

## Removing Predators from Ka`ena Point

Monitoring of invasive species has been occurring at Ka`ena Point for a number of years. Intensive monitoring of rodent species began in early 2008 to assess the species present, their density and their home range size in order to determine the most effective removal method. Currently, the house mouse (*Mus musculus*) and the black rat (*Rattus rattus*) are the only rodent species inhabiting Ka`ena Point and these were both brought to the islands by European ships. We are currently analyzing pre-removal rodent monitoring data to select the appropriate toxicant for the project.

The techniques required to remove all dogs, cats, mongoose, rats, and mice from inside the fencing will vary according to the target species. In general, the techniques used will be those that have proven successful at eradicating vertebrates from other islands. It is assumed that large mammals (remnant hooved animals and dogs) will leave the area before fences are complete and that most cats and mongoose will escape the area by climbing out the fence (the hood acts as a one-way barrier to prevent entry, but allow exit by non-native species). Surveys will be conducted to confirm the absence of these animals and any remaining animals will be shot, or trapped and humanely euthanized using existing protocols.

Due to their small size and small home ranges, rodents are likely to remain within the fenced area after construction and the technique for removal will primarily involve the use of toxicants. The toxicants under consideration for use in this project are diphacinone and brodifacoum. Both the anticoagulant rodenticide diphacinone (0.005% active ingredient) and the anticoagulant brodifacoum (0.0025% active ingredient) have been approved for conservation use by the U.S. Environmental Protection Agency (EPA). Both toxicants come in small pellet form suitable for broadcast. Diphacinone is currently used throughout Hawaii to control rodents as it is safe to use around native birds and people. We are currently analyzing pre-removal rodent monitoring data to select the appropriate toxicant for the project. Distribution of the bait will likely be done with by hand-broadcast at up to three separate intervals as determined by the final approved toxicant label. The operation will be conducted during the winter months (December through February) when the rat population is low, few if any new rats are born, and native non-target migratory species are not present or present in low numbers. Bait will only be applied during optimal weather conditions (low rain and winds <35mph).

Our conclusion that the use of toxicants will not have an adverse impact on the area's native fauna relies heavily on the data compiled and presented in the Draft Supplemental Environmental Assessment for the Lehua Island Ecosystem Restoration Project, published in July 2008. A

summary of the potential impacts of each group of animals found at Ka`ena Point is outlined below.

Native birds: During the rodent removal phase of the project, the use of toxicants is not anticipated to negatively impact native bird populations. First, rodent removal will take place during the winter months (December through February) when native non-target migratory bird species are not present or present in low numbers.

Second, birds can be exposed to rodenticide in two ways: they can eat the bait pellets (direct ingestion) or they can eat prey organisms that have been contaminated by eating rodenticide (indirect ingestion). The primary birds at Ka`ena are seabirds, which do not generally eat things they find on land, but feed on fish and marine organisms caught in the open ocean.

For native birds present at Ka`ena that do forage on land (e.g., Pacific golden plover and wandering tattler), it is unlikely that these birds would forage on pellets, given their normal feeding behavior and the low density of pellets in the intertidal area due to the planned delivery method of hand placement of bait adjacent to the shoreline. Further, previous studies on the effects on birds of direct and indirect ingestion of bait indicate that it is physically impossible for birds to eat enough diphacinone pellets or tainted prey to cause death.

Finally, the native pueo has been observed on occasion at Ka`ena. Its diet consists of rats, mice, small mongoose, and possibly small birds; as a result, it is unlikely to directly ingest bait pellets. However, they could eat rats or mice carrying rodenticide residues in their tissues prior to dying. Using the analysis contained in the Lehua Supplemental Draft Environmental Assessment for barn owls, the risk of mortality when using diphacinone is nearly zero, due the large numbers of rats that would have to be ingested (81 pounds) and the few numbers of pueo seen at Ka`ena.

In conclusion, no negative impacts to native birds are anticipated as a result of the use of toxicants.

Monk seal:

Rodent control activities involve the use of toxicants and are not anticipated to negatively impact monk seals for the following reasons. The operation will be conducted during winter months, outside the monk seal pupping season. In shoreline areas, bait will be placed by hand directly in burrows or other areas deemed to be high quality rat habitat to minimize risk of bait being swept or blown in the ocean and/or coming into contact with monk seals. If any monk seals are present during the removal operations, crews conducting hand broadcast of rodenticide pellets will maintain a 100-foot buffer from all seals.

Marine species:

The use of toxicants is not anticipated to negatively impact marine fish, marine invertebrates, or sea turtles. In shoreline areas, bait will be placed by hand directly in burrows or other areas deemed to be high quality rat or mouse habitat to minimize risk of bait being swept or blown in the ocean and/or coming into contact with monk seals, sea turtles or migratory shorebirds. This planned delivery method will reduce the amount of actual bait ending up in the water, minimizing risks to marine invertebrates, fish and turtles.

Both toxicants under consideration (diphacinone and brodifacoum) have low solubility in water and bind tightly to organic material in soil. Water sampling conducted after aerial application of diphacinone pellets to Mokapu island in February 2008 found no diphacinone residues in any of the seawater samples. Water quality data collected in New Zealand after a massive brodifacoum spill into nearshore waters (20 tons of bait spilled into the ocean at a single point), finding that brodifacoum levels were no longer detectable 36 hours after the spill. This low water solubility decreases the likelihood of exposure of marine organisms to dissolved rodenticides.

Direct ingestion of bait and consumption of contaminated prey is also unlikely. Data from field trials in other locations, including in Hawai'i at Lehua and Mokapu, indicates that nearshore fish are unlikely to be attracted to bait pellets. Moreover, sampling results at Mokapu after aerial drops found no detectable rodenticide residues in marine tissues of limpets and fish after two diphacinone applications, and tests after the 20-ton brodifacoum spill (which would exceed any potential exposure at Ka'ena by several orders of magnitude) noted above found unexpectedly low rodenticide levels in marine organisms.

As a result, the impact to marine species at Ka'ena Point is anticipated to be minimal, particularly since bait is not being delivered in a helicopter and therefore has more control over where it is spread. Based on the fact that the Mokapu aerial drops did not result in detectable rodenticide residues, and the low levels of contamination resulting from a worst-case (20-ton) brodifacoum spill, it is highly unlikely that rodenticide will end up in the marine environment at Ka'ena Point.

In summary, the following procedures are planned to minimize non-target impacts to both birds and marine species:

- During the entire removal period (up to several months), the reserve will be staffed daily to monitor the removal.
- If any broadcast of rodenticide pellets occurs after Laysan albatross chicks hatch, bait will not be distributed in a 6 foot buffer zone

around the nest so that chicks, which are not yet mobile, cannot play with, or ingest bait pellets accidentally.

- In shoreline areas, bait will be placed by hand directly in burrows or other areas deemed to be high quality rat habitat to minimize risk of bait being swept or blown in the ocean and/or coming into contact with monk seals, sea turtles or migratory shorebirds.
- If any monk seals are present during the removal operations, crews conducting hand broadcast of rodenticide pellets will maintain a 100-foot buffer from all seals.
- Samples of near-shore marine invertebrates, reef fish, and sea water will be collected for possible testing if non-target impacts are suspected.
- Results of a previous risk analysis by USFWS in the context of the rodent removal at Lehua through the use of aerial and hand broadcast of anticoagulant rodenticide pellets indicated that bait pellets will not present a poisoning hazard to foraging seals or sea turtles. Staff involved in the Ka'ena Point Ecosystem Restoration project will remain in communication with USFWS regarding the ongoing restoration at Lehua for additional mitigation measures, if required.