

Operational Monitoring of a Rat Eradication on Lehua Island (Kauai, Hawaii, August 2017)

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March 11, 2018

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Suggested Citation:

Siers, S.R. 2018 Operational monitoring of a rat eradication on Lehua Island (Kauai, Hawaii, August 2017). Final Report QA-2824. USDA, APHIS, WS, NWRC. Hilo, HI. 17 pp + appendices.

Introduction

Lehua Island is a 115 hectare island located 1.2 km off the northern shore of Niihau (a privately owned, 18,650 hectare island). Lehua is a state-designated seabird sanctuary managed by the Hawaii Department of Land and Natural Resources (DLNR) and federally owned by the U.S. Coast Guard (USCG). Lehua is one of Hawaii's most important seabird colonies because of its size and height above sea level. It also offers an opportunity for restoring an island ecosystem in the main Hawaiian Islands.

The Hawaii Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife (DOFAW), in conjunction with federal sponsors U.S. Fish and Wildlife Service (USFWS), technical partner Island Conservation (IC), and the cooperating members of the Lehua Island Restoration Steering Committee (LIRSC) have proposed to eradicate Polynesian rats (*Rattus*

exulans) from Lehua Island so restoration efforts can move forward in the future.

The purpose of this action would be to eradicate non-native rats from Lehua and maintain its rodent-free status, which would facilitate the restoration of the natural island ecosystem. This activity could improve seabird nesting habitat and aid in the recovery of rare endemic seabirds such as Band-rumped Storm Petrels (*Oceanodroma castro*), Hawaiian Petrels (*Pterodroma sandwichensis*), Newell's Shearwaters (*Puffinus newelli*), and native coastal plants and insects. The proposed action was not anticipated to have any significant negative environmental effects; the State of Hawaii and the US Fish and Wildlife Service have each completed Environmental Assessments (EAs) and issued Findings of No Significant Impact (FONSI) for this action.

The proposed action involves the aerial broadcast of bait pellets containing rodenticide into all potential rat territories on Lehua Island. Rat eradication would occur in the summer dry season to maximize the probability of success by targeting the rats when food resources are lowest and rat abundance is declining. Conducting the operation during this period would also minimize the risk of rain washing rodenticide pellets into the ocean. The plan includes aerial broadcast of rodenticide bait pellets containing 50 ppm diphacinone, with potential to use 25 ppm brodifacoum as a backup the following year, if the diphacinone application fails to eradicate the rat population. The proposed action was modeled on successful island rat eradication efforts worldwide.

Island Conservation, as the implementation partner, has requested that USDA provide an independent observer to monitor the bait application activities from the staging area on Niihau,



to validate that the implementation plan was adhered to and to document decisions and actions that deviate from that plan.

In response to this request, under the attached Protocol QA-2824 (Appendix A), the Study Director (S. R. Siers) attended all bait bucket calibration and aerial bait application sessions at the eradication operation staging area on Niihau Island (see Table 1). The Study Director maintained a log of all actions, incidents, discussions, and decisions that occurred during the implementation of the aerial rodenticide applications (Tables 3A–3M), and prepared this final report.

Operation Plan and Incident Command Structure

The “Operational Plan to eradicate Pacific Rats (*Rattus exulans*) on Lehua Island, Hawaii” (Appendix B), authored by Island Conservation personnel, details the methods and procedures followed for the eradication action. The plan also details the Incident Command Structure (ICS; Figure 1) and assignment of roles and responsibilities (Table 1 in Appendix B). For the purposes of this project, each aerial baiting operation was considered an “incident.”

Operational Monitoring Events Log

All significant events were recorded by the Study Director in the Lehua Eradication Independent Operational Monitoring Log (Appendix C). With key personnel and positions abbreviated as in Table 2, these events have been transcribed into Tables 3A–M. All rodenticide bait operations occurred under the supervision of Certified Pesticide Application Mike Walker of Hawaii DLNR, Oahu, Certification No. A15001 (Figure 2). Aerial bait application was conducted by the pilot, Rob Sherzinger, Certification No. C50169. Aerial bait applications were permitted under Permits No. KA-17-01, KA-17-02, KA-17-03 (Appendix D).

Table 3A. Bait bucket calibration and bait loading “dry run” (3 August 2017).

0550 Arrived at container location on Niihau Ranch property, Kauai (containing active and placebo baits)

0600 EA opened container only wide enough to discharge insect fumigant (photo), container closed

0606 EA briefed bait loading team, Niihau Ranch employees CH, DE, JA, JE, UI)

0610 EA introduced bait loading team to personal protective equipment (PPE); advised the team that bait to be used on this date is placebo only (inert, no toxicant) but that they should treat it as a dry run for the actual active operation. Also present: PB, MK, TH, DW, SS, LK

0620 EA opened container to air out fumigant

0622 Bait buckets loaded on trailer (photo)

0625 CH entered trailer to offload placebo pellet bags

Note: SS verified PPE respirators as using 3M Particulate Filters P100

0630 One placebo bag seal opened unintentionally during handling; bag was re-sealed

0640 IC confirmed count of placebo bags (30 bags, 22.7 kg each)(photo) matching manifest

0642 EA picks up ~10 dropped placebo pellets

0643 EA trained CH and DE on decontamination; Tyvek suits kept for re-use (exposed to placebo only)

0650 EA closed container

0655 All personnel depart Niihau Ranch property for the Kekaha Drag Strip (Kauai Raceway Park)

0714 Personnel arrived at Kauai Raceway Park, KR also present

0737 Helicopter arrived after Lehua overflight (Pilot: Mike Klink; RS as mentor)

0738 EA gave bait loading team briefing on bait loading

0748 EA gave bait loading team briefing on helicopter safety

0815 Bucket 2 tethered to helicopter

Table 1: *Calendar of significant events (all dates 2017).*

Date	Event	Location
3 August	Bait bucket calibration and loading “dry run”	Kauai Raceway Park
4 August	DLNR and ICS meeting	4115 Pai Street, Kauai
21 August	Niihau pre-drop preparations for Drop 1	Niihau Operations Area
23 August	Drop 1	Niihau, Lehua
25 August	Drop 1 debriefing	Conference call
29 August	Niihau pre-drop preparations for Drop 2	Niihau Operations Area
30 August	Drop 2	Niihau, Lehua
7 September	Lehua Island Restoration Steering Committee Meeting	Waimea, Kauai
11 September	Niihau pre-drop preparations for Drop 3	Niihau Operations Area
12 September	Drop 3	Niihau, Lehua

