CHAPTER 6: RODENT MANAGEMENT

OANRP has managed MIP and OIP species that are subject to rodent predation with various strategies since 1997. This chapter discusses rodent control methods utilized over the past reporting year and highlights recent changes. Specifically, this chapter has five main sections: Section 6.1 provides an overview of the current rodent control program and discusses recent changes; Section 6.2 discusses recently installed Goodnature® A24 automatic rat trap grids at Kahanahaiki and Ohikilolo; Section 6.3 provides results of an investigation into tracking tunnel data; Section 6.4 discusses on-going trap trials at Palikea and Ekahanui; and Section 6.5 lays out future plans for rat control.

6.1 OANRP RODENT CONTROL PROGRAM SUMMARY

OANRP manages rats threatening some rare species only seasonally (e.g., *Chasiempis ibidis* or Oahu Elepaio during the nesting season), while other species are protected year-round (e.g., *Achatinella mustelina*.). The methods of rodent control that OANRP currently utilizes for rodent control are limited to using kill-traps (Victor® traps, Ka Mate™ traps, and Goodnature® A24 traps) and predator-proof fences.

Rat control in 2015 consisted of deploying small Victor® snap trap and Goodnature® A24 trap grids around resources, maintaining large-scale trapping grids consisting of Victor® or Ka Mate™ traps, and installing and maintaining large-scale trapping grids of Goodnature® A24 traps. More Goodnature® traps will be installed across MUs and around additional population units over the next year. OANRP contracted Pono Pacific to conduct rat control during Elepaio nesting season (December – June) at Ekahanui, Kahanahaiki, Moanalua, Palehua, and Schofield Barracks West Range (SBW). Pono Pacific is also contracted to conduct year round rat control at Ekahanui and Palikea.

In October 2015 a new predator control contract will be awarded for a five year period. Control levels at most sites will increase with number of traps and size of grids. The contractor will also be responsible for checking tracking tunnels at Palikea, Ekahanui, Kahanahaiki, and Makaha. Year round control using A24s will be conducted by the contractor at Kahanahaiki and Makaha. Prior to this contract the OANRP field teams were conducting this control, and now they will be able to focus efforts on other units and management actions.

Table 1. Rat control strategies to be utilized by OANRP in 2015-2016.

MU/Area	Primary Spp. Protected	Control Method	Description	Trap Type	# Traps	Deployment	Check Interval
East Makaleha	*A. mustelina*	Trapping Grid	Two small grids	Victor® w/out boxes	40	Year-round	4-6 weeks
				A24 Automatic traps	20		
Ekahanui† *i*	*A. mustelina*	Trapping Grid	Many small grids	Victor® w/out boxes	47	Year-round	4-6 weeks
				A24 Automatic traps	30		
	C. ibidis	Trapping Grid	Large-scale grid	Victor® w/ & w/out boxes[i]	620	Annual: Dec-June	2 weeks

