



Palmyra Atoll National Wildlife Refuge Rat Eradication

Preliminary Field Update
February 2012

Project Summary and Preliminary Update

Between June 3 and 30, the Palmyra Atoll National Wildlife Refuge rat eradication project was implemented through a partnership between the U.S. Fish and Wildlife Service (FWS), The Nature Conservancy (landowners and co-managers of the atoll) (TNC), and Island Conservation (IC); after 7 years of planning and scientific investigation. Although it is too early to provide a conclusive outcome for eradication; evidence thus far are optimistic and the eradication team can be lauded for an incredible accomplishment. Over the 28-day period the team of 41 people from 5 countries utilizing 1 ship, 2 helicopters, 6 small boats, 10 slingshots, bait stations, and hundreds of field hours systematically applied 38,560 kg of rodenticide per the Final Environmental Impact Statement and following Environmental Protection Agency (EPA) supplemental label guidelines with 5 methods to every part of the atoll in order to eradicate the estimated 30,000 rats living on the 259 hectares (1 mile²) of land. Amidst mechanical breakdowns, weather shutdowns, and extreme bird-helicopter hazards, this remarkable team of people came together to accomplish the highly complex mission with no major accidents or human injuries.

Throughout the month, the team applied bait using aerial and hand broadcast, bait stations, and thousands of specially designed canopy baits (“bolas”) that were slung into palm crowns from the ground (with slingshots) and from the air by a crew member harnessed on a 50-foot line hovering from a helicopter. Application rates were within 5% of the targeted rate, and below maximum allowable limits (Attachment A.). The first application (targeted at 80 kg/ha, not to exceed 90 kg/ha) was applied at 84 kg/ha. The second application (targeted at 75 kg/ha, not to exceed 90 kg/ha) occurred 10 days after the first application began and was applied at 79.3 kg/ha. After a rat was detected on July 10 in the camp area on Cooper Island (18 days after the second bait application); an EPA-authorized “detection response” bait application was conducted in the vicinity of the rat detection at a rate of 71.6 kg/ha (targeted 80 kg/ha). Altogether, roughly 43,000 kg was transported to Palmyra; and of that, roughly 38,560 kg has been used in the project (the EPA supplemental Palmyra label allowed for 47,000 kg of bait for the atoll overall).

The team’s aerial broadcast application (with 2 helicopters) was complicated by more than 110,000 sooty terns and thousands of red-footed, brown, and masked boobies sharing the airspace. The helicopter pilots, among the most experienced in island eradications in the world, remarked that bird densities were greater than anything they had previously experienced. As a result, operational plans were augmented to enhance the safety of aircrew by instructing them on bird behavior, modifying application timing to try to coincide with lower bird activity, enhancing emergency response capabilities, and slowing flight speed to improve bird avoidance. Project leadership also revised and instituted a precautionary protocol for handling suspected bird strikes.

An operational change was also made to authorize the pilots to use their discretion for gauging potential accidental bait drift into the marine environment as well as ensure their safety. The GIS treatment blocks used to direct and document aerial baiting were based on 2010 satellite imagery that could not differentiate between the actual shoreline and dense vegetation overhanging the shoreline, resulting in the potential to add to accidental bait drift. Pilots were directed use their best judgment rather than strictly flying by the map when applying bait to coastal areas in order

to minimize the amount of bait drift into the marine environment, maximize the evenness of bait spread across the islands, as well as provide additional safety margin when flying around birds.

The extent of nontarget mortality due to the rodenticide will not be known until U.S. Department of Agriculture (USDA) laboratory testing is completed, but migratory bird carcasses collected and suspected to be possible victims of the rodenticide application numbered 8 bristle-thighed curlew, 2 pacific golden plovers, 2 ruddy turnstones, and 1 wandering tattler (the Migratory Bird Special Purposes permit authorized take of 182, 62, 35, and 48 of these species; respectively). Other wildlife carcasses found that showed no external signs of bait exposure but were discovered in the refuge during the hundreds of person-hours spent canvassing the islands include roughly 40 small mullet, 1 green turtle, 7 land crabs, and 2 sooty terns. The USGS National Wildlife Health Center-Honolulu later confirmed there was no evidence of anti-coagulant poisoning of the green turtle. Findings on toxicant exposure to other specimens will be reported by the USDA upon completion of their independent testing. Additionally, there were 11 known or suspected bird-helicopter collisions and 1 bird-airplane collision during the operation. No carcasses were found on Palmyra since the last one found on July 5, and no other injury or mortality has been detected as a result of the bait application.

