



# Freeing Islands from Rodents

BROADCAST RODENTICIDES HELP NATIVE SPECIES RECOVER

By William Pitt, Daniel Vice, Dana Lujan, Diane Vice, and Gary Witmer

Invasive rodent species occupy more than 80 percent of island groups worldwide, with devastating impacts to native flora and fauna. Rodents prey on birds, mammals, reptiles, amphibians, and invertebrates, and indirectly affect native wildlife by destroying plants, competing for food, and transmitting disease. Species such as Norway rats (*Rattus norvegicus*), black rats (*R. rattus*), and Polynesian rats (*R. exulans*) have caused the extinction of several species of native birds, mammals, and lizards (Atkinson 1985). For example, less than a decade after black rats were accidentally introduced to Big South Cape Island in New Zealand in the early 1960s, one bat species—the greater short-tailed bat (*Mystacina robusta*)—and five bird species, including the South Island snipe (*Coenocorypha iredalei*), went extinct (Bell 1978).

To protect natural resources from rodents, biologists and landowners have typically applied anticoagulant rodenticides through bait stations. Though such stations can effectively eradicate rodents in small areas, they have not been feasible or effective in larger areas or on inaccessible islands. In 2005, USDA-APHIS Wildlife Services, in collaboration with the U.S. Fish and Wildlife Service (FWS) and two private companies, achieved a breakthrough in large-scale rodent eradication by developing and registering three new anticoagulant rodenticide products—Diphacinone 50 Conservation, Brodifacoum 25W Conservation, and Brodifacoum 25D Conservation—for broadcast application, both by hand or by air. To date, these products have helped successfully eradicate rodents from numerous islands in California, Florida, Alaska, Hawaii, and through the Virgin Islands, American Samoa, and the Pribilof Islands. Once the rodents were gone, the recovery and restoration of wildlife on these islands has been dramatic.

## Victory on Cocos Island

One of the most notable recent success stories in rodent eradication has occurred on tiny Cocos Island, a 34-hectare island immediately south of Guam. There, superabundant invasive Polynesian rats (*Rattus exulans*) had been impacting native birds and other island species including nesting black

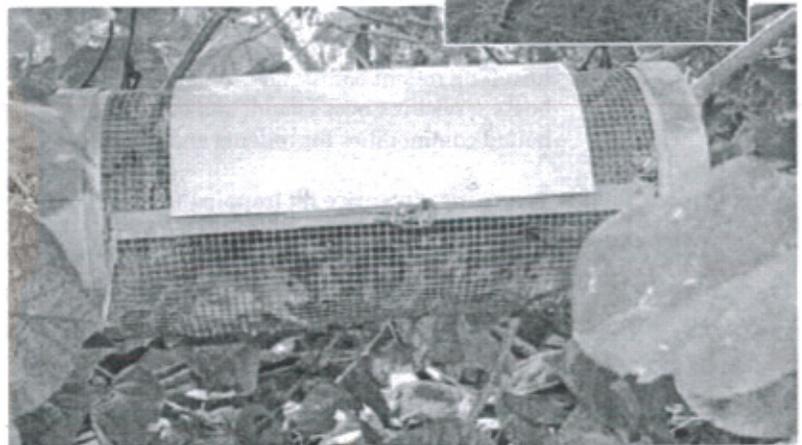
noddies (*Anous minutus*) and Micronesian starlings (*Aplonis opaca*). Rats were also limiting the ability of wildlife managers to detect and eliminate a potential population of brown treesnakes (*Boiga irregularis*) on the island: When there is ample supply of rodent prey in the environment, food-based control tools are less effective against snakes. It was believed that if brown treesnakes became established on the island, this would ultimately lead to the loss of all nesting birds on Cocos.

Rodent eradication and prevention of snake establishment on Cocos was especially critical because, in 2006, the Guam Department of Agriculture's Division of Aquatic and Wildlife Resources initiated the Ko'ko' for Cocos Project, an ecosystem restoration effort aimed at establishing a breeding population of endemic Guam rails (*Gallirallus owstoni*)—locally known as the ko'ko'—on Cocos Island. The project included the release of captive-bred Guam rails, which are federally listed as endangered and extinct in the wild on Guam. Partners in the rodent eradication included the Cocos Island Resort, USDA-APHIS Wildlife Services, FWS, and the U.S. Department of the Interior's Office of Insular Affairs.