MU/Area	Primary Spp. Protected	Control Method	Description	Trap Type	# Traps	Deployment	Check Interval
Kahanahaiki †+	*A. mustelina*	Predator-proof fence	Constructed 1998	--	--	Year-round	--
	A. mustelina, Cyanea superba	Trapping Grid	Large-scale grid	A24 Automatic traps	170	Year-round	4 weeks
Kamaohanui	*A. mustelina*	Trapping Grid	One small grid	Ka Mate™ A24 Automatic traps	47 10	Year-round	6 weeks
Kapuna	*Hesperomannia oahuensis*	Trapping Grid	Two small grids	A24 Automatic traps	5	Seasonal	6 weeks
	Schiedea nuttallii				4		
Koiahi	*A. mustelina*	Trapping Grid	One small grid	A24 Automatic traps	8	Year-round	6 weeks
Makaha Unit I	*A. mustelina, H. oahuensis, C. superba*	Trapping Grid	Large-scale grid	A24 Automatic traps	110	Year-round	4 weeks
Makaha Unit I	*H. oahuensis*		Two small grids	A24 Automatic traps	13	Seasonal	6 weeks
				Victor® w/out boxes	24		
Makaha Unit II	*Cyanea grimesiana*		Large-scale grid	A24 Automatic traps	80	Year-round	6 weeks
Manuwai	*Delissea waianaeensis*	Trapping Grid	One small grid	Victor® w/out boxes Ka Mate™ A24 Automatic traps	14 11 8	Seasonal	6 weeks
Moanalua†	*C. ibidis*	Trapping Grid	Many small grids*	Victor® w/out boxes	300	Annual: Dec-June	2 weeks
Ohikilolo	*A. mustelina, Pritchardia kaalae*	Trapping Grid	Many small grids	Victor® w/ boxes	47	Year-round	6 weeks
				A24 Automatic traps	53		
Palehua†	*C. ibidis*	Trapping Grid	Many small grids*	Victor® w/out boxes	200	Annual: Dec-June	2 weeks
Palikea	*A. mustelina*	Predator Exclosure	Constructed 2012	--	--	Year-round	--
Palikea-Mauna Kapu	*A. mustelina*	Trapping Grid	One small grid	Victor® w/ boxes	15	Year-round	6 weeks
Palikea†	*A. mustelina*	Trapping Grid	Large-scale grid	Ka Mate™	250	Year-round	2 weeks
SBW Haleauau‡†	*A. mustelina*	Trapping Grid	One small grid	Victor® w/out boxes	28	Year-round	6 weeks

MU/Area	Primary Spp. Protected	Control Method	Description	Trap Type	# Traps	Deployment	Check Interval
	H. oahuensis	Trapping Grid	One small grid	Victor® w/out boxes	3	Seasonal	6 weeks
				A24 Automatic traps	3		
	C. ibidis	Trapping Grid	Many small grids*	Victor® w/out boxes	450	Annual: Dec-June	2 weeks
				A24 Automatic traps	50	Annual: Dec-June	4 weeks
W. Makaleha	*C. grimesiana*	Trapping Grid	One small grid	Victor® w/out boxes	28	Year-round	6 weeks
Waianae Kai	*Neraudia angulata*	Trapping Grid	One small grid	Victor® w/out boxes	20	Seasonal	6 weeks
Waieli-Hapapa	*A. mustelina*	Trapping Grid	One small grid	Victor® w/out boxes	35	Year-round	6 weeks
		Predator-proof fence	Constructed 2011	--	--	Year-round	--

* *Each managed Elepaio (*C. ibidis*) territory has 12 traps installed ~12 m apart in trees.*
† *Contracted Pono Pacific to maintain rat grids during Elepaio nesting season.*
‡ *N. Haleauau snail sites are included during Elepaio nesting season.*
i *The majority of traps have been removed from the wooden boxes and placed in trees.*
\+ *Victor® snap traps discontinued to run A24s.*

OANRP is continually researching and reassessing rat control methods to determine the most effective strategies for the protection of natural resources.

6.2 A24 GRID AT KAHANAHAIKI

In 2015, OANRP managed a large scale grid of A24s at the Kahanahaiki Management Unit (MU). This MU has had various rat control conducted in previous years, ranging from small grids of bait stations to large scale Victor® snap trap grids. Kahanahaiki has long been a testing ground for new management techniques and was the first area with ecosystem scale rat control. It was decided to install the A24 grid in Kahanahaiki so that the results could be compared to other rat control strategies used there in the past. Additionally, easy access at this location allows for frequent monitoring and adjustments.

The Kahanahaiki grid is designed for large-scale lethal trapping for rats (*Rattus* spp.) across the MU. The overall goal is to reduce rat activity within an MU to a level that benefits the endangered plants, *A. mustelina* (Oahu tree snail), native insects, and the native ecosystem as a whole.

