Sesbania tomentosa*)

The ilima community covers the alluvial slopes above the sand dunes.

The prostrate vine, pa'u-o-Hiiaka, is the most frequent codominant with the ilima.

Taller native shrubs such as naupaka and naio (*Myoporum sandwicense*) are also scattered through the community.

Other shrubs in the community are alena (*Boerhavia repens*), ohelo kai (*Lycium sandwicense*)

Pili grass (*Heteropogon contortus*) and ma~o (*Abutilon incanum*) locally common in the upper reaches of the community

nehe (*Lipochaeta integrifolia*) common near the point

Endemic Plant Species at the Kaena Point sand dunes:

'Ohai (*Sesbania tomentosa*), which grows as a low-lying shrub, is an endangered species once reduced to about a dozen specimens before the NAR created and all-terrain vehicles prohibited from Kaena Point.

'Ohai has hairy silvery leaves that allow the plant to conserve moisture and produces red-orange flowers (legume or pea family).



Pohinahina or beach vitex (*Vitex rotundifolia*) grows right out of the sand and produces charming blue-purple flowers and rosettes of aromatic leaves that release a sweet fragrance when crushed.



Endemic Plant Species at the Kaena Point grassland:

Ilima papa often found with the native morning glory pauohiiaki (*Jacquemontia ovalifolia* subsp. *sandwicensis*) which has small purplish flowers.

When they bloom along side each other, the green tapestry of their intermingled foliage is accented by lovely purple and yellow-orange flowers.



Another beautiful ground cover at Kaena Point is nehe (*Lipochaeta integrifolia*).

During the peak winter bloom, the landscape is ablaze with the yellow-orange color of nehe and ilima flowers.



Introduced Plant Species at the Kaena Point grassland:

Haole Koa (Leucaena leucocephala) dominates the dry slopes at Kaena on the leeward side of the point, covering 70 - 90 % of the slopes, with 25 - 50 % coverage of the wetter windward slopes.

Kiawe (Prosopis pallida) is intermittent on the flats and lower slopes, covering 5-10 % of the windward side.



Guinea grass (Panicum maximum) has invaded much of grasslands, where it covers flats near the road and on the lower slopes.

Swollen fingergrass (Chloris inflata) is abundant on the lower slopes covering 5-25 % of roadside areas, and continues up to the mid-slopes of the windward and leeward sides.

Sour grass (Andropogon aristatus), found on the flats and lower slopes near the road, where it constitutes 5-15 % of the ground cover.



Laysan Albatross (*Phoebastria immutabilis*) began re-colonizing sites across the Pacific in the 1970s after severe population declines

First birds sighted in 1991. First O'ahu chick fledged in 1992.
Now breed at Kaena Point and Kuaokala (mountain top).