In addition to the successful baiting, there were additional notable discoveries and achievements made by this team during the implementation. Team members defied odds and are the first to have successfully captured and cared for bristle-thighed curlews. Thirteen curlews and one Pacific golden plover were caught and cared for. Two of the curlews were confirmed to have been exposed to bait prior to capture and were successfully treated. All 14 birds were held in captive care and successfully released in August. Most have been resighted, having joined returning flocks from Alaska. The scientific knowledge gained through this capture and care will provide significant contributions to future conservation programs focused on bristle-thighed curlews and other shorebirds. Thirty individuals of two native gecko species (one undescribed) were also captured, cared for, and have now been successfully released. In addition, the three elderly domestic animals (one dog and two cats) whose residence at Palmyra was grandfathered in when it was purchased remain in relatively good health for their age. During the significant field hours spent on the outer islands, a team member found an unconfirmed, yet possible first evidence of ancient Polynesian presence at Palmyra. Finally, targeted and independent monitoring of the bait application and possible environmental effects from this action was undertaken by the USDA, with FWS and IC assistance, throughout the operation and continued through August. Samples of wildlife (geckos, land and marine crabs, fish, cockroaches, ants), soils, water, and carcasses collected are under-going follow-up analysis by the USDA to provide additional scientific understanding of the movement and fate of the toxicant in the ecosystem to inform future eradication operations.

Two final components that yielded highly favorable results in this project came from lessons learned on previous eradication efforts. The team was organized, trained, and committed to the implementation of an Incident Command Structure (ICS), under Service lead. The group used a structured and documented decisionmaking process to guide this highly complex, multifaceted, dynamic, and time-sensitive project. The ICS provided clear levels of decision-making, chains of communication, and organization. These factors were essential to carrying out the mission

clearly and effectively and the commitment and expertise of each talented individual on this team made it work.

Post implementation efficacy monitoring was conducted in August and September, 8 weeks after the second bait application. Rat detection stations (n=280) placed throughout the atoll and checked and serviced over a 15-day period (total effort of 2,500 person-nights of work) failed to detect rats on the atoll. Personnel working on the atoll since the implementation share anecdotal, observed signs of ecosystem recovery including increased size, scope, and nesting success of the sooty tern colonies; intact coconut inflorescence and pandanus fruit, greater abundance of land crabs as well as observed juvenile coconut crabs; large numbers of katydids, dragonflies, and snails, young plant seedlings carpeting the forest floor, and sounds of ground-nesting wedge-tailed shearwaters heard at night.

A pictorial summary of the project is also attached.

Budget Summary- Palmyra Atoll NWR Rat Eradication/Atoll Restoration Project FWS Project Funding Allocated

In June 2009, FWS awarded a grant of \$1 million (from the Director's Invasive Species fund) to IC to investigate techniques appropriate for effective eradication of rats at Palmyra Atoll and to evaluate the types and extent of environmental effects of an eradication using rodenticide. This grant made to IC funded planning, compliance (including assisting FWS with NEPA document development), research and monitoring up to project commencement but not including on-the-ground eradication actions.

USFWS- Funded Project Preparation	Expenses
Coordinate program partnership	\$ 25,000
Pre-planning	\$133,000
Environmental Compliance	\$325,000
Operational Planning and Testing, and pre-eradication monitoring	\$325,000
Support for communications and outreach by TNC and FWS	\$ 85,000
Allocated overhead (not to exceed 20%)	\$107,000
Total	\$1,000,000

In 2010, a \$1.2 million appropriation from Congress was used to implement the planned rat eradication at Palmyra Atoll. The money went to purchase rodenticide bait, charter transportation, acquire equipment and supplies, and provide trained and authorized personnel to carry out the eradication operation. It was also used to investigate and document the effectiveness of the work and the responses of the environment to the removal of all rats at the atoll.

USFWS-Funded Project Implementation	Expenses
Rodenticide	\$240,000
Supplies, equipment, transportation, and fuel	\$514,517
Contract Personnel	\$282,963
Overhead	\$162,520
Total	\$1,200,000

Island Conservation received an additional \$500,000 private donation that also funded the implementation of the eradication bringing the dedicated funding total to \$2.7 million.

In addition TNC, FWS-Pacific Reefs National Wildlife Refuge Complex, and IC provided other in-kind contributions of staff time, logistical support, and support for independent monitoring of the project and its effects by USDA Wildlife Services (roughly estimated at \$420,000).