In 2014, OANRP installed a grid of 119 Goodnature® A24 automatic rat traps across the 26 ha Kahanahaiki MU, equating to 4.6 A24s per ha. The A24 grid was used in 2015 instead of maintaining the prior snap trap grid of 464 Victor® snap traps, equating to 17.8 Victor snaps per ha. The A24 grid was laid out using 50x100m spacing with some traps placed at 25x100m based on prior snap catch data. From past snap catch data we have observed, the gulch area in general accounts for more rat catches than other areas of the MU, so additional traps were placed here based on this information.

A24s were checked monthly, requiring 3 personnel. The A24s were checked for presence of carcasses, re-baited with Goodnature® preservative peanut butter and each CO_2 canister was tested. Due to a limited number of counters, only 17 of the 119 traps were fitted with counters to monitor hits.

A total of 38 tracking tunnels were monitored inside the grid and 24 tunnels were monitored at a nearby site (Kapuna Gulch, within Pahole Natural Area Reserve) as a control with no active trapping being conducted. Tunnels were monitored one month prior to installation of the A24s and then monthly thereafter for both sites. Kahanahaiki has been monitored since 2009 and monitoring results have been included for comparison (Figure 1). Tunnel data show that percent rat activity at the Kapuna site remains high year round, and in the 2014-2015 season, Kahanahaiki was approaching control site levels.