Map of Laysan Albatross Nesting Sites in O'ahu

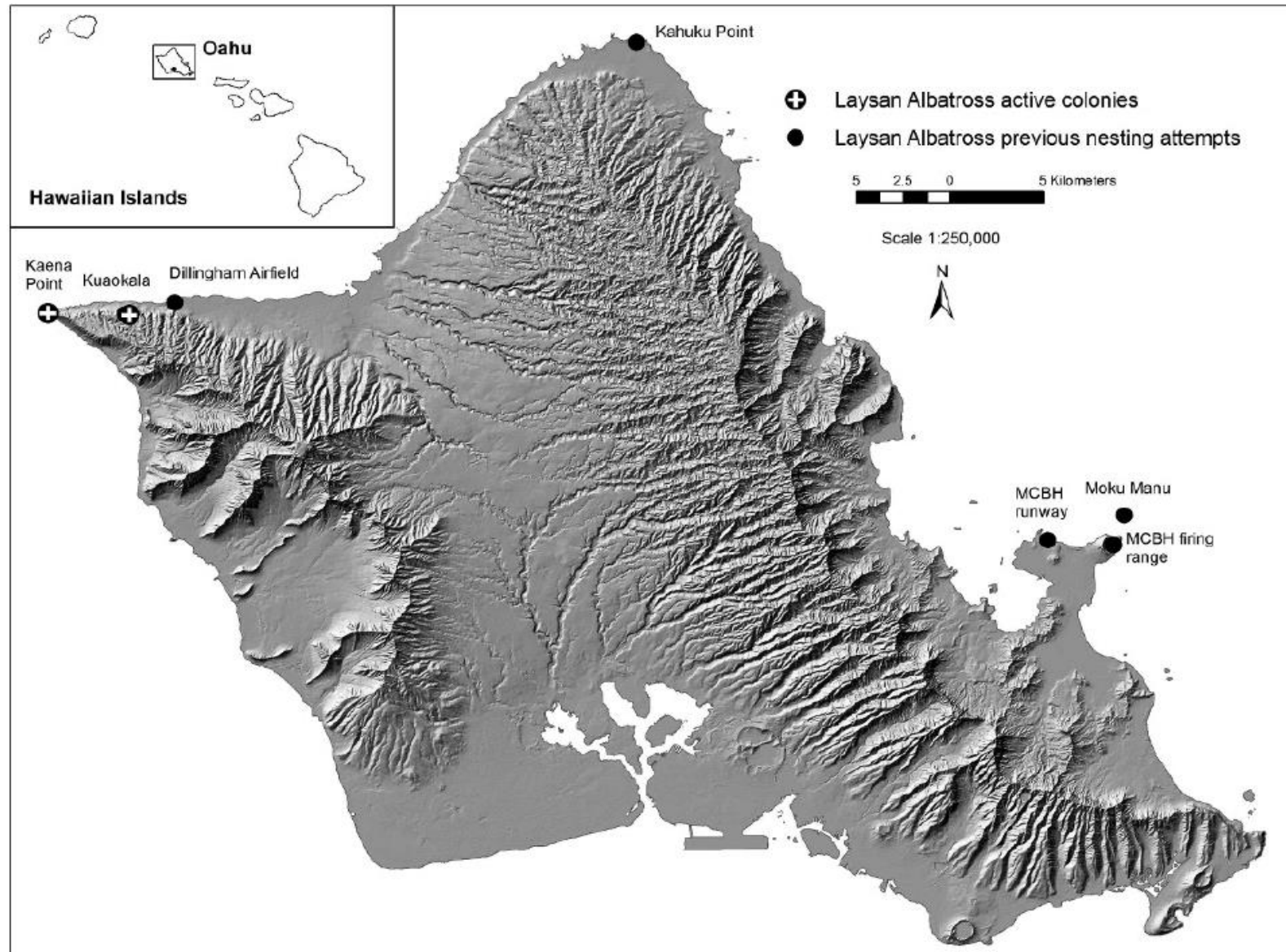


FIG. 1. Study sites and other locations on Oahu, Hawaii where Laysan Albatross have attempted to nest.

Laysan Albatrosses have attempted breeding at six sites on O'ahu since 1979 and currently breed at two of them.

Successful breeding is a more recent event, with the first chick fledging in 1992 once predator control was started.