0826	Pilot (Mike Klink) gave all personnel safety briefing	0949	GIS reported a successful run; deflector working well; heavier application rate
0831	BOC gave bait team briefing on bait buckets	0955	HDOA Pesticides Branch inspectors (Ann Kam and Les Wynn); discussed formalities of bait ownership and certified pesticide applicator (CPA) assignment
0841	Bait Team 2 suited up		
0849	Helicopter powered up; GIS briefed pilot on track recorder (TracMap) unit	1007	Helicopter powered up for Run 3 (50 ml aperture disk, no deflector; same 2 bags of pellets, no refill)
0901	GIS departed helicopter		
0902	Helicopter began hovering, bait team approached and loaded two bags of inert bait (SS confirmed inert label)	1015	Run 3 pellet count begins
0904	Bucket lifted	1020	Switched to Bucket 2
0906	Pellets applied along drag strip and over pellet counting plots; GIS reports pellets applied at a very low rate	1058	Helicopter hovered, two bags of inert pellets loaded in bucket
0910	AIC and Josh Atwood (DLNR) arrived at site	1100	Helicopter landed from Run 3
0915	Pellet retrieval for swath distribution; GIS estimated 7 kg/ha application rate based on TracMap	1134	Helicopter lifted off for Run 4
0930	Helicopter started for Run 2; no bait refill needed	1137	Helicopter landed after Run 4
0933	Helicopter lifted for Run 2	Note:	Five runs so far, fifth run lot logged
0935	Run 2	1140	Helicopter lifted off for off-site refueling
0936	Helicopter landed after Run 2	1215	Helicopter returned from refueling
0940	Began pellet count; remaining pellets in bucket removed, weighed, and returned to bucket	1224	Helicopter lifted off for Run 6
		1226	Helicopter landed after Run 6
		1226	Team break for lunch
		1326	Helicopter powered up for trickle baiting calibration; two trickle runs
		1342	Helicopter landed

Table 2: *Initials, names, roles, and agencies for personnel referenced within this report. Individuals will be referred to by initials throughout the operations log.*

Init	Name	Role	Code	Agency
AS	Aracelli Samaniego	Bait Uptake Monitoring Officer		Island Conservation
CH	Chelsea Niau	Bait Loader		Niihau Ranch
CM	Caleb Morrison	Bait Uptake Monitoring		DOFAW, Kauai
CN	Chris Niebuhr	Environmental Monitoring Crew		USDA NWRC
DE	Derek Kanahele	Bait Loader		Niihau Ranch
DF	Dean Foster	Environmental Monitoring Officer		USDA NWRC
DW	David Will	GIS Specialist	GIS	Island Conservation
GH	Gregg Howald	Operation Advisor / External Communication Officer	OA	Island Conservation
HA	Chad Hanson	Acting Ops Advisor (Drop 3)	AOA	Island Conservation
IL	Israel Leinbach	Environmental Monitoring Crew		USDA NWRC
JA	Jarian Benia Mina	Bait Loader		Niihau Ranch
JE	Jean Benia Mina	Bait Loader		Niihau Ranch
JV	Jason Vericelli	Safety Officer	SO	DOFAW, Kauai
KR	Keith Robinson	Biosecurity Officer / Niihau Landowner Representative		Niihau Ranch
LI	Lindsey Ibara	Kauai Logistics / Biosecurity		DOFAW, Kauai
LK	Latham Keaweamahi	Kauai Logistics / Biosecurity		DOFAW, Kauai
LR	Lei Robinson	Niihau Ranch		Niihau Ranch
MB	Mike Borge	Helicopter Mechanic		Pacific Helicopters
MK	Mele Khalsa	Lehua Team Leader / Safety Officer	LTL	Island Conservation
MM	Mary Sue Matter	Niihau Ranch Support Kauai		Niihau Ranch
MW	Mike Walker	Certified Pesticide Applicator	CPA	DLNR, Oahu
PB	Patty Baiao	Incident Commander	IC	Island Conservation
PC	Patrick Chee	Bait Uptake Monitoring		PCSU
PM	Pete McClelland	Eradication Advisor Drop 3 Bait Loading	EA/BL	Island Conservation
RS	Rob Sherzinger	Lead Niihau logistics co-lead with WJ		
		Baiting Pilot	Pilot	Aspen Helicopters
SE	Scott Enright	Observer		HDOA
SM	Sheri Mann	Assistant Incident Commander	AIC	DOFAW, Kauai
SS	Shane Siers	Independent Observer	IO	USDA NWRC
TH	Tommy Hall	Baiting Operation Chief	BOC	Island Conservation
UI	Ui Kanahele	Bait Loader		Niihau Ranch
WJ	Wes Jolley	Bait Loading Lead (Drop 1 & 2) Niihau logistics co-lead with PM	BL	Island Conservation