PALMYRA ATOLL RAINFOREST RESTORATION PROJECT: POST IMPLEMENTATION BAIT APPLICATION SUMMARY

Version 1: 27 July 2011

BROADCAST BAIT APPLICATION			
	Bait used (kg)	Area (ha)	Ground application rate (kg/ha)
Application 1			
Aerial	19,344.0	228.1	84.8
Hand	379.8	6.8	55.9
Total	19,723.8	234.9	84.0
Application 2			
Aerial	18,483.0	230.8	80.1
Hand	141.0	4.1	34.4
Total	18,624.0	234.9	79.3
Detection response baiting			
Hand	723.2	10.1	71.6
CANOPY BAIT APPLICATION			
	Bait used (kg)	Palm crowns treated	Application rate (g/crown)
Application 1	72.3	4,185	17.2
Application 2	71.5	4,350	16.4
Detection response baiting	5.1	351	14.5
BAIT STATION APPLICATION			
	Bait used (kg)	Bait recovered (kg)	Application rate (g/station)
Bait Stations	58.7	36.9	120.0
ABANDONED STRUCTURE BAIT APPLICATION			
	Bait used (kg)	Abandoned structures	Application rate (g/structure)
Application 1	3.3	22	149.7
Application 2	6.9	35	197.4
BAIT TOTALS			
Total initial bait (kg)	43,020.0		
Total bait used (kg)	38,560.6		
Total bait remaining (kg)	4,398.3*		

*The 61.1 kg difference between the sum of the total bait used and the total bait remaining, and the total initial bait is most likely attributed to estimation and rounding

Palmyra Atoll National Wildlife Refuge Rat Eradication Project Update February 2012