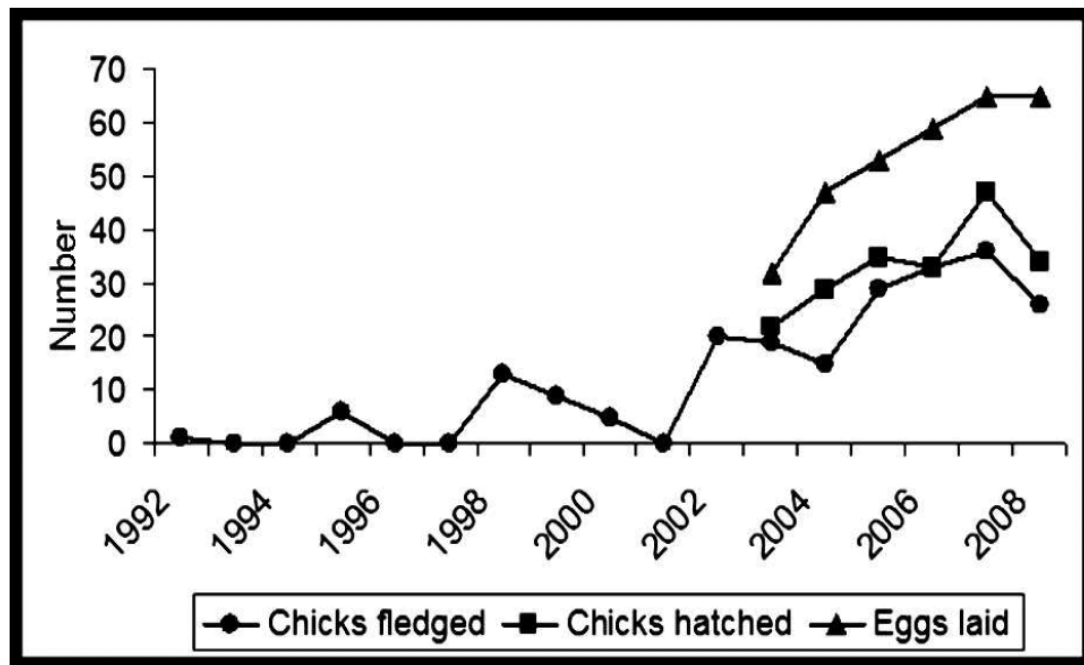


FIG. 2. Number of chicks fledged each year from Laysan Albatross colonies on Oahu, Hawaii since 1992 and numbers of eggs laid and chicks hatched from 2004 to 2008.

Population growth has come from immigration as well as from local recruitment.

The annual breeding population of the island is now of the order of 75 pairs, having increased at the rate of 27% per year since 1991.

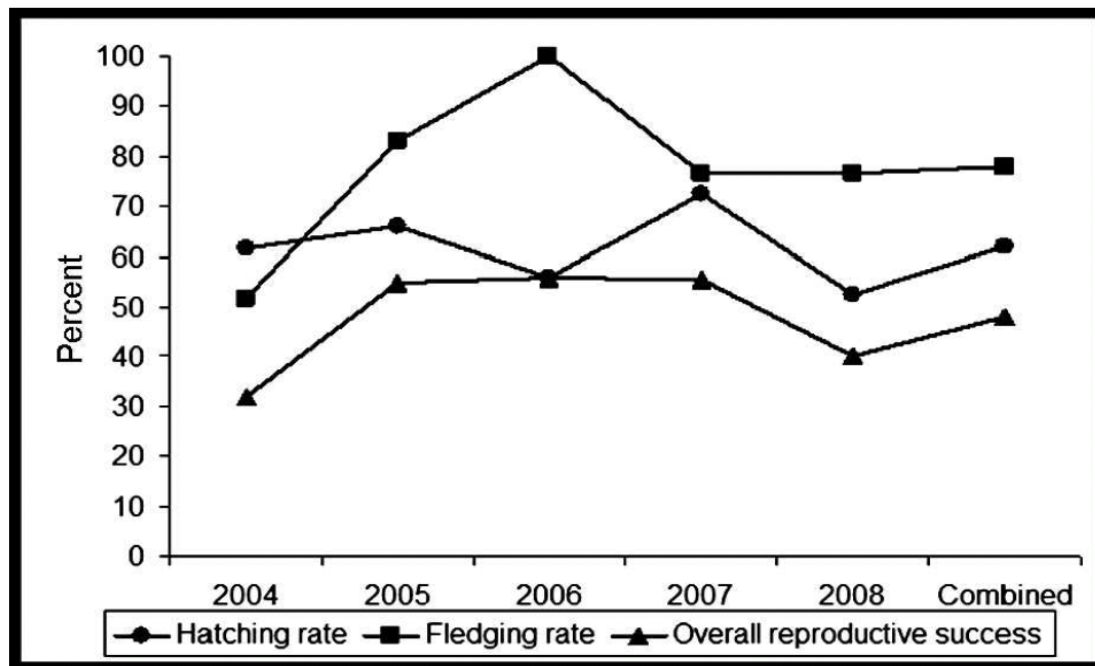


FIG. 3. Rates of hatching (% of eggs laid that hatch), fledging (% of chicks hatched that fledge), and reproductive success (% of eggs laid that result in fledged chicks) for Laysan Albatross on Oahu, Hawaii.