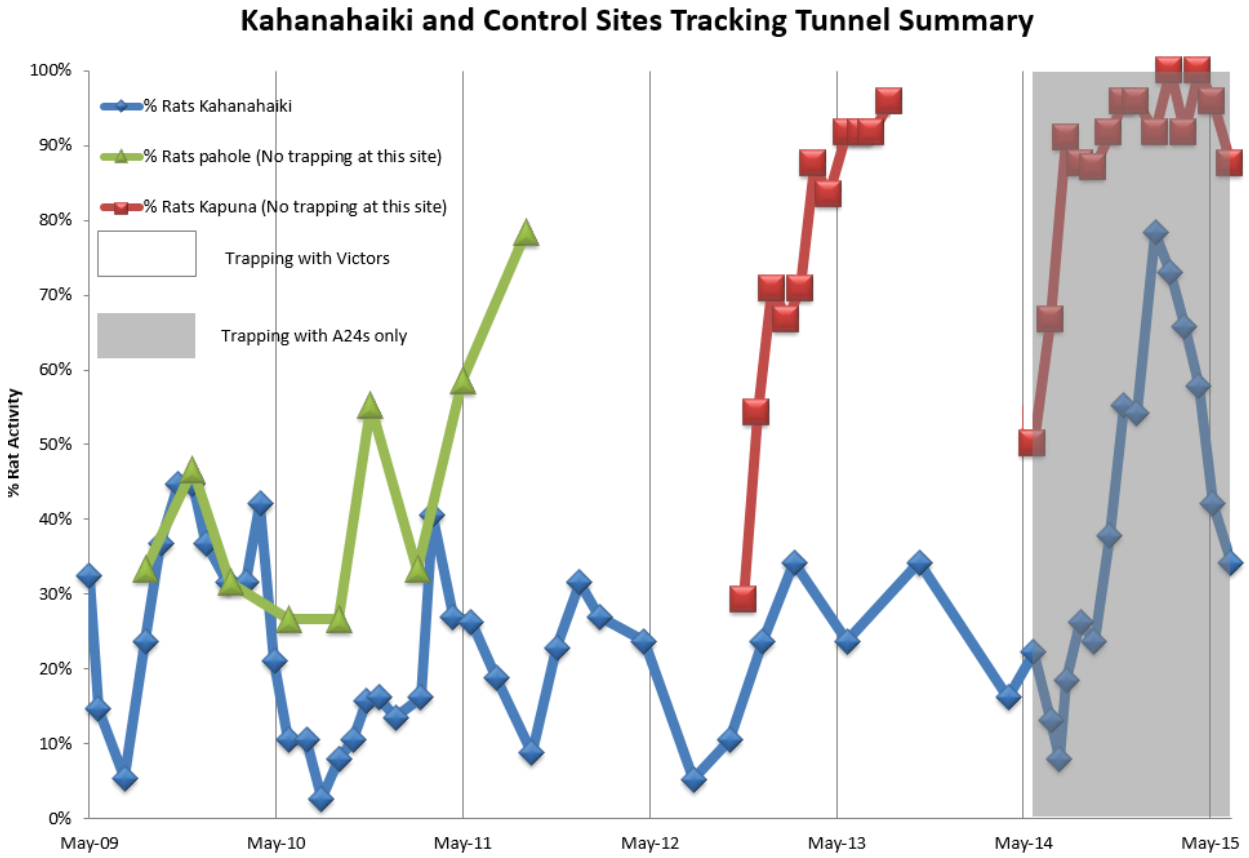

Figure 1. Percent of rat activity each month at Kahanahaiki and two control sites Kapuna and Pahole.

Diphacinone-50 Hand Broadcast Pilot Project

Since 2012, OANRP halted rodenticide use because of a change in the Special Local Needs (SLN) label that makes bait-station application unfeasible in the steep, rugged terrain where the work is conducted. Relying solely on traps has not been effective in keeping populations below the targeted 10% tracking in monitoring tunnels, particularly during the period of peak rat abundance (typically Fall/Winter). In an attempt to combat this problem in Hawaiian habitats, OANRP will make an effort to determine the effectiveness of a "one-time" two-application hand-broadcast (applications spaced approximately 5-7 days apart) and canopy baiting of rodenticide bait (Diphacinone-50) during a period of high rat abundance, October 2015, within Kahanahaiki. The hand broadcast application will involve OANRP staff walking a grid of trails while evenly distributing rodenticide bait; canopy baiting involves placing bait, held in small cloth bags, into trees within the grid. These application methods comply within the

Diphacinone-50 label (EPA Registration No. 56228-35). The hand broadcast method of rat control was assessed in the Programmatic Environmental Assessment for the Final Implementation Plan for Oahu Training Areas, March 2010, FNSI June 2010. USDA National Wildlife Research Center (NWRC) will provide the monitoring associated with this study (e.g., bait application according to label, efficacy of this rat-reduction method, and non-target impacts). See Appendix 6-1 for OANRP Diaphacinone-50 Hand Broadcast Study.

Other Management Considerations for 2016

One of the OANRP goals for the A24s is to eventually reduce the trap monitoring interval from monthly to quarterly. Because this is a multi kill trap and costs more than traditional traps, a balance of staff time and trap cost needs to be achieved to meet program objectives. One of the ways to accomplish this is by increasing the bait longevity and attractiveness in the A24s at Kahanahaiki. A study developed to do this involves constructing custom counters that record the date and time of each hit. This will allow us to determine how effective the bait is over a three month period and if the monitoring interval affects number of hits. From bait trials in previous years, we have found that the Goodnature Preservative peanut butter has been more attractive and outlasted all other bait alternatives and thus will be used for the trial.

6.3 COMPLETED TRIALS AT PALIKEA AND EKAHANUI

Although the significant amounts of data and research conducted on traps and bait in New Zealand is helpful for implementation in Hawaii, OANRP has documented difficulties and conditions that are not experienced in New Zealand. For example, bait removal by slugs and other invertebrates is a major issue that is not experienced to the same degree in New Zealand. Additionally, it is possible that black rats (*R. rattus*) in Hawaii spend more time in trees than black rats in New Zealand (Peters, pers. comm. 2013). Two questions OANRP asked over the past years is whether or not rat control is improved by housing snap traps inside a protective box (typically placed on the ground) or whether uncovered snap traps mounted directly to trees is more effective. It is thought that perhaps the rats would encounter the traps more easily if they were in trees while the slugs would not encounter them as easily, reducing bait loss. DOC's best practice includes housing Victor® traps inside wooden boxes placed on the ground in order to exclude non-target species, guide target species, prevent accidental triggering, and maintain the integrity of the trap from weather (NZ DOC 2005).

