

Hawaii's Forests and Wildlife



Volume IX No. 4
Winter 1994

The Quarterly Newsletter of the Hawaii State Division of Forestry & Wildlife
Department of Land and Natural Resources

Tests Indicate Minimal Hazard To 'Io From Diphacinone Baiting

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Government conservation agencies and cooperators recently received approval from the Hawaii Department of Agriculture to use EATON'S ALL-WEATHER BAIT BLOCKS RODENTICIDE to control rodents in forest, offshore islands and other non-crop areas to protect Hawaiian native and endangered plants and animals. One question that immediately arose was, "What is the risk to non-target animals, particularly avian predators such as the endangered 'io, when baiting forested areas?" Laboratory studies have shown that diphacinone (the toxicant in the bait blocks) can cause illness or death to some avian predators which consume poisoned rodents.

We have three avian predators—'io (Hawaiian hawk), pueo (native short-eared owl), and the introduced barn owl—in Hawaii that could be exposed to poisoned rodents during baiting programs. Although we believe that, in forested areas, most rats will die below ground or in dense cover and will not be accessible to avian predators, no experimental field studies have been conducted to document the fate of rodents that die during baiting programs.

To find out whether baiting rats with diphacinone would present a hazard to 'io, we conducted two tests in the wet forest of the Hakalau Forest National Wildlife Refuge on the Big Island. In the first test, we placed 43 dead Black, Norway and Polynesian rats (kill trapped in areas without poison) on open ground under the forest canopy to see what animals would take them. At 28 of the rats, we placed cameras to obtain pictures of the scavengers. A black nylon thread, tied to each rat, was attached to a small mouse trap located next to the camera. When a scavenger picked up the rat the mouse trap would spring shut, triggering the camera.

Within 17 days of exposure, we had 33 of 43 rats (76.7%) taken by scavengers. The mean time for scavengers to find and remove 16 rats (where we knew the day that the rats were taken) was 2.9 days (range = 1-7 days). Scavengers identified in photographs included 6 feral pigs, 4 mongooses, 2 rats, and 1 feral cat. Rats not found by scavengers were consumed by fly larvae, generally with only the skin and bones remaining after 17 days.

Although we observed 'io flying over the study areas on at least three occasions, located one active 'io nest within 450 m of dead rat locations, and observed or heard 'io within 500 m of the study area on most days that rats were exposed to scavengers, we did not observe 'io approach any rat

location or see pueo or barn owls near or in the study areas.

In the second test, we placed 9 bait stations, each containing 227 g of 0.005% diphacinone EATON'S ALL-WEATHER bait blocks flavored with peanut butter and molasses, at 25 m intervals around the nest site of each of 6 radio-tagged black rats and 2 radio-tagged Polynesian rats. Nest sites for all rats were located underground near or in downed logs, root masses, dead stumps or hapu'u ferns.

We documented minimal daytime activity, and, with few exceptions, radio-tagged rats were located during the day in or adjacent their nest sites. Three rats located above ground and away from their nests during the day were found in areas of dense vegetation and downed logs. All radio-tagged rats became active, moving above ground, immediately after dark.

House mouse activity in bait stations began immediately after baits were set out, but rat activity in bait stations did not occur until day 25. By 55 days of bait exposure, however, 67% of bait stations had been visited by rats. Within 48 days after exposure to diphacinone-treated bait, rat mortality was 87.5% (7 of 8 rats). One Polynesian rat survived the baiting.

None of the seven radio-tagged rats died in areas that were accessible to 'io. We recovered three radio-tagged rats and two detached radios above ground under downed logs, within root masses, or dense vegetation. A third detached radio

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Conservation Exchanges Between Hawaii and New Zealand

Colin Bassett, Administrative Officer
Secretariate for Conservation Biology

This is an invitation for managers, researchers and educators to apply for financial support to visit New Zealand in FY96. The Secretariat for Conservation Biology (SCB) and Landcare Research New Zealand Ltd have agreed to facilitate exchange visits between Hawaii and New Zealand of appropriate managers, researchers, and educators. Two persons will be supported for visits of 2-3 weeks, with the SCB providing international air fares, and Landcare providing the actual costs of internal transport and living expenses within New Zealand.