Colonies on O'ahu monitored weekly from 2004 to 2008; all individuals censused, banded, and genetically identified to gender.

Population of 365 adults on O'ahu in 2008; 47% were active breeders.

Breeding population increased 27% annually since 1991. High rate of increase due primarily to immigration, with some local recruitment.

Recaptures indicate that 7 birds were from French Frigate Shoals, 1 from Midway, and 52 from O'ahu; all other adults of unknown origin.

Hatchingrate (62%), fledging rate (78%), and overall reproductive success (48%) comparable to other colonies despite occasional predation.

Rate of adult dispersal is high: with up to 10% of birds observed on O'ahu visiting from Kauai.



The Reserve:

Peninsula-style predator-proof fence with three double doors





The fence encloses 59 acres of Ka'ena Point NAR.

Completed in March 2011.

The fencing corridor is 4m (13 f) wide and 622m (2040 f, 0.4 mile) long.

The fencing alignment follows a World War II-era roadbed that skirts along the bottom of the hill, above the sand dunes.

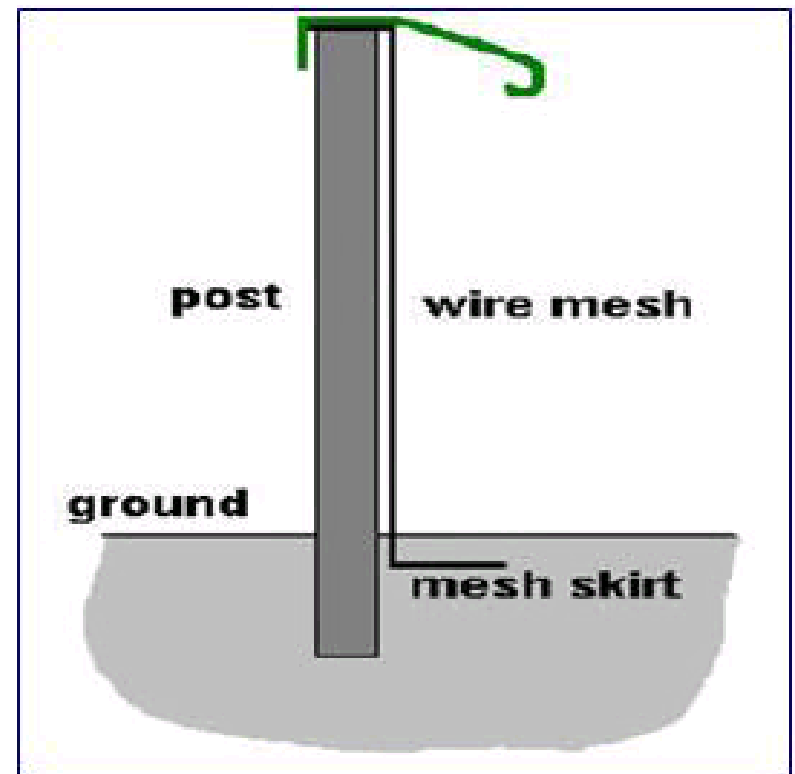
<http://restorekaena.org>

The fence includes a combination of key features to prevent animals from jumping, climbing, squeezing through or digging their way into the protected area:

- built approximately 6.5 feet high
- with a rolled hood at the top
- fine mesh between fence posts
- and a skirt buried underground,

This design has been thoroughly tested in coastal and forested areas of New Zealand, and on the slopes of Mauna Loa (in Hawai'i).

