OPERATIONAL PLAN

Title: Operational Plan for the Eradication of House Mice (*Mus musculus*) from Allen Cay, Exuma Islands, Bahamas.

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Reviewers:

Version History:

VERSION	DATE	AUTHOR	REASON FOR CHANGE
Version 1	4/19/2012	A. Alifano	1st draft for review
Version 2	5/2/2012	A. Alifano	2nd draft revised

Citation:
This report should be cited as:

Alifano, Aurora (2012). Operational Plan for the Eradication of House Mice (*Mus musculus*) from Allen Cay, Exuma Islands, Bahamas. *Island Conservation*, 100 Shaffer Road, Santa Cruz, CA 95060. Unpublished report for the Bahamas National Trust, Nassau, Bahamas.

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EXECUTIVE SUMMARY

This Operational Plan for the eradication of introduced House mice (*Mus musculus*) from Allen Cay in the Exuma Islands, Bahamas outlines the operational structure and individual tasks and responsibilities required to implement and fulfil the goal and objectives of the proposed project.

A number of planning and preparatory tasks are required before the fieldwork is able to commence. A task schedule with assigned responsibilities is presented in chronological order as a way of ensuring all required tasks are carried out effectively and at the appropriate time.

The fieldwork will consist of four keys stages

1) The capture and transfer of rock iguanas to another cay
2) The cutting of transects necessary to establish a grid system for baiting
3) The double application of bait to the cay
4) The monitoring of operation efficacy and impact

The operation will be led by Island Conservation (IC) and Bahamas National Trust (BNT), and team members include IC and BNT staff along with a shearwater biologist.

Eradication of mice will be accomplished by using a cereal-based pelleted bait (Conservation 25D, Bell Laboratories®) containing the anti-coagulant toxin brodifacoum. Bait will be spread at a rate of 20 kg/ha for both the first and second applications. A total of 240 kg of bait will be distributed during the operation.

Planning documents and all necessary permits and approvals should be concluded by 5 May 2012 and a final decision to proceed will be made on that date. All work is aimed at enabling the first application of bait to commence on or as soon as possible after 12 May 2012. The second application of bait is anticipated approximately 10 days after the first. Monitoring and biosecurity programs will be implemented following the conclusion of the baiting operations.

Temporarily relocated rock iguanas will be released back onto Allen Cay after the removal of mice has been confirmed and there is no appreciable risk to the iguanas (likely one year after the implementation). The delay in relocation will allow time for the creation of appropriate breeding habitat on Allen Cay, mainly requiring that sinkholes be filled with sand from a nearby cay.

1. INTRODUCTION

The purpose of this document is to provide details for the planning and activities to eradicate introduced House Mice from Allen Cay, Bahamas. During the 2012 Horizon Oil Spill in the Gulf of Mexico, an estimated 400-800 Audubon's Shearwaters were killed. The project is funded by the proceeds of oil collected in the clean-up efforts from the spill that were set aside in a "Recovered Oil Fund" and administered by the National Fish and Wildlife Foundation. The project is overseen by the Bahamas National Trust, in consultation with Island Conservation. Bahamas National Trust will take the lead in the planning and implementing effective biosecurity for Allen Cay (see Biosecurity plan).

This operational plan is primarily aimed at the project manager and operational team that will implement the eradication. It details the timeframe, methods, sequence of events, and responsibilities for the numerous tasks required to complete the eradication. A feasibility study of the eradication project concluded that the project was both feasible and worthwhile, and would have significant conservation value (Alifano 2012). It also outlined some issues relating to the project and a basic outline of tasks required to ensure a successful completion of the project.

2. GOAL, OBJECTIVES and OUTCOMES

2.1. Goal

Two primary goals exist for the restoration of Allen Cay; increase the survival of Audubon's shearwaters through the eradication of House mice and recover the endangered endemic Allen Cay's iguana through the creation of breeding habitat on the cay.

2.2. Objectives and Outcomes

The objectives that this project will achieve and the outcomes that will be seen as a result of achieving these objectives are listed in Table 1. This Operational Plan outlines the plan required to achieve Objective 1 and 2. Other objectives will be planned and facilitated by the Bahamas National Trust.

Table 1: Objectives and desirable outcomes for the restoration of Allen Cay

Objectives	Outcomes
1. Eradicate House mice (*Mus musculus*) from Allen Cay	1.1 No population of mice on Allen Cay
	1.2 Increase population size and survivorship of Audubon's Shearwater on Allen Cay
	1.3 Decrease in barn owl visitation to the cay
	1.4 Increase in native vegetation densities on Allen Cay
2. Improve the capacity of BNT to undertake eradication projects.	2.1 BNT staff exposed to skills required to undertake further eradication projects of a similar or larger size to current project.
	2.2 BNT staff promotes and enforces biosecurity of restored sites.

3. Make breeding habitat available for endemic Allen Cay Rock Iguana.	3.1 Overall population of rock iguana on Allen Cay is increased
	3.2 Breeding of rock iguana is observed
	3.3 Survivorship of juvenile rock iguanas is improved.

The plans for monitoring of the project outcomes will be recorded in the project monitoring and evaluation plan.