6 Expeditions = 70 People



**43,000 kg 25W Manufactured in April 2011
(86,000,000 pellets)**



132 Pods Shipped to Seattle



**All Bait, Equipment, Supplies
Loaded on the Support Vessel**





More Supplies Loaded in Honolulu



Transporting Personnel to Palmyra

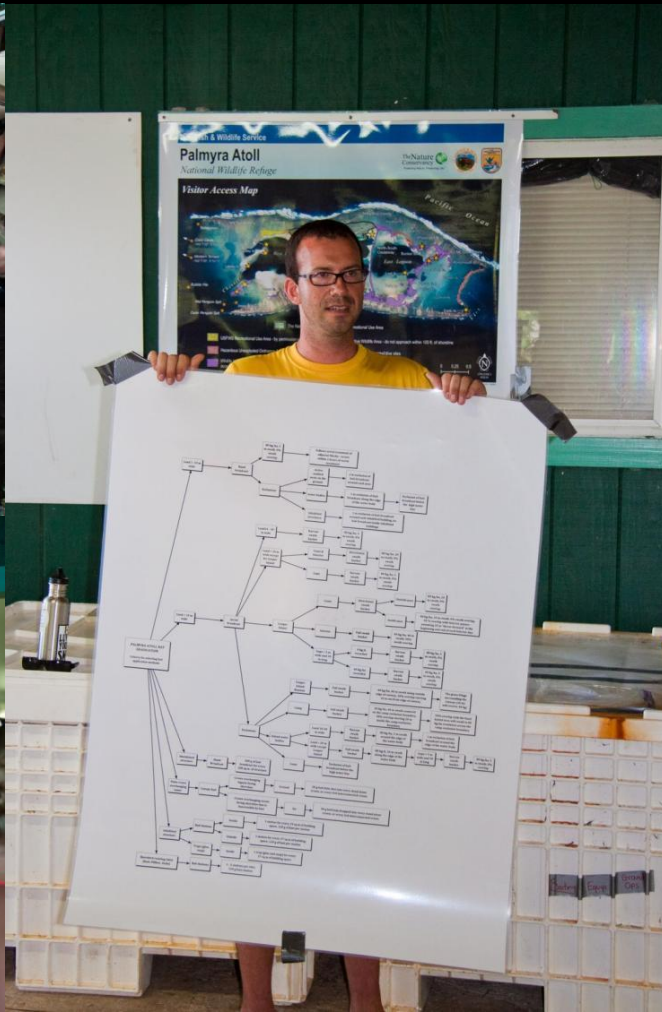
14 by Ship

27 by Plane

41 Total!



69 Meetings, Briefings, Training Sessions



25 Islands = 12 Baiting Blocks

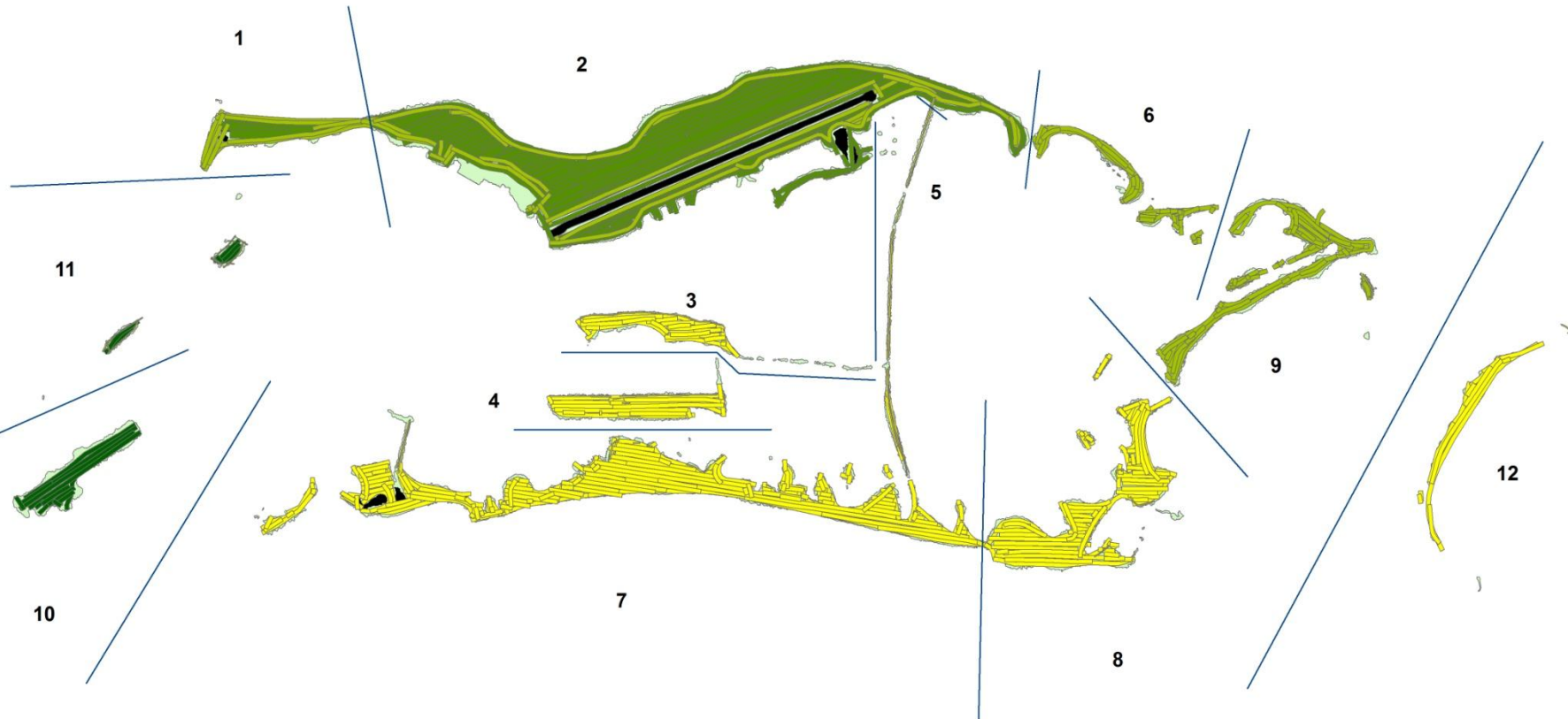




110,000 nesting sooty terns, 2 very skilled pilots



1st Broadcast = 5 days, 2nd Broadcast = 2 days





**4,200 Overhanging Palms
Baited**



10 ha Baited by Hand



165 Bait Stations



Broadcast and Overhanging Palm Baiting



1 Safety Director, 0 Major Incidents.....



Shooter

- PPE
- Bolas
- Cutting device
- Slingshot

Spotter

- PPE
- GPS
- Notebook / pencil

Other

- 1st Aid kit
- H₂O, Sunscreen
- Extra gloves
- Carcass collection bags

Aloha
FINALLY A FRIDAY

0900 - PRE-BRIEF IN ICC

1630 - ALL CANOPY BATERS BACK AT ICC

1700 - DEBRIEF, CLEAN

1800 - BOATS LEAVE FOR PAU HANA + DINNER ON AQUILA

Name, Block ID, Date	# Successful bores	# palmers treated

Reminder

- no loose food!
- Heli pad HOT 24 hrs a day
- please empty your pockets for laundry
- Check w/ Neal before taking anything from the Station