<http://restorekaena.org>



Methods:

Peninsula-style predator-proof fence

Bait stations targeting rats

Mouse / Rat snap traps

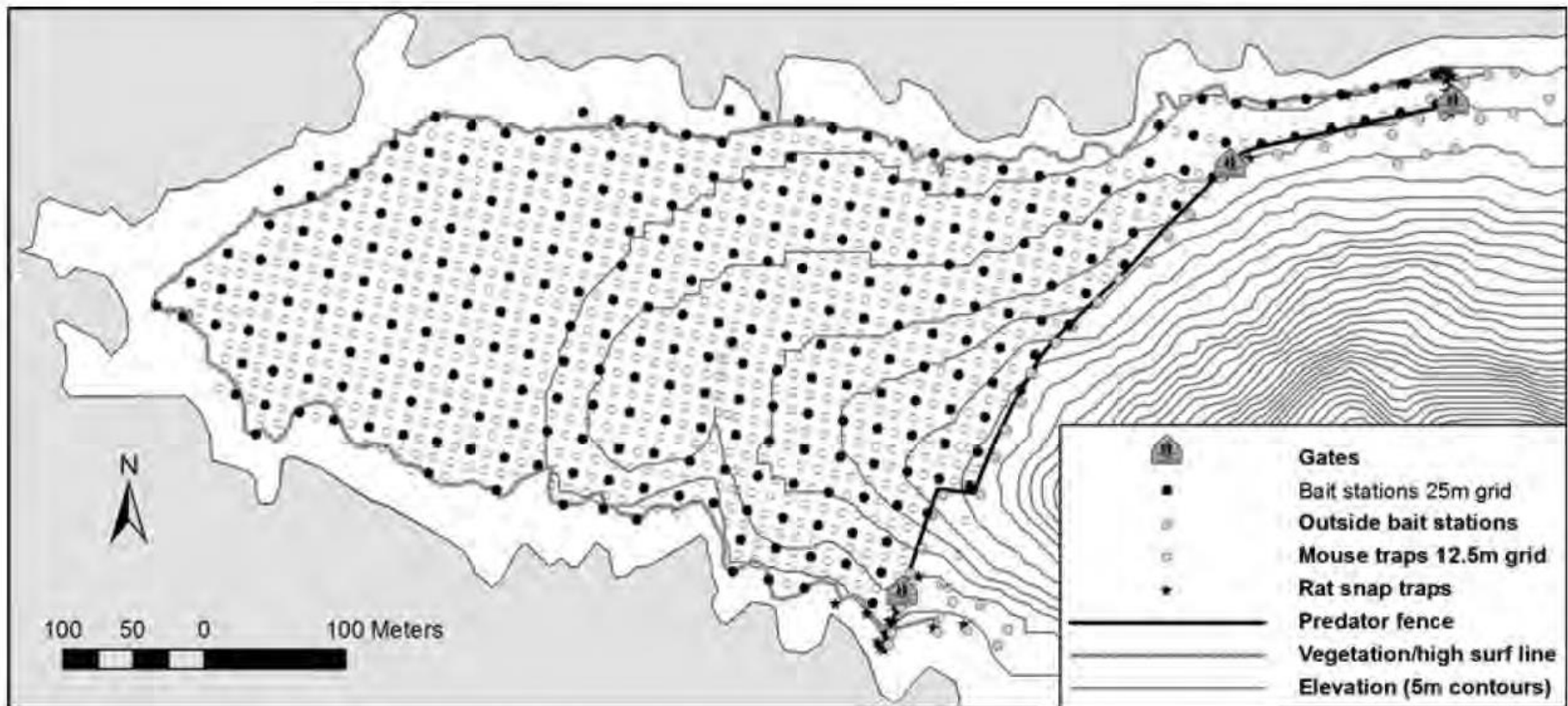


Fig. 1 Map of Ka'ena Point Natural Area Reserve showing locations of the predator-proof fence, bait stations, and traps used in predator removal and incursion detection and prevention

(Young et al. 2013)

Evidence of Eradication:

Rats & Mongoose -> Mice



Four rodent species:

- the house mouse
- the Norway rat
- the Polynesian rat
- the black rat

inhabit most islands of Hawai'i.