3. PROJECT SITE & TARGET SPECIES

3.1. The Site

The northern Exuma Island chain is an archipelago of 365 cays and islands, beginning 34 km southeast of Nassau, Bahamas (Figure 1). The Allen Cays are located in the northern portion of the Exuma Islands, and contain four small cays (Allen Cay, 6 ha; SW Allen Cay (= U Cay), 3 ha; Leaf Cay, 4 ha; Flat Rock Reef Cay, 4 ha), all which are of conservation concern and protected by Bahamian law. Allen Cay is Crown Land belonging to the Commonwealth of the Bahamas, as is Flat Rock Reef Cay. The other two cays are privately owned and are not currently included in the Exuma National Land and Sea Park protected by the Bahamas National Trust.

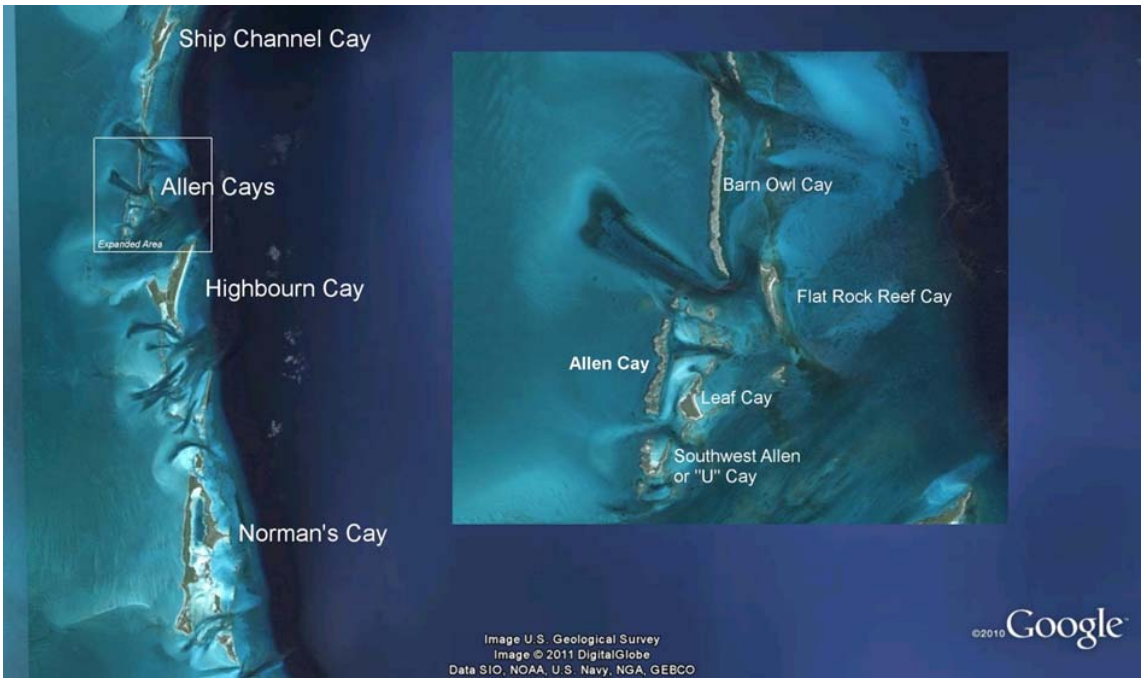

Figure 1: Map of Allen's Cays, in the Exuma Island Chain, Bahamas.

The cay is uninhabited, but is sometimes used by visitors for unknown purposes. Stacks of rocks and garbage at the landing site are evidence of human visitation. Infrequent visits from scientists are known to occur. The Allen Cays are just 60 km southeast of Nassau and because of this proximity, are regularly visited by recreational boaters and tour companies. There is no wharf or permanent structure on Allen Cay.

Weather patterns are typical of the Bahamas; trade winds blow almost continually throughout the region and produce a warm climate with little variation. Humidity is fairly high, especially in summer months. Wind speeds are, on average below 10 knots; in winter months, periods of north and northeast winds of about 25-30 knots may occur. May and June are typically humid months with heavy squalls and thunderstorms that arise quickly. Allen Cay is subject to tropical storms and hurricanes from June until November.

Tropical cyclone activity in the Atlantic basin during 2011 was above average. There were 19 tropical storms of which 7 became hurricanes and 3 became major hurricanes. Between April 27th and May 1st 2012, rain fell continuously all over the Bahamas, a recorded 10.8 inches and the most significant rainfall event since 1989. Operations could be delayed if a large tropical storm was detected prior to the implementation. The Bahamas Meteorology Department provides storm warnings and forecasts, including 3 day public and marine forecasts for the Northwest Bahamas and a 7 day Nassau weather forecast (http://www.bahamasweather.org.bs/index.php). A daily weather report is also broadcast from Highbourne Cay, conducted at 8 am. A general announcement is broadcast over marine 16 to indicate switching to channel 06 for weather. A decision to proceed with the application of bait will require at least four days and three nights without significant rainfall (less than 0.2" per day).

Physical and biological factors must be considered for optimal operation timing. Table 2 indicates that May is a suitable month for conducting the eradication of mice from Allen Cay.