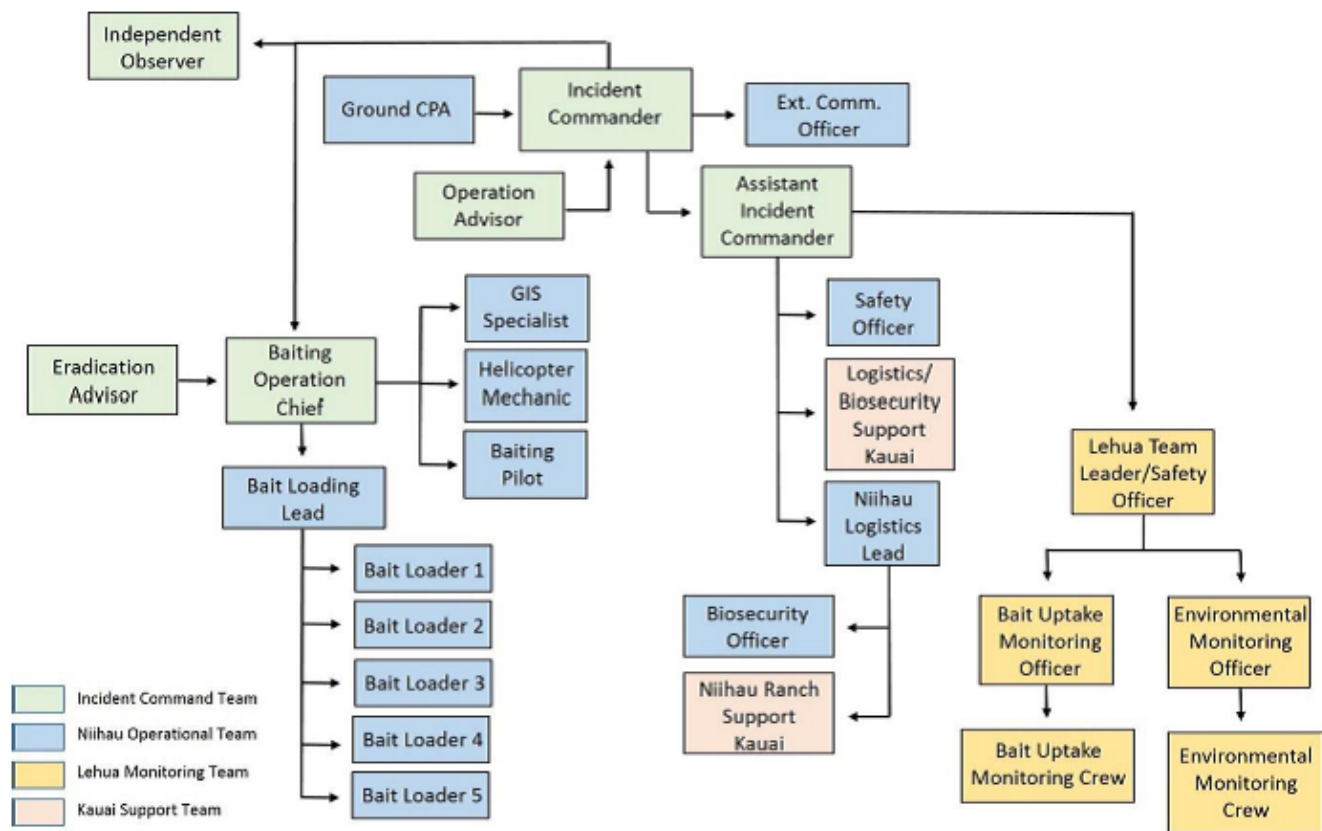


Figure 1: Incident Command Structure (ICS)

- 1346 Helicopter departed calibration site for Lehua reconnaissance; calibration results will be reported to Incident Command Team (ICT) prior to bait application (GIS).
- 1433 Helicopter departed for return to Maui; calibration session completed

Table 3B. Debriefing, Island Conservation (IC) rental house, 4115 Pai St. Kauai (evening, 3 August 2017).

- 1708 BOC: Bait team excellent, EA excellent, calibration excellent, good spread
- GIS: Pilot (Mike Klink) very uncomfortable, concerned about bird strike and lack of a safe landing zone
- BOC & GIS feel that the pilot is very uncomfortable; also had concerns about HDOA, birds, steep terrain, winds, and HDOA liability. Generally concerned about accountability for equipment
- IC: Inquired "what is Plan B"?

BOC: Reported 7 days for RS and helicopter to arrive from California

- 1720 IC announced a certain one week delay, if not more, moving anticipated Drop 1 date to 8/15 or 8/22/2017.

LTL: Discussed staffing of Lehua and people potentially coming off island

Table 3C. State DLNR Meeting, Island Conservation rental house, 4115 Pai St. Kauai (4 August 2017).

- 0910 Meeting commenced
- IC: Permits not yet issued; first drop now planned for 8/15; projected drop dates 8/15, 8/22, and 9/1
- 0921 Discussion of enforcement of buffer zone and island access; Division of Conservation and Resources Enforcement (DOCARE) cannot effect enforcement of buffer around island, US Coast Guard (USCG) advisory only, but can arrest trespassers if entering



Figure 2: Certified Pesticide Applicator's license.

into the wildlife sanctuary (above the high tide line).

Fish sampling discussion with Division of Aquatic Resources (DAR; Katie Nalesere); planning to collect fish on the day before Drop 1 as a baseline; DAR boat planning to ferry HDOA personnel day of Drop 1; will help NWRC with final follow-up collection of fish 1-2 weeks after the final drop

Discussion of boat safety and conditions

Established that a points of contact (POC) list would be distributed

Lehua team: decided to pull DOFAW and NWRC staff from Lehua Saturday 8/5 and return them Saturday 8/12

Katie Nalesere (DAR) acknowledged that she would coordinate with HDOA (Cal

Westergard, HDOA, Pesticides Enforcement) and HI EPA (Chris Chen) for boat transportation on day of Drop 1

1011 Meeting broke to sub-discussions

Table 3D. ICS Meeting, Island Conservation rental house, 4115 Pai St. Kauai (4 August 2017).

1031 Meeting commenced

ICS chart reviewed (Fig. 1)

Discussed documentation of deviations from operational plan, need to ensure that deviations are approved and legal

1215 ICS meeting adjourned, state personnel departed

In the interim, Mike Klink and Windward Helicopters were relieved of commitment to aerial baiting operations, and Rob Sherzinger was retained to serve as pilot flying a Bell Jet Ranger (Registration #N5743H) owned by Pacific Helicopters.