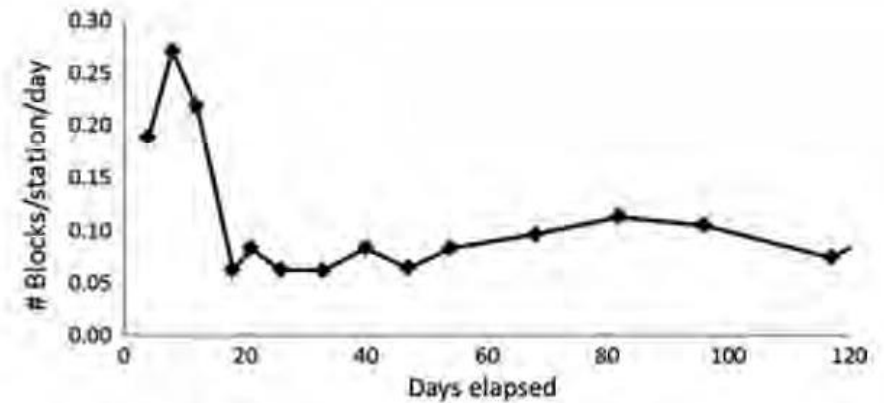


Fig. 2 Take of diphacinone bait from stations at Ka'ena Point Natural Area Reserve. High levels of take during the first 2 weeks were by rats and possibly mongoose; low bait take thereafter was by mice and insects

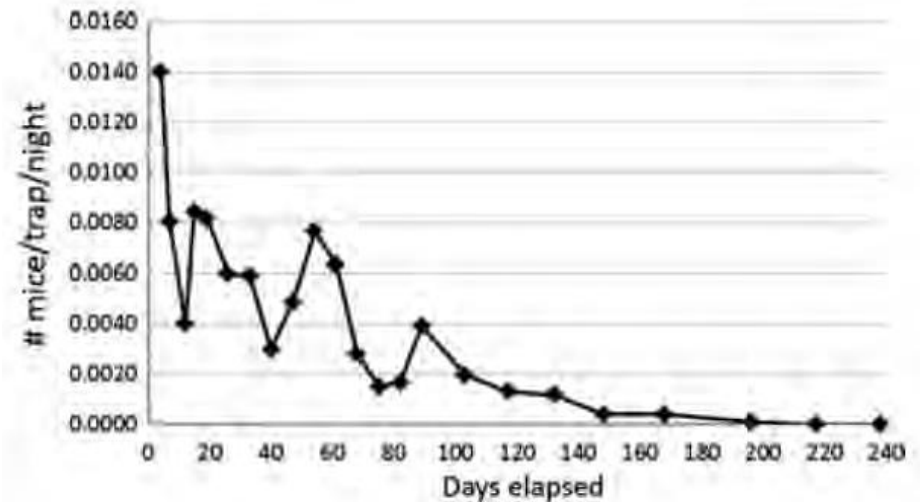


Fig. 3 Capture rate of mice in live traps during the eradication over time

(Young et al. 2013)

Need to consider trophic links between the various introduced predators: cats, mangoose, rats, mice