Table 2: Calendar of biological and operational windows for Allen Cay

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry Season	X	X	X	X								X
Hurricane season						X	X	X	X	X	X	
Iguanas removed					**X**							
Laughing Gulls nest				X	**X**	X						
Shearwaters nest	X	X	X	X	**X**	X	X	X	X	X	X	X
Shearwaters with eggs			X	X	**X**							
Barn Owl breed			X	X	**X**							
Mice present at cay	X	X	X	X	**X**	X	X	X	X	X	X	X

(Red box indicates eradication timing)

3.2. The Target Species

Only one invasive mammal has been reported from Allen Cay, the house mouse (*Mus musculus)*. Rodents are one of the most devastating of all of the invasive species introduced to island ecosystems. They impact native plants and animals through direct predation, competition or changes in the food web. It is unknown when or how mice were introduced to the cay. The first confirmed sighting of mouse on the cay was recorded in 2003 by Dr. Will Mackin. The mice attract barn owls which, in addition to hunting mice, prey on Audubon's shearwaters. This operation aims to eradicate all mice from Allen Cay.

A secondary objective of this operation is to decrease the number of barn owls frequenting the cay. Barn owls are attracted to Allen Cay in higher numbers than to other cays because of the presence of mice. Each year, hundreds of adult shearwaters are found dead at Allen Cay, and almost all are killed by barn owls. The death rate at this colony is twice the rate at nearby colonies that do not have mice (Mackin 2007). The explanation for these observed impacts is known as 'hyperpredation'. This phenomenon occurs because mice provide a food source that allows barn owls to persist on Allen Cay throughout the year.

4. OPERATION DETAILS

4.1 Eradication of Mice

4.1.1 Rodenticide Efficacy

A fundamental requirement for the successful eradication of invasive mice from Allen Cay is that every last rodent is removed or killed. The use of bait containing a rodenticide is the best technique capable of achieving successful eradication of mice. For Allen Cay, brodifacoum is the toxicant mostly likely to achieve success. Brodifacoum is a coumarin-based second-generation anticoagulant. It is a vertebrate toxicant that acts by interfering with the blood's ability to form clots, causing sites of even minor tissue damage to bleed continuously. Brodifacoum is the primary rodenticide used in rodent eradications on islands (Howald et al. 2007).

4.1.2 Bait Production

The bait product selected is Brodifacoum-25D Conservation manufactured by Bell Labs Inc., Madison, Wisconsin. This product is specifically manufactured for use in dry environments. The active ingredient, brodifacoum, is represented at 25 ppm (0.0025%) in a 1.1g pellet with an inert grain matrix; the pellets are colored green or blue. Two applications at a rate of 20 kg/ha requires 22 buckets of bait pellets (Table 3). Bell Laboratories will oversee the packaging and shipment of bait to the R/V Coral Reef II in Miami. The shipment will be scheduled for delivery at the dock on May 8th 2012, a few days before the vessel departure from Miami to Nassau on May 11th 2012.

Table 3: Bait requirements for Hand Broadcast on Allen Cay

Total Area	Application Rate	# of Applications	Total Bait Order	# of buckets (11.3kg each)
6 ha	20 kg/ ha	2	240 kg	22

4.1.3 Hand Broadcast Technique

Even distribution of bait on the ground is the objective of broadcasting bait by hand. A grid with regular 10x 10 meter spacing has been created to cover Allen Cay's emergent land area (Figure 2). Use of trained personnel experienced with chain saws will expedite the creation of transects in heavily vegetated areas. Three days have been dedicated to cutting and flagging transects, working in four teams of two people. Transects within the grid will be defined with a hand-held GPS and flagged with either flagging tape or pin flags depending on the terrain. Odd number transects will have a different color flagging than even numbers to help baiting personnel stay on track. All points will be flagged prior to bait spread, to facilitate quick and

smooth application in one day. Completion of bait application completed in one day is ideal so that mice do not move from unbaited areas into baited areas where some or all of the bait has already been consumed.