The natural environments of New Zealand and Hawaii have much in common. Both places have been isolated in time and space for millions of years, have evolved unique plants and animals in the absence of browsing mammals, have suffered habitat destruction following human occupation, have been subjected to a steady inflow of alien plants and animals and are experiencing extinctions of elements of their flora and fauna.

The common issues in managing natural resources have been addressed in both places by managers and researchers, sometimes with similar approaches, sometimes with quite different ones. Each place has made advances and found solutions or part-solutions that may be applicable in the other. Regular communication and interaction between natural resource researchers, managers, and educators in Hawaii and New Zealand is of benefit to both states.

Proposals should state the purpose(s) of the visit; organizations and projects to be visited; the benefits to Hawaii; and show evidence that the visit is supported by colleagues or organizations in New Zealand. Proposals should be brief, no more than 3 pages. They may be submitted by individuals or organizations nominating an employee. The original deadline of July 31 has been extended to August 31, 1995. Submit proposals to Colin Bassett, SCB, 3050 Maile Way - Gilmore 310, Honolulu, HI 96822. For additional information, call (808) 956-9825 or fax (808) 956-9608.

Diphacinone (cont.)

was located in a burrow 0.3 m below ground. The three rat carcasses exhibited hemorrhaging typical of diphacinone poisoning, and the stomachs, gut, and feces contained blue-green diphacinone bait. We believe that the rats carrying the three detached radios were probably eaten by mammalian scavengers after dying of diphacinone. One detached radio, when found, had a small piece of rat skin laying adjacent to it. The radio and, presumably the carcass of the seventh radio-tagged rat was located about 8 m above ground within a large koa tree.

Within the study area, we twice observed single 'io and once observed a pair of barn owls. 'Io was periodically heard calling within 500 m of the study area. As in the first test, we did not observe 'io approach a rat nest site or bait station. Although we observed three feral pigs, and fresh pig and feral cow sign within the study area, no bait station was disturbed by these animals during the 56 days exposure period.

Feral pigs in areas treated with Eaton's Bait Blocks would be unlikely to consume dangerous quantities of diphacinone by scavenging dead rats. In experimental laboratory studies, black rats exposed to Eaton's bait blocks consumed an average 1.45 mg diphacinone before dying (Mark Tobin, pers. comm.). The LD₅₀ of diphacinone for pigs reported in the literature is 150+ mg/kg. Therefore, a 60 pound pig would have to consume 4,095 mg diphacinone (about 2,824 rats) to obtain a lethal dose. Dead rats were rapidly consumed by fly larvae, limiting the exposure time

'Alala Support (cont.)

Please write one or more of our delegates listed below, and let them know of your support for this important rainforest acquisition. A detailed description of this proposed addition to Hakalau Forest National Wildlife Refuge will be forthcoming this summer, through the Fish and Wildlife Service's National Environmental Policy Act (NEPA) disclosure. However, since the NEPA process will likely come after some key Congressional appropriations decisions in the House of Representatives, your letters of support are needed now.

Mahalo nui loa for your efforts on behalf of this important conservation project!

Address your letters to any or all of the following:

Honorable Daniel K. Inouye
United States Senate
Washington, DC 20510

Honorable Daniel K. Akaka
United States Senate
Washington, DC 20510

Honorable Neil Abercrombie
House of Representatives
Washington, DC 20515

Honorable Patsy Mink
House of Representatives
Washington, DC 20515

to scavengers. Rats dying of diphacinone also tended to die underground, under logs, in trees, and root masses; areas that would be relatively inaccessible to pigs.

Evidence from these two tests also suggests that hazards to 'io from baiting in Hawaiian wet forests with 0.005% diphacinone bait would be minimal.

Dead rats were rapidly consumed by fly larvae or found by mammalian scavengers. 'Io did not appear to recognize dead rodents laying on the forest floor as food items. Rats moving above ground during the day, before and after exposure to diphacinone bait, tended to remain under cover (within dense vegetation or areas of downed logs, stumps and root masses), minimizing their exposure to avian predators.