**...Except When We
Almost Lost Jordan**

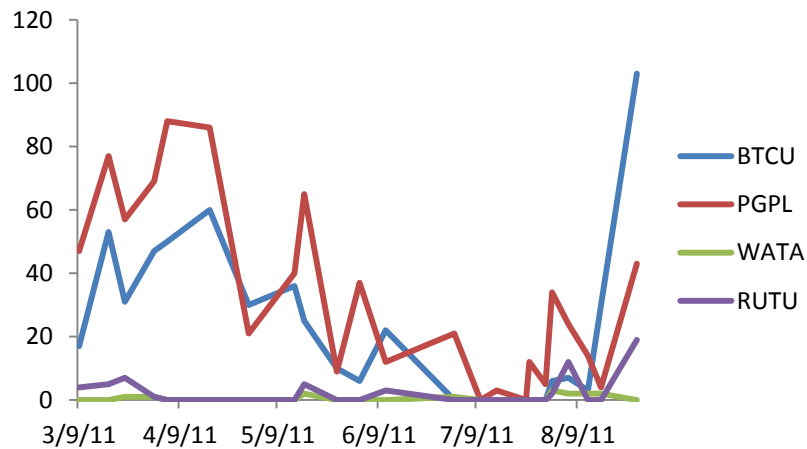


14 Shorebirds Captured and Held During the Project



14 Shorebirds Released in August

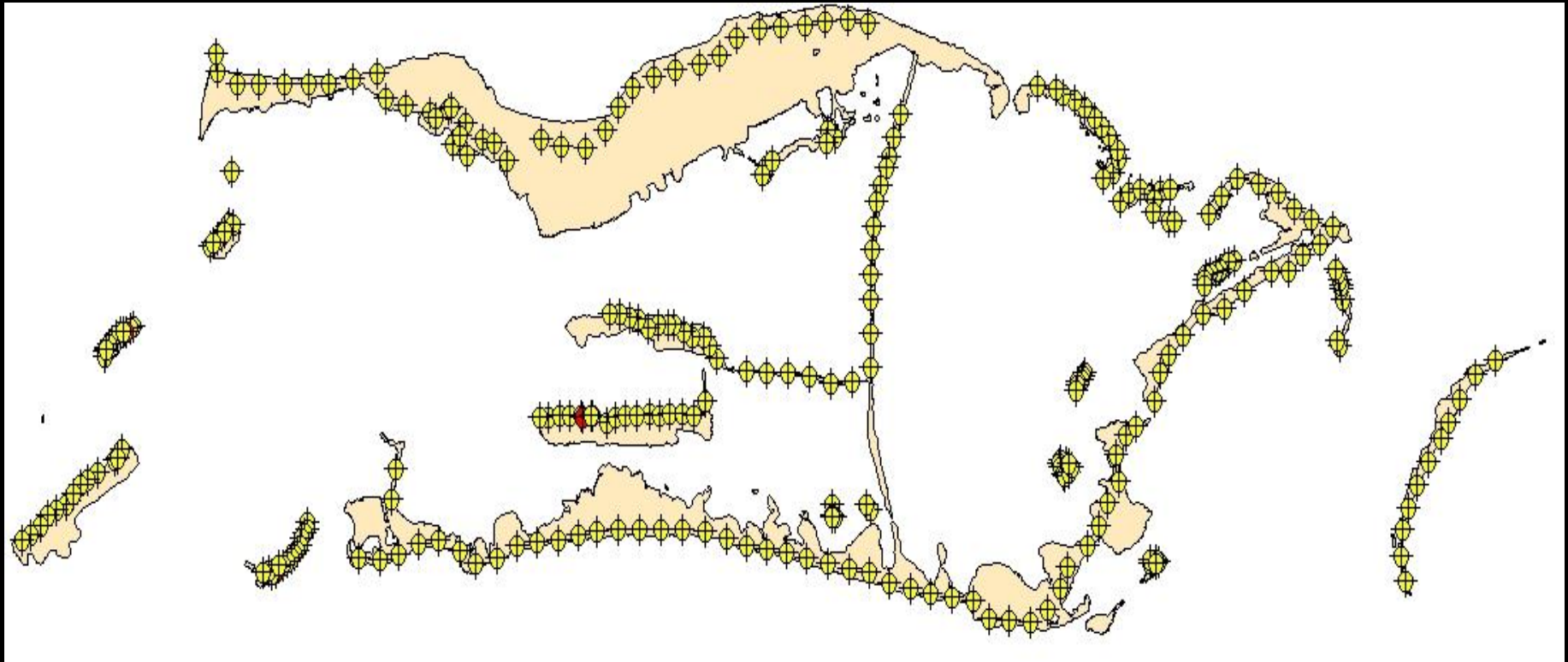
Post Eradication Shorebird Numbers Look “Normal”



Post-Implementation Efficacy Monitoring

2500 Station-nights

Zero Rat Detections



Hopeful signs of ecosystem recovery