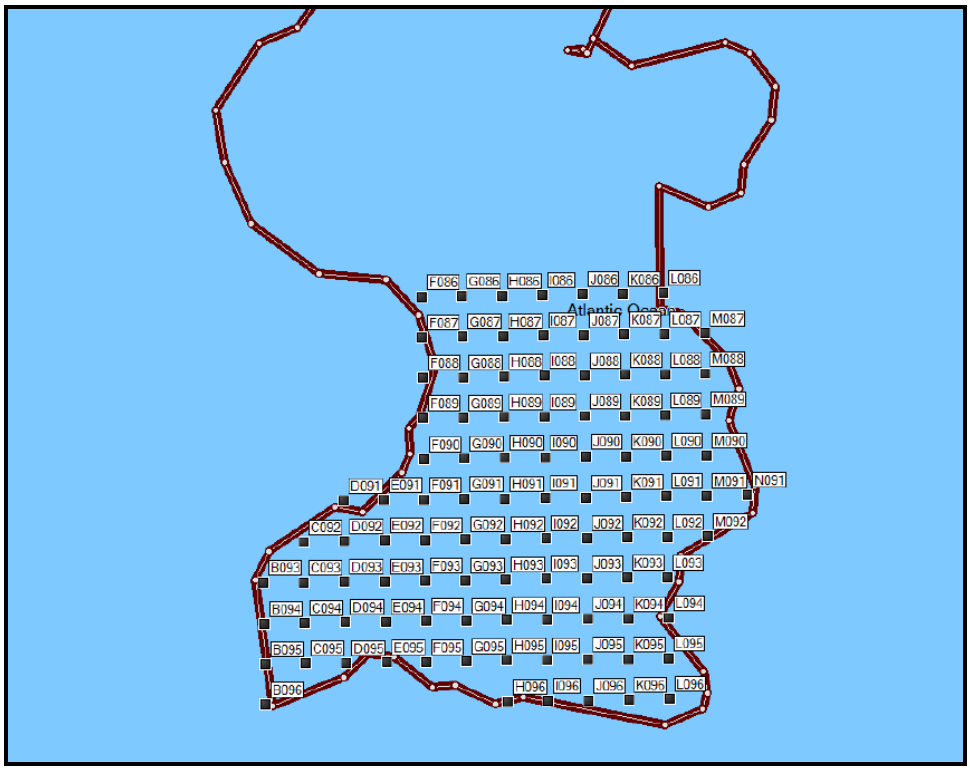

Figure 2: Example of a 10x10m grid of baiting points on the South end of Allen Cay, depicting 1 ha of area (zoomed in to make individual points visible)

Hand broadcasting is limited by the rate at which bait can be spread (number of personnel and physical demands of the terrain). Teams larger than four people become unwieldy, especially in dense vegetation. Two four-person teams led by Island Conservation personnel will work independently on separate halves of the cay. Personnel will work on adjacent transects, dispensing a pre-determined amount of pellets 360° around each point on the grid, taking care to ensure an even distribution within the area. One GPS waypoint will be recorded for each point where bait is dispensed. When all points are uploaded after the application, any gaps will be identified and "spot-treated" as soon as safely possible. Bait will not be applied below the high tide line to prevent rodenticide from entering the water surrounding the cay.

Bait will be dispensed at a pre-determined amount for each grid point to equal a total of 20 kg per hectare. Bait will be measured in plastic bait scoop cups marked with a line indicating the correct number of pellets. At each baiting point ($100m^2$), approximately 182 1.1gram pellets will be evenly dispensed (Figure 3).

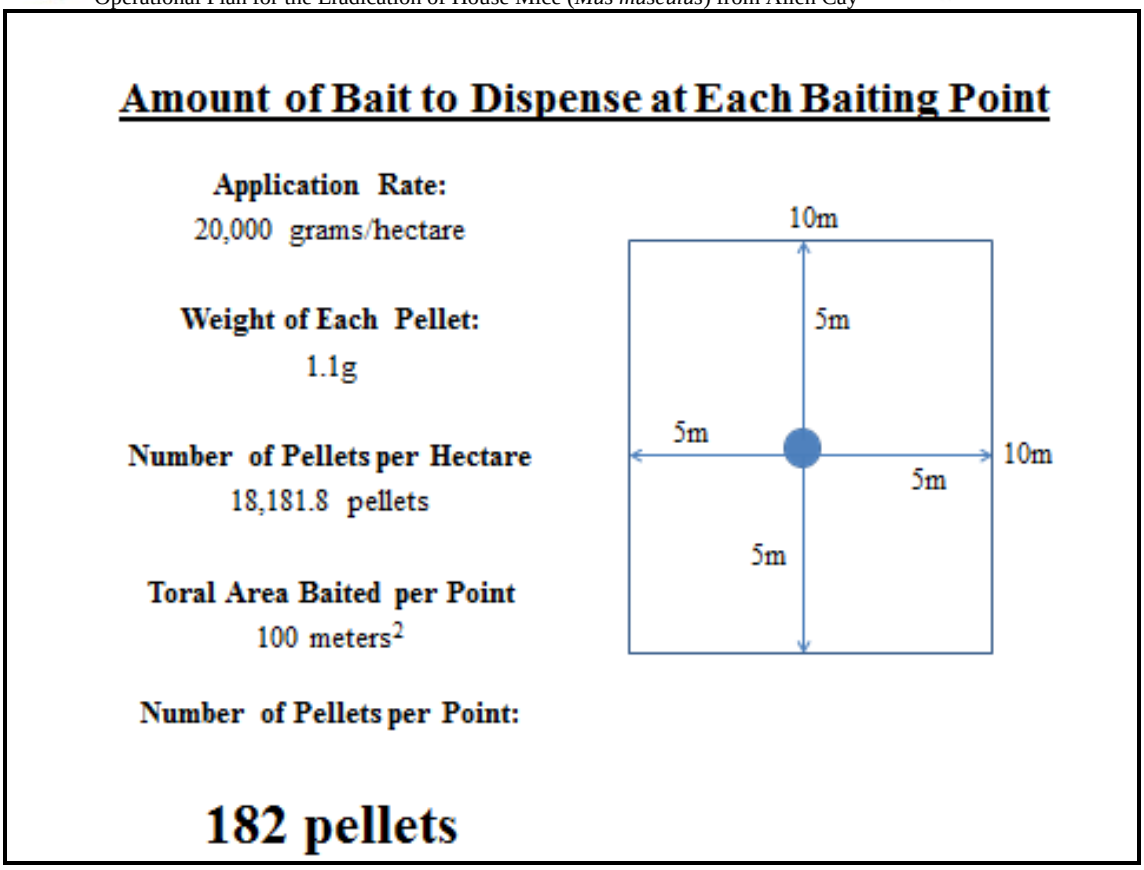

Figure 3: Diagram depicting the number of pellets to dispense at each baiting point in the grid.