During 2014 a trial was conducted at Ekahanui to assess if putting Victor® traps uncovered in trees is better than putting Victor® traps in trees with two different trap coverings: wooden boxes or greenhouse plant pots. This study also looked at catch of non-targets to determine whether covered traps will catch fewer non-targets relative to uncovered traps while maintaining the same efficacy for rats. The entire Ekahanui grid covers an area of 177 acres (72 ha). The grid consists of 620 Victor® snap traps that are housed in protective wooden boxes on the ground or placed in trees without boxes; there are 225 traps on the perimeter of the MU and 394 traps in the interior of the MU, all spaced 25 meters apart. For this trial, only a subset of traps (150) were used. 80 Victor® traps were placed in trees with no covering, 36 were placed in boxes in trees, and 34 were placed in greenhouse plant pots in trees. Traps were checked every two weeks and catches were recorded.

From July to October, a total of 105 rats were caught using the 3 different treatments. Uncovered traps recorded a higher total number of rat catches than covered traps, but this difference was not statistically significant ($p = 0.8748$). Uncovered traps also caught more birds (*Leiothrix lutea* and *Copsychus malabaricus*) than covered traps, but this difference was not statistically significant ($p = 0.1893$). The different trap covers (wooden boxes and plastic 2 gallon tree pots) did not show a significant difference in the number of rat catches ($p = 0.1613$).

During 2014 a trial was conducted at Palikea to compare two different trap types, Victor® versus Ka Mate™, and to conduct a cost benefit analysis. The Palikea grid covers an area of 21 acres (9 ha). The grid consists of 180 Ka Mate™ traps: there are 98 traps on the perimeter of the MU spaced 12.5 meters apart and 82 traps in the interior of the MU spaced 25 meters apart along trails. Ka Mate™ traps were deployed in order to experiment with that style of trap and compare the trapping efficacy to Victor® snap traps. On June 5, 2014, staff replaced every other Ka Mate™ trap with a Victor® trap uncovered in a tree, for a total of 91 Ka Mate™ and 84 Victor® traps. Both trap types were then baited every two weeks using small pieces of coconut and observations were recorded. Peanut butter was not used for this trial as Ka Mate™ traps require the use of hard bait for proper trap function. Ka Mate™ traps are set by wedging coconut underneath the trigger. The bait is held in place by tension and the trap cannot trigger until the bait is removed. Victor® traps are set by placing the coconut securely on the yellow pan in-between the plastic triangle or by smashing into the little box on the trigger.

A total of 165 rats were caught across both traps during the 4 months of deployment and no differences were observed between trap types ($p = 0.5365$), with Ka Mate™ traps recording a total of 75 catches and Victor® snap traps recording a total of 90 catches. However, the proportion of traps recorded as 'Snapped with no bait' (no rat was caught, but trap was triggered) was marginally higher for Ka Mate™ traps than Victor® traps ($p = 0.0934$). There were no significant differences between trap types in terms of bird catch rates ($p = 0.2697$), with a total of 9 birds caught in the Victor® snap traps and 2 birds in the Ka Mate™ traps.

6.4 FUTURE PLANS

Large scale grids of A24s may prove to be more cost effective and beneficial for MU wide rat control compared with large scale grids of Victor® traps; however, additional methods of control may be needed in combination with traps, such as hand broadcasts of Diphacinone-50. OANRP will use the Diphacinone-50 pilot project findings, counter trials and tracking tunnel results from Kahanahaiki to determine future rat control at other MUs. Over the next year OANRP will utilize all trapping methods in combination at some sites to see if more effective control is achieved.

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