GIS Specialist and Baiting Operation Chief declared that pellet/bucket calibrations are independent of helicopter and re-calibration was not necessary.

Table 3E. Niihau pre-drop preparations for Drop 1 (21 August 2017).

0845 ICS team arrived on Niihau for day-before preparations for Drop 1

0850 Unloaded supplies at ICS awning/tarps (hereafter referred to as Command Center or CC). Present: IC, PM, WJ, DW, TH, MW, SM, JV, CH, DE, JA, JE, UI, KR

0920 Helicopter (Bell Jet Ranger) arrived, RS pilot; Baiting Operations team established loading zone layout (marked out contamination and helicopter operating zones on the ground); plan footprint changed by KR (landowner representative); ICS team later determined deviation form not required

Note: Ground operations certified pesticide applicator (CPA) Mike Walker on site, Certification Number A15001, Category 2, issued 1/2/2013, expiration date 12/26/2017

1000	Unloading bait “pods” for loading platform; bait bags will be re-loaded into container; EA and bait loaders constructed loading platform with three empty pods as the base; fourth pod emptied for trash; 49 bags left in flatbed of truck, will stay overnight under a tarp	Not Rec. ICS review of 8/21	BOC: Missed opportunity for group briefing on 8/21; KR had altered loading zone arrangement
1010	Bag/container unloading zone inspection; no pellets found (clean)		All helicopter operation conversations to go through BOC
1051	Prepared helicopter for familiarization flight around Lehua (Pilot, GIS, BOC); flight tracked the perimeter of the island	1600	Re-iterated importance of following ICS Adjourned, to reconvene at 1600
1104	EA conducted practice run for bait loaders (no helicopter, no baits)		All Niihau operations personnel meeting Safety briefing Air operations briefing
1124	Helicopter returned from familiarization flight	Table 3G. Drop 1 (23 August 2017).	
1251	Helicopter with bucket took off for another familiarization flight, testing TracMap tracking functioning	0500	Camp active, prep began
1314	Helicopter returned from bucket practice flight (no bait)	0550	BL reviewed loading process and loading zone layout with bait loading team; unloaded 147 bags (3,337 kg) of active bait from container; entire drop for the day would not exceed 147 bags (= 30 kg/ha label-approved maximum)
1322	Helicopter returned from second bucket practice flight	0610	SE (Chair, Hawaii Department of Agriculture) briefed at loading area
1330	Helicopter refueling begins	0619	KR (late addition to bait loading team) briefed on decontamination by BL
1338	Bait trailer locked for the night	0625	Bait loading team briefed on decontamination and conducted PPE check
1345	Refueling complete	0630	Helicopter arrived with pilot (RS) and mechanic (MB)
1355	Small intense windstorm, very dusty, helicopter unable to take off	0638	Pilot’s briefing conducted by RS; Baiting Operation Chief briefing and pre-operation checklist run through by BOC
1416	Bags in flatbed of pickup truck returned to the container due to high winds and chance of rain	0647	Baiting Operation Chief (TH) confirmed with Incident Commander (PB) and Assistant Incident Commander (SM) that all was ready
1420	Container locked by CPA	0648	ICC checked preparedness, all personnel affirmed that they knew their duties and were ready to commence the baiting action
1445	Strong winds continue, helicopter still grounded	0650	Pilot prepared for reconnaissance flight
1550	IC gave team briefing; HDOA pesticide application permit not issued in time for 8/22 application; delayed until 8/23/2017		
Table 3F. Niihau Team Meeting (22 August 2017).			

0653	Non-critical personnel cleared the contamination and helicopter operation zones	0805	Helicopter landed from Flight 1-3, shutting down
0658	Helicopter took off for reconnaissance flight	0808	DF reported all three boats at southwest corner of island
0711	First bait load away from bait loading area (Flight 1-1)	0810	Helicopter inspection continues
0719	Helicopter returned from first load	0813	DF reports boat approaching from Kauai, approximately 15 miles away
0720	Protestor boat filming with GoPro (DF text)	0816	DF reported white V-bottom boat approaching from north; identified as DOBOR boat
0724	GIS conducted preliminary flight data review	0818	LTL reported divers in the water at "Pinnacle" dive site
0731	DOCARE boats presumed in channel between Niihau and Lehua	0818	Pilot (RS) and Mechanic (MB) reported helicopter mechanical check good after two bird strikes reported (main rotor, nose section of fuselage)
0731	Lehua team (LTL) reports boats with signs, yelling	0818	Decision made to switch to coastal deflector bucket
0737	Initial flight path review; application rate adjusted (increased bait bucket aperture ring size)	0822	DOBOR boat told anywhere on south coast was good to observe coastal bait application per Pilot
0747	Second application flight (Flight 1-2) took off	0825	Swapped to deflector bucket
0749	Two protest boats at Lehua site; DOCARE on site; Division of Boating and Outdoor Recreation (DOBOR) boat inbound	0830	Zodiac confirmed to be divers, diving off north corner of Niihau
0752	One boat, a Zodiac (inflatable) with eight people, possibly tourists, not confirmed to be protestors	0833	Pilot confirms that boats are far enough away from the coast to fly coastal application swaths
0752	DF (positioned at peak of Lehua with radio) reports Zodiac full of dive gear; passed channel and moved around west side of Lehua	0835	Flight 1-4 loading and away to treat south coast with deflector bucket
0754	AIC saw DOBOR boat inbound	0838	Pilot reports still comfortable with boat location
0756	Flight 1-2 returned; bait bucket reloaded while hovering	0841	DF reports protest boat approaching coast after application
0758	Flight 1-3 away	0843	DF reports protestor boat 150 ft. offshore
0800	AIC confirms DOBOR boat inbound	0845	Flight 1-4 returned, hot loaded (bucket refilled while hovering)
0801	SO states Zodiac on southwest side of Lehua, seemed to be moving off	0845	Flight 1-5 away
0804	Pilot reported bird strike, shutting down for helicopter inspection	0851	Larger boat (tour boat?) approaching from east