As bait is spread, select transects will be "activated" by marking a specific number of pellets for monitoring purposes. Within 20 transects stratified by main habitat types, 18 pellets will be marked with pin flags and monitored daily (Table 4).

Table 4: Uptake plot: Number of pellets per plot size for a given application rate (1 pellet = 1.1g).

	Aplication Rate (kg/ha)																					
Plot Size (sq. meters)		**5**	**6**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**
	5	2	3	5	7	9	11	14	16	18	20	23	25	27	30	32	34	36	39	41	43	45
	10	5	5	9	14	18	23	27	32	36	41	45	50	55	59	64	68	73	77	82	86	91
	15	7	8	14	20	27	34	41	48	55	61	68	75	82	89	95	102	109	116	123	130	136
	20	9	11	18	27	36	45	55	64	73	82	91	100	109	118	127	136	145	155	164	173	182
	25	11	14	23	34	45	57	68	80	91	102	114	125	136	148	159	170	182	193	205	216	227
	30	14	16	27	41	55	68	82	95	109	123	136	150	164	177	191	205	218	232	245	259	273
	35	16	19	32	48	64	80	95	111	127	143	159	175	191	207	223	239	255	270	286	302	318
	40	18	22	36	55	73	91	109	127	145	164	182	200	218	236	255	273	291	309	327	345	364
	45	20	25	41	61	82	102	123	143	164	184	205	225	245	266	286	307	327	348	368	389	409
	50	23	27	45	68	91	114	136	159	182	205	227	250	273	295	318	341	364	386	409	432	455
	55	25	30	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
	60	27	33	55	82	109	136	164	191	218	245	273	300	327	355	382	409	436	464	491	518	545
	65	30	35	59	89	118	148	177	207	236	266	295	325	355	384	414	443	473	502	532	561	591
	70	32	38	64	95	127	159	191	223	255	286	318	350	382	414	445	477	509	541	573	605	636
	75	34	41	68	102	136	170	205	239	273	307	341	375	409	443	477	511	545	580	614	648	682
	80	36	44	73	109	145	182	218	255	291	327	364	400	436	473	509	545	582	618	655	691	727
	85	39	46	77	116	155	193	232	270	309	348	386	425	464	502	541	580	618	657	695	734	773
	90	41	49	82	123	164	205	245	286	327	368	409	450	491	532	573	614	655	695	736	777	818
	95	43	52	86	130	173	216	259	302	345	389	432	475	518	561	605	648	691	734	777	820	864
	100	45	55	91	136	182	227	273	318	364	409	455	500	545	591	636	682	727	773	818	864	909

4.2 Deterrent of Barn Owls

Efforts will be made to dissuade owls from inhabiting shearwater breeding areas surrounding Allen Cay; however this is a lower priority than the eradication of mice. If time allows, efforts will be focused on disrupting roost sites and making them unsuitable. Filling in owl roost sites with rocks from the surrounding area may discourage owls from remaining in the area.

Efforts to capture owls will be attempted if all time and resources allow it. Two actions are proposed to capture barn owls.

1) Mist net: Mist nets made of nylon mesh will be suspended between two poles and audio recordings of bird distress calls will be used as a lure.
2) Bal-chatri (raptor) traps: Bal-chatri traps will not be used on Allen Cay, as the pose a potential risk to the operation. Instead, they may be used on other nearby cays, using trapped rats as bait.

Owls captured at Allen Cay will be euthanized to stop the predation immediately. It is believed that only a handful of owls inhabit Allen Cay and the adjacent cays. The specimens will be tissue-sampled, exported, curated, and saved for study at the Smithsonian Museum of Natural History in Washington, DC.

5. Monitoring

Between bait applications, the monitoring team will assess the efficacy of and several environmental responses to the bait application. Select personnel will leave their GPS turned on to log distance covered during monitoring activities that will be used to estimate search hours and area coverage during post operations analysis.

5.1 Bait Availability

Tracking the disappearance of bait pellets will provide an indication of operational efficacy.

a. Personnel: Two teams of two people per day
b. Equipment: GPS units, notebooks, pencil, pin flags.
c. Method: Twenty 10m x 1m transects will be selected prior to the first application, and pin flags staged at each one. After spreading bait at that point, personnel will indicate the presence of 18 pellets with flags, chalk, or grease pencils. Transects will be monitored daily and remaining pellets counted and recorded. Flags or other markers without pellets found beneath them will be removed. Qualitative notes about the overall degradation of bait across the cay will be recorded by personnel throughout the duration of the project.

5.2 Opportunistic Rodent Carcass Searches

Locating mouse carcasses during the operation is a simple indicator that mice are eating and succumbing to the bait. Opportunistic mouse carcass searches will take place any time that team members travel across the island. Assessment of morphometric information and dissections will be conducted nightly as a team to maximize information transfer and opportunities to apply skills.

a. Personnel: All personnel
b. Equipment requirements: GPS units, dissection kits, Pesola spring scale (50g), metric ruler, nitrile gloves, and notebooks.
c. Method: Mouse carcasses encountered at any time will be checked for the consumption of bait, aged and sexed. Carcasses will be removed from the open, limiting the ability of raptors and reptiles to scavenge contaminated animals. Location of a carcass will be marked with a GPS waypoint, and carcasses should be placed in a Ziploc bag and brought back to camp.