Credit: TK

William Pitt is the Field Station Leader and Project Leader with USDA-APHIS Wildlife Services' National Wildlife Research Center Hawaii Field Station in Hilo, Hawaii.



Credit: TK

Otaes as dolest occupia de vendaerio et eum accabo. Vid exceatus ut verunt eribea consequid qui beroreius non nos nonsent utem adit vollamus. Ehenis dolum suntissenem et ut estem essimin verspientitas dolenis sequati ne velibus de et,



Credit: TK



Credit: TK

Ex estibus aci opta volecestiae acipsae nest verrum et, ommolorupta duntem quatemp oratium idunt anturestios et latiosam eum ressurunt quatus, omnisque erum verores equidem. Siti quam solorep udaeproria deligen dereprem et volupta vendia volupta tqunt maionsedi

Eradicating rodents from Cocos presented a technically challenging situation for several reasons. Terrestrial crabs and native forest birds consumed broadcast rodenticide baits. In addition, daily ferries between mainland Guam and Cocos Island created the risk of rodent re-introduction, and a day-use resort on the island created substantial manmade rodent habitat (such as trash stations) that required specialized control approaches. Finally, visitors in direct contact with control activities posed a potential health risk.

To help address these issues, project partners identified key needs in the eradication effort and developed an integrated eradication plan, which involved the following steps:

**Biosecurity.** The team drafted and implemented a comprehensive biosecurity plan for the island. This plan involved improving waste management processes; educating resort staff, visitors, and the boating public about the risks of invasive species; installing rodent bait stations on ferry and vendor boats servicing Cocos Island; and inspecting resort-bound commodities for rodents and snakes.

**Trapping.** Intensive rat trapping was initiated around resort dining and trash facilities prior to distributing anticoagulant baits, in part to address concerns over possible anticoagulant bait resistance in the commensal rat population, as well as to provide a safe alternative to the use of toxicants in and around areas of human habitation.

**Crab-proof bait stations.** We began to distribute the anticoagulant rodenticide containing brodifacoum via crab-resistant bait stations throughout the resort

settings of the island. The bait stations were made crab-proof simply by affixing a commercially-available, tamper-resistant bait station to a covered three-gallon plastic pail, which crabs couldn't climb. These stations were placed on a 10m-by-10m grid across the resort facility. Each morning, the stations were gathered and stored out of sight, then after the departure of the last tourist ferry, they were set out again.

**Bait broadcasting.** Project managers made two hand-broadcast applications of the anticoagulant Diphacinone 50 Conservation across the forested areas of the island, an area covering approximately 25 square hectares. A rodenticide bait containing diphacinone was chosen because it represented less risk to non-target species. Baits containing other ingredients would likely result in bird mortality. In addition, a hand broadcast was used to place baits more accurately and prevent bait from entering the marine environment. Two one-day broadcast applications were completed nine days apart, placing adequate bait –12 kilograms per hectare during the first application and 9.5 kilograms per hectare during the second—throughout the island to target all rodents.

**Monitoring.** Throughout the project, researchers conducted environmental residue testing and intensive monitoring for environmental impacts—including non-target mortality. Monitoring indicated the eradication was completed successfully with no non-target species losses and minimal environmental persistence of anticoagulants. After completion of the baiting program, we conducted post-eradication monitoring using non-toxic baited tracking stations situated around the island. In March 2011—after two years with no sign of rodents—Cocos Island was officially declared rodent-free.

This victory enabled the release of captive-bred Guam rails onto Cocos Island, and has allow the ko'ko' to thrive and reproduce in an environment free of rodents and snakes for the first time since humans colonized Guam. In addition, native forest and seabirds continue thriving across the island, a sure sign that rodent eradication on Cocos Island represents a great step forward for conservation, and a great hope for island ecosystems everywhere. ■



To see a 2007 video about efforts to protect the Guam rail on Cocos Island, go to [wildlife.org/twplugin](http://wildlife.org/twplugin).

#### Co-author Affiliations

Daniel Vice is the Assistant State Director with USDA-APHIS Wildlife Services in Barrigada, Guam.

Dana Lujan is a Wildlife Biologist with USDA-APHIS Wildlife Services in Barrigada, Guam.

Diane Vice is a Wildlife Biologist with the Guam Division of Aquatic and Wildlife Resources in Mangilao, Guam.

Gary Witmer is a Project Leader with USDA-APHIS Wildlife Services' National Wildlife Research Center in Fort Collins, Colorado.