0853	AIC says LTL confirmed that Jessica Else (Reporter, The Garden Island, Kauai newspaper) is in the protestor boat (captained by private individual ¹)	1123	DF reported Holoholo snorkelers in water within a few hundred feet of the shore
0858	Flight 1-5 returned, landed powered down	1124	Flight 1-9 returned, landed, powered down
0903	SE shown the deflector spreader	1155	LTL reported diver with camera very close to shore off south of Lehua, with same Zodiac boat; BOC says that area will not be treated on the next flight
0912	CPA reports all good and according to label instructions	1200	LTL said diver resembles known individual ² (marine biologist/videographer from Kauai)
0915	Pilot, BOC, GIS, EA begin review of flight application data	1201	Boat update: protest boat appears to be going back to Kauai; diver near camp appears to be from the Zodiac; Zodiac about 400 meters from shore
0924	No significant boat activity reported. DAR in water looking for pellets	1203	Flight 1-10 away
0940	Perimeter Flight 1-6 away, bucket with deflector	1206	IL hiking to summit to begin plot checks
0956	Flight 1-6 returned, shut down	1207	DF reported everyone aboard Holoholo tour boat, appears to be leaving
1000	Deflector lines complete; bucket swapped; helicopter refueled	1214	Zodiac picked up diver
1015	DOBOR and DOCARE boats departed	1218	Flight 1-10 returned, hot loaded, 1-11 away
1018	GIS experiencing file transfer problems	1231	Flight 1-11 returned, hot loaded, 1-12 away
1033	Flight 1-7 took off to fly interior lines	1232	IL on top of hill, checking plots
1043	Flight 1-7 returned, hot loaded, Flight 1-8 away	1235	33 (of 147) bags of bait remaining
1048	AIC stated she would attempt to get funding for DOCARE overtime for full presence all day	1241	Flight 1-12 returned, powered down; map check
1050	Pilot reported dive boat/catamaran right offshore on the caldera side of Lehua	1316	Flight maps reviewed to identify gaps in bait coverage
1055	Flight 1-8 returned, hot loaded, Flight 1-9 away	1336	Flight 1-13 away to treat gaps; final bucket load
1106	Flight 1-9 returned, hot loaded, Flight 1-10 away	1336	Loading zone cleanup commenced
1114	Boat check: one protestor boat; Zodiac moved divers to another site; Holoholo tour boat and dive boat (Zodiac) at the southwest corner of Lehua	1349	GIS reported total application 200 kg less than planned; total application greater than 90% of the planned application, within 10% established tolerance
		1352	Flight 1-13 returned from final application

¹Identity not confirmed; suspected identity in original notes, available upon investigation.

²Identity not confirmed; suspected identity in original notes, available upon investigation

- 1355 After further examination of the bait application map, ICS team determined that another application was necessary for an approximately 10-ha swath on the south face; currently treated at 15 kg/ha (target = 20 kg/ha)
- 1403 Flight 1-14 loaded from ground (no platform)
- 1405 Flight 1-14 away; loading zone demobilization continued
- 1410 Unused bait loaded in container; container sealed
- 1414 Flight 1-14 returned
- 1415 Bait team walked abreast to shoreline along helicopter/bucket flight path to search for pellets
- 1419 CPA confirmed that all bait handling was to standards. 21 (of 147) bags were loaded back onto the trailer
- 1445 Breaking camp

Table 3H. *Drop 1 debriefing conference call; present: WJ, DW, TH, PB, PC, PM, GH, MW, SM (25 August 2017).*

- Not Rec. Discussed communication with DLNR; resolution: Josh Atwood assigned as off-island DLNR contact
- Discussed communication with Lehua
- Discussed need to wait for a systematic ICS team decision to invoke demobilization, to prevent premature demobilization as occurred under Drop 1
- Discussed starting drop days with a full-group briefing at the CC
- Conducted workflow check-in
- Discussed slowing the rush for the departure of the helicopter
- Assigned single POC for KR (EA)
- Discussed availability and need for DOBOR boat

Discussed logistics

Table 3I. *Niihau pre-drop preparations for Drop 2 (29 August 2017).*

- 1130 Team arrived Niihau 1130-1200
- Established bait loading area
- Container unlocked
- Platform constructed
- 24 bags removed from container
- Three bags from three different pods were sampled for confirmatory chemistry (BL)
- Bait bags for 8/30 Drop 2 removed from pods, staged inside the container
- Container secured
- CC shelter tarp and shade structure assembled and repaired
- 1630 Scott Enright declined to have a HDOA representative present for 8/30 Drop 2; KR voiced he would prefer to have HDOA present, but did not insist; IC, AIC, EA, and others agreed to go ahead without HDOA present
- 1637 Briefing meeting for 8/30 Drop 2
- Discussed need for better marking of hot zone (contamination area)
- Discussed expectations for lots of public scrutiny
- Announced that three additional IC reps would be present for Drop 2
- Announced that a reporter would be on Niihau at the behest of KR
- Discussed probability of boater presence; announced DOCARE would be on site
- Anticipated mostly same schedule as Drop 1
- Established meeting time of 0500 at bait loading area for preliminary setup then briefing