5.3 Incidental Species Observations

Identification of bird and reptile species will contribute to the species records list for Allen Cay. Observations of species during the bait operation will allow the field team to compare species records to previous data, and document any species not seen, and any new species records for the island.

a. Personnel requirements: all personnel.
b. Equipment requirements: GPS units, binoculars, notebook, bird guide to Bahamas.

5.4 Directed Carcass Surveys:

It is important to measure the response of island species during the operation to demonstrate the impact (or lack thereof) on the current populations. Any carcasses naturally present at the cay will be counted and disposed of as transects are created across the cay, providing a baseline of carcasses present prior to operations.

a. Personnel requirements: all personnel.
b. Equipment requirements: GPS units, nitrile gloves, collection bag, notebook.
c. Method: After bait is applied to the cay, directed carcass surveys will be conducted daily on 20 pre-established transects. Personnel will survey the same transects every day and actively search for and collect any carcasses found, regardless of species. Personnel will record species, coordinates of carcass location, and any other relevant notes.

5.5. Opportunistic Songbird and Other Non-target Carcass Surveys

Reptile species on the cay, specifically the anole and ground iguana have been identified as possible primary or secondary bait consumers. Because of their feeding habits, several species of landbirds, including raptors, mockingbirds, Clapper Rails, and doves, may be at risk of primary or secondary poisoning and are included in opportunistic non-target carcass searches. Carcasses collected during this effort will be examined for evidence of bait consumption.

a. Personnel Requirements: all personnel
b. Equipment requirements: GPS units, dissection kits, nitrile gloves, notebooks, pencil, Ziplock bags, Sharpie, bird guide to Bahamas.
c. Method: The location of any carcasses encountered should be recorded with a GPS and species type should be recorded in a notebook. Personnel should don gloves, place carcass in a plastic bag, and bring the carcass back to camp. Non-target birds and reptiles encountered will be identified to species, genus, or taxa (e.g. shorebird, passerine) and examined for hemorrhaging.

6. NON-TARGET SPECIES

Accidental mortality of individual animals during invasive species eradication operations is possible, however action can be taken to reduce or completely mitigate the risk to non-target species.

6.1 Removal of Iguanas

As a precautionary measure every effort is being made to remove all iguanas from the cay prior to the bait application. Capturing iguanas is difficult work that requires a team of experienced personnel. Most individuals were removed in May and August 2011, and a third trip to get the last few individuals will preclude the eradication of mice. Iguanas are released on Flat Rock Reef Cay and will be returned to Allen Cay following confirmation that mice have been successfully removed.

6.2 Gull Harassment

Bird species may be at risk of exposure from feeding directly on bait (primary), or by feeding on contaminated prey (secondary). Laughing Gulls are at risk of primary exposure because of their generalist diet. Gulls can be effectively hazed from Allen Cay to reduce risk of bait consumption using a variety of techniques. Qualitative notes about general gull behaviour and reaction to each technique will be recorded.

a. **Destruction of Nests and Eggs:** A team of hazers will locate and destroy any nests on Allen Cay created each day by breeding gulls. Personnel will count the number of gulls, the number of nests present and the number of eggs in each nest prior to destruction.
b. **Biosonics:** Animal alarm or distress calls will be used to alter the behaviour of gulls, typically causing them to vacate or avoid an area. The vocalizations used are usually those emitted by a predator of the target species or the alarm or distress call of the target species (or a closely related species). Harris & Davis (1998) reported that Gunn (1973) found gulls to be responsive to Peregrine Falcon calls.
c. **Air horn:** Air horns are inexpensive and portable, and have unknown efficacy at dispersing gulls. This method will be tested on Allen Cay.
d. **Shotgun:** The report of a shotgun can be effective at dispersing a large number of gulls at once. A shotgun in the care of a BNT game warden for the purpose of capturing Barn Owls may have a secondary purpose for hazing gulls.
e. **Lasers:** Lasers are concentrated light beams used in low lighting conditions to disperse or deter roosting & feeding birds. They remain one of the most effective tools for dispersing birds at night, when most other techniques are ineffective. Lasers emit red light and are highly portable (Gorenzel and Salmon 2008). Lasers are not effective on all bird species, but there is considerable evidence that lasers can be used to effectively deter gulls (Blackwell et al. 2002, Baxter 2007).
f. **Kites:** Kites in the shape of predators or painted with predators have been used in the past to deter birds The unpredictable movement of a kite in the wind serves to slow the habituation of gulls to this method
g. **Effigy:** Dead gulls or other seabirds suspended in the air with feathers flapping in the wind is extremely effective at clearing gulls from an area. Due to high winds and the risk of a carcass suspended on a pole falling over and potentially creating a food sources for mice, only the wings from a carcass will be used for this purpose. Wings from a seabird will be affixed to a pole and placed in an area of high gull density if needed.

7. ENVIRONMENTAL EFFECTS

The use of hand broadcast technique makes it very unlikely that any bait would end up in the ocean or in the living tissues of aquatic animals directly surrounding Allen Cay. Special care will be taken during hand broadcast to ensure bait doesn't enter the surrounding waters. The bait is specifically formulated for dry environments, and breaks down with exposure to rainfall. Any bait that remains unconsumed on the cay will degrade naturally over a short period of time.