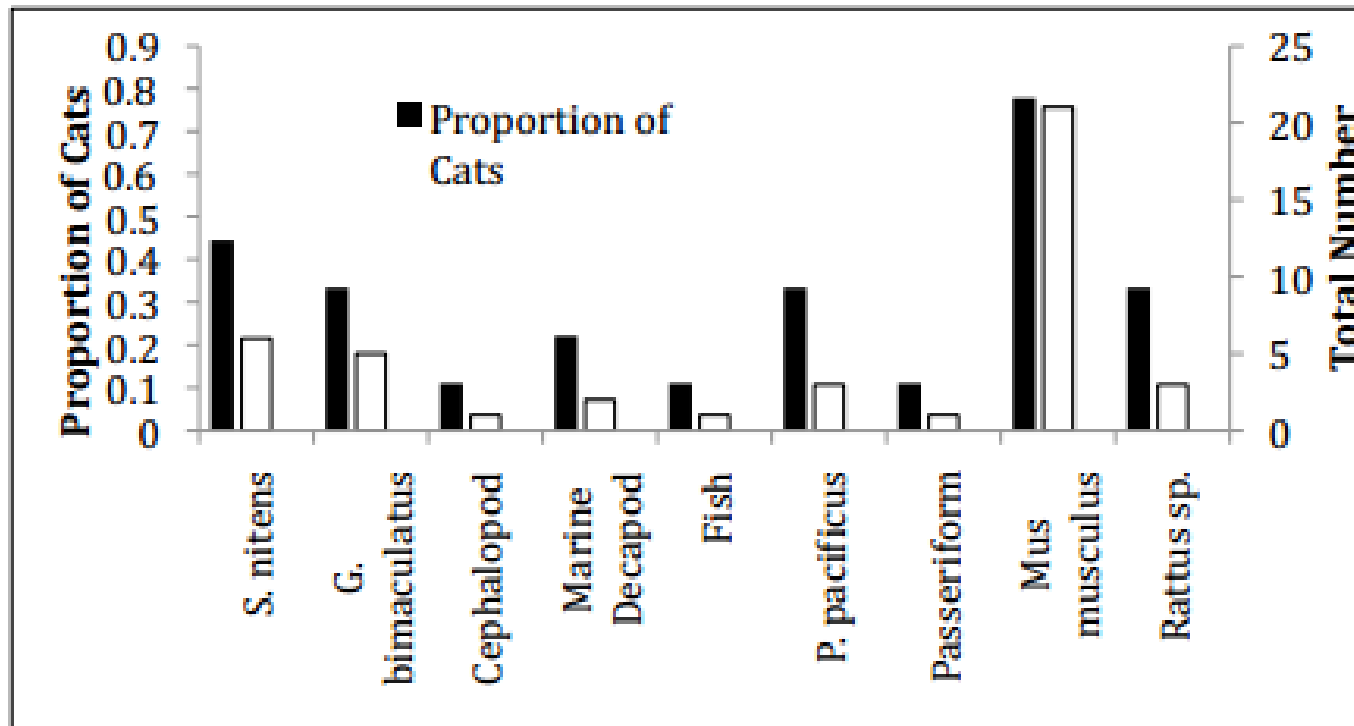


Figure 1. Proportional occurrence of prey items and total prey items documented in the digestive tracts of nine cats collected at Ka'ena Point, Hawai'i, USA.

Sequence of Eradication:
Cats -> Rats -> Mice

(Lohr et al. 2013)

12/02/11 – Shearwaters fledge in record numbers at Ka'ena Point following Predator Proof Fence

<http://hawaii.gov/dlnr/chair/pio/nr/2011/NR10-317.pdf>



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.

03/30/12 - Ka'ena Point Predator Proof Fence Helps Restore Native Dune Ecosystem - Albatross Nesting At Highest Recorded Levels

<http://hawaii.gov/dlnr/chair/pio/nr/2012/NR12-033.pdf>



As hoped for, nesting albatross have increased, showing the highest number of nests ever recorded. Currently there are 34 active nests, many of which are in close view of the designated walking paths. While it used to be a rare treat to catch a glimpse of one of the fluffy albatross chicks, it's now a common, but still special, occurrence.