Announced addition of a fifth bait loader in the lading area to assist BL with bucket handling	0530	Weather check; all good; pilot called for operation confirmation; forecast good for 48 hours
BOC reviewed baiting sequence:	0530	EA confirmed 147 bag count
1) Deflector bucket around coast twice (three bucket loads)	0600	Loading zone and decontamination zone demarcation adjusted for clarity
2) Switch bucket, full internal lines	0610	Baiting team safety briefing by BOC and BL
3) [illegible; suggested "inner coastal (full) swath" by reviewer PM]	0625	IC personnel (GH, Karen Poiani, Nick Holmes, Paula Castano) and freelance reporter Jan Tenbruggencate arrived on Niihau
4) Gap checks, bait horns		
5) Stop, set down, wait to pack up until cleared by ICS	0630	Pilot and mechanic arrived with helicopter
CPA reported contamination zone would be more clearly marked	0637	Pilot reported seeing boats headed toward Lehua
With no HDOA representative present, IO role would be even more important	0638	BOC gave loading zone tour to IC leadership
KR confirmed with Niihau bait loaders that all are comfortable with following procedures without HDOA present on Niihau	Note:	Late report received from Lehua team 8/29 p.m.: two bird carcasses recovered, no external signs of intoxication; more details to be obtained later
Announced that HDOA rep would be on Lehua	0653	IC commenced all-hands briefing: All personnel confirmed positive status AIC noted radio problems
AIC stated desire to not have personnel under falling bait; operations team did not concur that it posed a risk; AIC concerned about "optics" (looks bad)	0655	BOC verbalized check list; all affirmative on check list
Scott Enright confirmed with KR by telephone that KR was okay with proceeding without HDOA presence on Niihau	0708	Helicopter powered up; bucket hooked up; first bait loading; Flight 2-1 away
	0710	DOCARE boat arrived at Lehua; only boat so far. HDOA representative Cal Westergard arrived on Paradise Helicopters flight (contracted by DOFAW for personnel transport).
1715 Briefing adjourned		
Table 3J. Drop 2 (30 August 2017).		
0500 Baiting team assembled at loading zone' container opened; bait bags unloaded for staging; pulled 147 bags under CPA supervision; IO confirmed 147 bags offloaded, no bait spills (three crushed pellets observed on tarmac)	0727	Flight 2-2 away
	0738	Flight 2-2 returned, hot loaded
	0740	Flight 2-3 away
0515 IC, AIC, and IO arrived at CC	0756	Flight 2-3 returned, shut down; bucket swapped; data downloaded for initial review; GIS state all looks good

0800	Shiny spot on helicopter blade and feathers indicated a bird strike; pilot was unaware of an impact (this was reported late to IO, at approximately 1100)	1039	Flight 2-11 returned, landed, data downloaded for review
		1040	Helicopter refueled
0807	IC team checked in with BOC; coast finished; bait application light, but within 2 kg tolerance established	1045	Holoholo tour boat approached from northeast edge of Niihau into channel
0820	Systems check on new bucket, slide not activating; problem resolved	1057	Holoholo boat tourists snorkeling in regular place (off southwest corner of Lehua)
0825	HDOA rep inquired if pilot in proper PPE. IC confirmed	1058	Coverage review: basic coverage complete; GIS marking polygons for gap coverage; estimate three more loads, including some use of narrow swath bucket
0835	BOC announced resuming operations, helicopter powered up	1114	IO made aware of 1013 pilot error in-flight overwater discharge
0840	Flight 2-4 away, flying interior lines on the south face	1116	Gap in current flight line skipped because of proximity to divers (flight count lost due to attention to pilot error incident)
0850	Flight 2-4 returned, powered down; data checked; application coverage rate low compared to same aperture last week; on review, GIS determined application rate was fine	1117	OA suggested sending DOCARE boat around to investigate. AIC discussed with DOCARE via radio. Incident command team discussed sending marine spill kit if DOCARE reports visible pellet accumulation
0910	Flight 2-5 away 0917 Flight 2-5 returned, hot loaded, 2-6 away	1126	LTL reported small boat with large fishing poles approaching
0927	Flight 2-6 returned, set down, powered down for refueling	1136	DOCARE confirmed that they will investigate area of accidental over-water application
0949	Flight 2-7 away	1137	DF confirmed that approaching boat appears to be fishing, no visible protestors
0955	HDOA representative Cal Westergard departed Lehua on Paradise Helicopters flight; reportedly pleased with operation	1140	Helicopter returned, set down, powered down; waiting for Holoholo snorkelers to depart
0957	Flight 2-7 returned, hot loaded, 2-8 away	1141	DF reported new boat approaching, approximately 4 miles out
1006	Flight 2-8 returned, hot loaded, 2-9 away	1147	Holoholo starting to pull snorkelers
1013	Pilot error; a bait application line was flown over water inside the caldera; GIS calculated approximately 1.7 ha of water surface area was treated with approximately 16.5 kg of bait, with the edge of the swath out to 70 m from the shoreline (estimated application of 9.7 kg/ha)(IO made aware at 1114)	1151	DOCARE reports conducting sweep of caldera including tide pools; saw no pellets. Continued searching entire perimeter of the island and observed no pellets.
1018	Flight 2-9 returned, hot loaded, 2-10 away	1200	SO reported all Holoholo snorkelers out of water
1028	Flight 2-10 returned, hot loaded, 2-11 away		

- 1200 Fishing boat reported approximately 300 yards from shore; looks like large approaching boat is going to go around the north side
- 1202 DOCARE boat departed
- 1215 ICS Team confirmed satisfied with application after planned gap treatments, including treatment of southwest corner of the island not treated while waiting for Holoholo boat to depart
- 1224 Pilot decided to do trickle treatment while waiting for Holoholo boat to depart; GIS to accompany
- 1225 ICS Team proposed additional monitoring of over-water treatment area by shore crew. Agreed that HDOA Director Scott Enright will be notified of the incident
- 1230 Holoholo boat departed; fishing boat still approximately 300 m off of the southwest point of Lehua
- 1240 Trickle baiting (narrow swath) flight away
- 1240 White boat moved into Holoholo boat position
- 1256 AIC contacted white boat on radio (marine band 16) and talked to LTL; boat agreed to move off to 300 m to allow finishing of aerial operation and complied
- 1303 GIS declared trickle treatment complete
- 1306 Final Drop 2 flight away
- 1316 Final flight returned, landed, powered down
- 1318 LTL reported small boat in channel, showing no apparent interest or interaction with the operations
- 1330 Final map review; helicopter refueling
- 1350 ICS Team agrees coverage complete; baiting operation (Drop 2) finished
- 1353 BL and EA report 25 (of 147) bags remaining; 122 bags (2,770 kg) applied
- 1355 CPA confirms all operations according to label

- 1400 Demobilization activities commenced

On 5 September 2017, in response to a social media post depicting dead fish and two dead birds (posted by Dustin Barca), CN and PC visited large tide pool along east arm within the caldera. Found 45 dead small mullet-type fish and two dead immature boobies in the pool. All fish and birds were collected. Twelve fish were bagged with a separate chain of custody form for HDOA as requested by Tom Matsuda.