8. ENSURING THE SAFETY OF PEOPLE

Access to Allen Cay is uncontrolled and though visitors are unlikely, placing a notice of application sign would be prudent to prevent accidental contamination or ingestion. A pesticide warning sign will be installed at the beach, the only access site for individuals landing on the cay by boat (Figure 4). A pesticide sign will be placed by a BNT warden as soon as bait is applied on the cay. The sign should be water resistant and be visible from a vessel. A full safety plan detailing protocols to ensure operational safety is contained in a separate document, attached as an Appendix. Project safety is the responsibility of the Operations Facilitator.

Figure 4: An example of the pesticide notice of application sign to be posted at Allen Cay during the removal of mice.

9. LOGISTICS

The following section summarizes logistical plans to support preparation and implementation of baiting operations on Allen Cay.

9.1 Shipping Supplies and Equipment to Nassau

Supplies and equipment will be transported to Nassau, Bahamas via three different methods. Equipment owned by Island Conservation in use by another project in Puerto Rico will be shipped directly to the BNT Retreat in Nassau and stored until the operation. Other supplies and equipment purchased by Will Mackin or sent from Island Conservation Santa Cruz will be shipped to Miami and loaded upon the R/V Coral Reef II for transit to Nassau. Shipping information is listed in Table 5. Bell Laboratories will ship the bait in buckets to Miami to be loaded aboard the R/V Coral Reef II. Other sensitive equipment like cameras and laptops will be hand carried in personal luggage.

Table 5: Shipping Address for R/V Coral Reef II and Bahamas National Trust

Shipping Address for R/V Coral Reef II	Shipping Address for BNT in Nassau
R/V Coral Reef II Captain John Rothschild 3399 NW South River Drive Miami, FL 33142 USA	For: Bahamas National Trust Attn: Predensa Moore P.O.Box N-4105 Nassau, Bahamas Telephone: (242) 393-1317

Consumable groceries and last minute needs will be purchased in Nassau on May 11th and packaged for transport aboard the R/V Coral Reef II.

9.2 Transfer of Personnel, Equipment and Supplies From Nassau to Allen Cay

Personnel and all supplies and equipment for the project will be transported to Allen Cay aboard the R/V Coral Reef II on May 12th. All personnel, bait and gear will be loaded into a zodiac and will land on the beach at Allen Cay, possibly in the dark. Adequate headlamps and lighting sources for transferring gear will need to be accessible. Safety gear for off-loading (life jackets) will be provided by the R/V Coral Reef II and the zodiac will be operated by a member of vessel's crew.

If possible, several personnel carrying tents could use Powerboat Adventures to access the cay during daylight hours and set up camp to the best of their abilities, to reduce the work required in the dark.

9.3 Personnel Travel To/From and Within Nassau

Personnel not local to the Bahamas will arrive at the Nassau International Airport (NAS) and take a cab to the Towne hotel on May 10th 2012. On May 11th a representative from BNT will arrange for pickup and transport to complete grocery shopping and package gear and supplies at the BNT Retreat Gardens. A BNT vehicle will be reserved for transporting personnel and gear to the Prince George Wharf where the R/V Coral Reef II will dock on May 12th.

9.4 Operational Transportation Biosecurity

Any vessels going to Allen Cay will be inspected for animals prior to loading and before departure.

- All food will be packed in rodent-proof containers.
- All small cargo should be packed in rodent-proof containers.
- All cargo will be inspected immediately before loading onto the boat. Particular attention will be placed on high-risk cargo such as food, fabric, and other items that may attract or hide non-native species.
- All boxes, containers, bags, boat hatches, doors, etc. will be closed tightly to minimize opportunities for animals to hide inside.

9.5 Protocols for Waste Disposal on Allen Cay

The success of the Allen Cay mice eradication relies on every individual mouse eating a sufficient quantity of bait pellets. If additional food sources such as garbage, food scraps, and

perishable food items are available to mice during the eradication, there is a risk that mice will not eat the bait pellets. For this reason, all waste food and food containers must be collected in garbage bags, sealed, and removed from the island. In addition, the campsite, especially the kitchen area, must be kept clean and all food scraps removed from the ground and the stove.

- All garbage including waste/unused perishable food MUST be removed from the island.
- All garbage and waste perishable food must be collected on-island in sealed garbage bags, inside sealed garbage bins.
- Ensure that all totes/Action Packers containing food are sealed with lids in place; tinned food is the only packaging that mice *cannot* chew into.
- Ensure that no food items or food wrappers remain in your backpack at night, remove to a sealed tote.
- Do not discard any foodstuffs, empty food containers/tins/packaging into vegetation or into the sea (e.g. do not throw your banana skin into the bush after eating).
- For used dishes and kitchen utensils, scrape all remaining food into garbage bags and/or wipe with kitchen paper then wash.
- After use, pour washing water through a colander/sieve to collect all food scraps before disposing of the water; dispose of food scraps in garbage bag.
- Ensure that all kitchen utensils, pots, pans etc. are cleaned after each meal and packed in totes.
- Clean-up and dispose of food scraps on the ground and keep the stove clean.
- Maintain a clean and hygienic camp.

9.6 Camp Waste Facilities

Rodents will use human excrement as a food resource. For this reason, you will be provided with toilet facilities that ensure that all human waste is collected and removed from the island. Field staff is encouraged to use the toilet facilities at the field camps at the beginning of each day before hiking out onto the island. Human waste deposited elsewhere on the island will be an additional food source for rats.