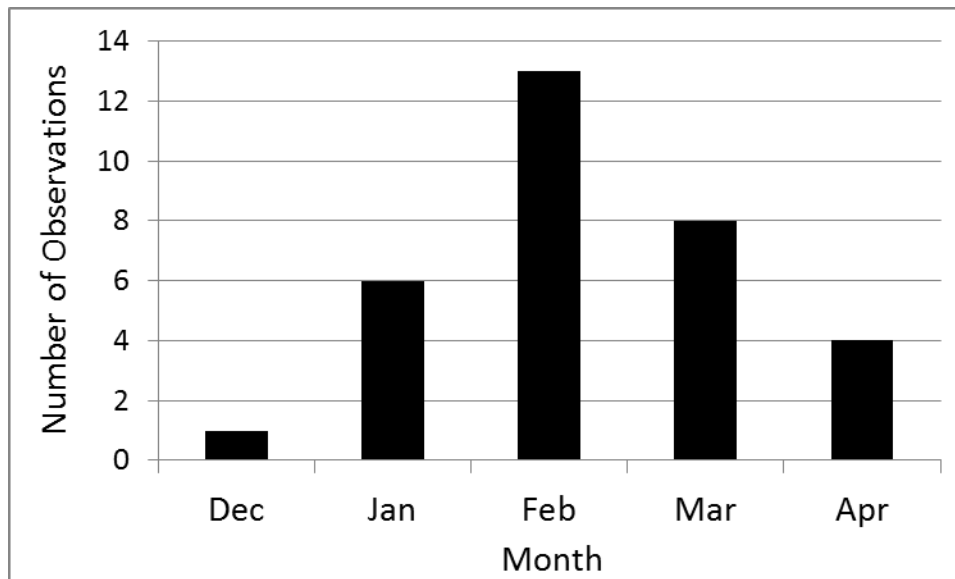
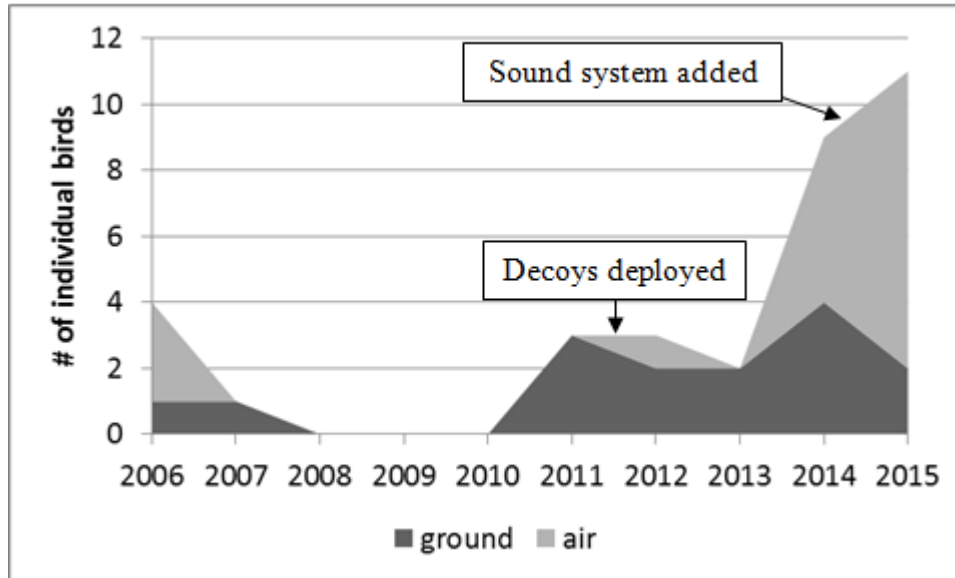
The Start of Something New? The beginnings of Black-footed Albatross colonization on O'ahu



Black-footed Albatross associating with Laysan Albatross at Kaena Point: 3 Feb 2006 (left), 23 Feb 2011 (right)

(Young & Vanderwerf 2016)

A total of 32 Black-footed Albatross have been seen at Kaena Point since 2003



Increasing BFAL Occurrence at Site

Strong Seasonality: (winter / early spring)

(Young & Vanderwerf 2016)

Saturday's Field Trip



Departure: 8.00 am

Drive: 1.0 - 1.5 hours

Walk: 1.75 miles (each way)

Things to Bring:

- Comfortable walking shoes
- Sun cream / hat
- Water (for walk / for car)
- Rain jacket
- Lunch / Snacks

References

Lohr, M., Young, L.C., VanderWerf, E.a., Miller, C.J., & H. Leong. (2013) Dietary analysis of free-ranging cats at Ka`ena Point, Hawai`i. `Elepaio. 73:1-3.

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