Table 3K. *Lehua Island Restoration Steering Committee Meeting (7 September 2017).*

- 1400 Meeting commenced
- Progress recap
- Nontarget summary
- One remaining radio-collared rat
- Discussion of fish die-off event
- Show of hands to gauge willingness to proceed with third drop; unanimous consent, including indications of support from DLNR (Suzanne Case) and USFWS (Kristy Young) relayed by agency representatives.
- Steering committee unanimously approved of supplemental hand baiting in low bait density/high productivity areas (protocol deviation form to be signed by ICS Team)
- Discussion of pilot error over marine environment
- 1548 Meeting adjourned

Table 3L. *Niihau pre-drop preparations for Drop 3 (11 September 2017).*

- 1215 Received confirmation of issuance of HDOA bait application permit
- 1315 IC, EA, AOA, CPA, IO, KR arrive on Niihau. Chad Hansen (HA), Island Conservation, Acting Operations Advisor (AOA) in place of Gregg Howald, not present

1334	Buckets and bait container arrive at the LZ from Niihau storage area	Niihau side of operation to be the same
1430	EA opened container at LZ, CPA present; bait loading team began assembly of bait loading platform; temporarily removed 24 bags from container	CPA had no changes to operations to announce
1430	DF reported that a woman from a Zodiac boat owned by Kauai Searider Adventures swam ashore to take a water sample from Lehua	BOC (TH) gave safety briefing; all injuries or heat stress to be reported to TH, first responder; if TH not available, HA backup first responder; announced change of bucket strop length
1443	CPA swept container interior, removing a few loose pellets and dust and place them in marked waste container	BOC gave helicopter operations briefing
1446	DF reported that the woman collecting water was Tara Leota, and that she filmed DF with a GoPro camera	All reminded JV serving as SO
1447	24 bags returned to container	Announced plan to have an additional helicopter on-site 8/12 for emergency responses
1452	Zodiac now at southwest corner of Lehua in the typical Holoholo tours snorkeling area	Announced that Dan Dennison (DLNR Communications Manager) and Josh Atwood (DLNR) would be on site 8/12; Lyndsey Ibara (DOFAW) and Coral Wolf (IC Science Team) will observe; Alex Fisher from Pacific Helicopters will be on site; HDOA representative will be on Lehua
1458	Platform assembly completed	Same AM schedule, 5 a.m. at LZ for Bait Loading Team
1458	IO received email with bait application permit sent by OA (GH) at 1338	May be much public interest (boats) on 9/12; DOCARE will be on site
1459	CPA locked container; IO inspected and confirmed no pellets on tarmac	There will be a longer demobilization after the last drop
1530	9 m bucket strops replaced with 6 m strops by BOC	KR discussed earthquakes on mainland and Mexico, and discussed tsunami evacuation plans
1635	All-team briefing held with ICS and BL team: HA introduced to team as AOA Team changes: PM now BL in addition to EA (WJ not present); primary first responder now TH Announced issuance of final permit Operation adjustments: Will be more sensitive to tide pool issue, will try to avoid treating tide pool, ground personnel will attempt to remove pellets from tide pool; will treat gulch with more alternative food productivity and higher bait consumption with more bait (still within 30 kg/ha label limit; Operation Plan Deviation Form will be signed by ICS)	1700 Meeting adjourned
<hr/> Table 3M. Drop 3 (12 September 2017). <hr/>		
0500	Camp active	
0518	IC writing deviation form for supplemental treatment of gulch and avoidance of tide pool	
0521	CPA reports that the container was opened at 0505	
0521	Bag unloading began for staging for application, all personnel handling bags in PPE	

0534	129 bags unloaded; IO confirmed bag count	0746	Flight 3-4 returned, set down, powered down for bucket swap
0544	EA/BL confirmed 129 bags unloaded		
0550	ICS team reviewing gulch/tide pool deviation form	0748	Paradise Helicopters dropped off HDOA and DOFAW staff on Lehua
0600	All signs good for operation; pilot en route	0756	Navy ship reported on the horizon
0606	IC confirmed on deviation form with OA (GH) by telephone	0811	Alex Fisher, Pacific Helicopters, arrived with support helicopter
0614	Helicopter arrived with Dan Dennison, Josh Atwood, Lyndsey Ibara, and Coral Wolf	0815	CN reports another helicopter northwest of Lehua, kept flying west
0623	BL (PM) reported oil leak from Robinsons-owned "sheep truck"; being cleaned with fuel spill kit	0819	CN reported Zodiac put two divers in water
0625	Deviation form signed by ICS team with telephone concurrence by OA	0828	Flight 3-5 powered up for interior lines on south face of Lehua
0626	Three bait samples collected from bags from three separate pods by BL for confirmatory chemistry	0833	Flight 3-5 returned, hot loaded; set down momentarily to adjust TracMap; Flight 3-6 away
0630	Pilot arrived with mechanic (MB) and Josh Lang of Paradise Helicopters	0842	Flight 3-6 returned, hot loaded, 3-7 away
0645	All-team briefing called by IC: Safety reminder Hot zone PPE reminder BOC completed pre-operation checklist IC affirmed readiness from all personnel present	Note:	GIS reported that first set of inland flight lines did not have 50% overlap set, meaning the first application was at 10 kg/ha instead of 20 kg/ha; after bait coverage complete GIS will look at bait density map and treat this area as a gap for supplemental treatment
		0846	CN reported vessel approaching channel
0655	DOCARE reported in-bound; confirmed sighting by CN on summit of Lehua	0849	Heavy bird activity (apparently frigate-birds) over southwest corner of Lehua
0702	IC confirmed Lehua Team readiness by radio	0850	Flight 3-7 returned, hot loaded, 3-8 away
0708	Flight 3-1 away for coastal application with deflector	0852	Large white boat (dive boat) approaching from east, entering channel
0718	Flight 3-1 returned, hot loaded, 3-2 away	0856	Dive boat turned away
0727	Flight 3-2 returned, hot loaded, 3-3 away	0859	Flight 3-8 returned, set down, refueled
0737	Flight 3-3 returned, hot loaded, 3-4 away	0904	Dive boat in east portion of channel near Niihau
0741	Boat entering channel, approaching fast, in channel; CN reported three individuals with scuba tanks; MK reported that the boat was filming	0910	CN reported small dive boat at southwest corner of Lehua

0916	A voice was heard over the radio (frequency unknown) to say "stop dropping poison"; IC and Josh Atwood said that the voice sounded like a known individual ³	1039	Flight 3-12 returned, hot loaded, 3-13 away
0929	Flight 3-9 away	1048	Holoholo swimmers entering water
0934	Zodiac has left southwest corner, possibly moved around behind Lehua	1049	Flight 3-13 returned, hot loaded, 3-14 away
0937	Flight 3-9 returned, hot loaded, 3-10 away	1057	Flight 3-14 returned, set down, powered down
0938	Zodiac dive boat within Lehua caldera	1104	CN reported helicopter approaching from east
0940	CN reported small vessel entering channel from east, possibly a known individual ⁴ ; four people on boat	1106	BL reported taking 5 more bags from the container (total 134 bags removed)
0948	Boat halted at east end of channel due to divers in the water	1110	Data review; GIS created gap polygons
0950	Small zodiac left caldera; Holoholo Tours boat inbound	1116	CN announced Zodiac divers out of the water, Holoholo swimmers only persons in water
0950	Flight 3-10 returned, hot loaded, 3-11 away	1137	Flight 3-15 away
0952	Four boats in channel: Zodiac, large white dive boat, possibly a known individual's ⁵ boat, and DOCARE	1142	CN reported all swimmers returned to Holoholo boat
1005	Flight 3-11 returned from treating Lehua "horns", landed, powered down for data download	1150	Flight 3-15 returned, set down for bucket swap
1012	Small dive boat in southwest channel has two divers in the water	1155	Flight 3-16 away with trickle baiting bucket
1020	CN reported larger catamaran coming around the caldera, approaching the southwest corner; a smaller catamaran approaching the caldera	1157	Large catamaran quickly motoring through channel
1026	MK overheard radio traffic between boats, leaving the area to avoid the operation	1204	Holoholo boat departed, but other boat still has divers in water
1030	CN reported Holoholo approaching southwest corner mooring	1214	MK reported most boats cleared out, sport divers still in water at west end
1032	Flight 3-12 away, treating coastal interior and arms (full-swath bait spreader)	1223	ICS team concurs that the baiting operation was complete; map coverage approved
		1227	CPA reports all operations according to label
		1230	Remaining bait bags being returned to container; buckets emptied and received rough cleaning; tarmac free of bait pellets; of 134 bait bags removed from the container, 6 were returned; 128 bags total applied; approximately 5 to 7 kg of pellets were removed from the buckets, waste pellets placed in marked 5-gallon waste bucket, to be returned to the container; BL reported 4 pods of 16 bags each plus 1 bag remain in the container

³Identity not confirmed; suspected identity in original notes

⁴Identity not confirmed; suspected identity in original notes

⁵Identity not confirmed; suspected identity in original notes

- 1242 More thorough bucket cleaning continues
- 1248 Pellet waste bucket place in container
- 1249 Container sealed and locked by BL
- 1258 Demobilization began

conducted in a thorough, data- and science-driven, safe and efficient manner, to the highest standards and best practices for island rodent eradication, and were conducted by properly experienced personnel with invaluable support from the staff and leadership of Niihau Ranch and the Niihauan community.

Operational Plan Protocol Deviations

Two deviations from the prescribed protocols in the Operational Plan (Appendix B) were proposed, discussed with the ICS, and approved and documented as prescribed in the procedures for deviations outlined in the Operations Plan. Protocol Deviation 1 (Appendix E) proposed and approved the hand broadcast of rodenticide pellets in the vicinity of one surviving radio-collared rat, in an area where on-the-ground pellet counts indicated rapid bait depletion. Protocol Deviation 2 (Appendix F) involved the care of bait application around the caldera tide pool (in response to the number of dead fish observed after Drop 2) and an additional aerial application of bait over a gulch of high productivity/alternative food to ensure targeting of rats in this habitat.

Independent Operational Monitoring Findings

Independent Observer's Attestation: All Niihau-based baiting operations occurred under my observation. All aerial bait applications were conducted in accordance with the permissions and conditions prescribed in the respective permits (Appendix D). The bait loading zone was maintained under adequate access control, was inspected frequently, and was virtually free from bait spillage. All deviations from the Operation Plan were documented and approved in writing by the Incident Command Team and witnessed by myself. I observed no unsafe actions, nor violations of the bait label or permit restrictions. State of Hawaii and Island Conservation personnel were afforded an opportunity to review a draft of this report for completeness only, and were afforded no influence on the findings of propriety and integrity of the operation. It is this observer's opinion that the operations for the aerial rodenticide baiting for rat eradication were

Signed and attested:

Shane R. Siers, PhD.
Supervisory Research Wildlife Biologist
USDA APHIS Wildlife Services National Wildlife
Research Center

Attachments:

- Appendix A.** NWRC Operational Monitoring Protocol (QA-2824)
- Appendix B.** Operational Plan to Eradicate Pacific Rats on Lehua Island, Hawaii
- Appendix C.** Operational Monitoring Journal
- Appendix D.** Permit(s) to Apply Restricted Use Pesticides by Aircraft (1-3)
- Appendix E.** Protocol Deviation 1 (Hand Broadcast)
- Appendix F.** Protocol Deviation 2 (Tide Pool & Gulch Treatments)
- Appendix G.** Reviewer Comment and Response Matrices