10. EQUIPMENT LIST

Category	Item	Quantity	Complete?	Location	Notes	From
Camping equipment	bowls	8	X	BNT	BNT Edu Dept. eqpt	
Camping equipment	buckets (general use- pack things in)	3	X	Denny's House	2-4 pre-bait empties	stored at Denny's
Camping equipment	camp chairs	7	X	Ship Channel		Ship Channel
Camping equipment	camp tables	1	X	Ship Channel	1 stored at Denny	Ship Channel
Camping equipment	cutlery	8	X	BNT	BNT Edu Dept. eqpt	8 ea - spoon/forks + cooking utensils
Camping equipment	Dish washing basin	2	X	Denny's House		
Camping equipment	fry pan big and small	2	X	Denny's House		[1sm + griddle-Will purchased for Dec trip]
Camping equipment	kitchen towels	4	X	Denny's House	4 stored at Denny	
Camping equipment	Lanterns - 4 oil burning were returned to BNT	2	X	Ship Channel	what type?	Ship Channel
Camping equipment	Off Mosquito repellant	2	X	Ship Channel		Ship Channel
Camping equipment	pots/pans	4	X	BNT Edu Dept. eqpt	2lg + 2sm	
Camping equipment	Sleeping bags	8	X	IC and BNT	CS & DM - personal	IC (2) and BNT (6).....[3 stf & WM?]
Camping equipment	Sleeping pads	8	X	IC and BNT	CS & DM - personal	IC (2) and BNT (6) ……. [Do I need BNT pads for all?]
Camping equipment	spoon wooden	1	X	BNT Edu Dept. eqpt		Other non-stick utensils?
Camping equipment	Storage tents (Small)	1	X	IC		IC Santa Cruz and BNT

Camping equipment	stove	1	X	Denny's House		
Camping equipment	Tents - 4 guys share 2	6	X	BNT Edu Dept. eqpt		IC (2) and BNT (5)….Denny-personal/Will?
Camping equipment	toilet bucket with lid seat	1	X	Ship Channel	hope so!	Did this go to ship channel?
Camping equipment	wag bags	10	X	CRII		Campmor
Camping equipment	water cans (jerry cans)	6	X	BNT and Powerboat Adv.	JI-3 +WM purc add.?	2 stored on Ship Channel
Electrical	power strips	2	X	CRII		IC Santa Cruz (1)
Equipment	Handheld GPS- Garmin 60CSx	8	X	Island Conservation		IC Santa Cruz
Equipment	Handheld radio chargers & cord	4	X	Island Conservation		IC Puerto Rico
Equipment	Mouse Live Traps	40	X	Ship Channel	Heavy!	Ship Channel
Equipment	Radio Holster	6	X	Island Conservation		IC Puerto Rico
Equipment	Satellite phone	1	X	Island Conservation		IC Puerto Rico
Equipment	VHF Handheld Radios/ batteries	5	X	Island Conservation		IC Puerto Rico
Field Equipment	bucket backpack systems	2	X	Island Conservation		IC Puerto Rico
Field Equipment	Day Pack	1	X	Island Conservation		IC Puerto Rico
Field Equipment	Digital Point and Shoot Camera	2	X	Island Conservation		IC Santa Cruz
Field Equipment	Digital SLR Camera	1	X	Island Conservation		IC Santa Cruz
Field Equipment	Field Calculator	2	X	Island		IC Santa Cruz

				Conservation		
Field Equipment	Headlamps	6	X	CRII		Campmor
Field Equipment	Hiking boots for BNT staff	3	X	CRII		Forestry Supply
Field Equipment	Medical Kit (IC to provide)	1	X	Island Conservation		IC Chile
Field Equipment	Water bottles-Platypus	6	X	CRII	1 per person	Campmor
Gull Hazing	Air Horn	2	X	CRII		Forestry Supply
Gull Hazing	Air Horn refil	2	X	CRII		Forestry Supply
Gull Hazing	Handheld Laser	1	X	CRII	red	Forestry Supply
Gull Hazing	Kite	1	X	Will		Forestry Supply
Supplies	Bait scoop cups	9	X	CRII	IC provides	Safeway
Supplies	Brodifacoum Bait	22 Buckets	X	Coral Reef II	Ship to CRII	Bell Labs, Madison WI
Supplies	Cable ties	100	X	Ship Channel		Ship Channel
Supplies	Clipboards	2	X	Ship Channel		Ship Channel
Supplies	Compass Protractor	7	X	CRII		Forestry Supply
Supplies	Dissection Kit	1	X	CRII		IC Santa Cruz
Supplies	Dissection Kits	3	X	Island Conservation		IC Santa Cruz
Supplies	Dry bag	3	X	Island Conservation		IC Puerto Rico
Supplies	Duct Tape	1	X	CRII		Forestry Supply
Supplies	Electrical Tape	1 roll	X	CRII	Nassau??	IC Provides
Supplies	EMT shears for tail snips	3	X	Island Conservation		IC Santa Cruz
Supplies	Flagging Tape (orange)	12	X	CRII		Forestry Supply
Supplies	Flagging Tape (Orange/silver stripe vinyl)	7	X	CRII		Forestry Supply
Supplies	Flagging Tape Dispensers	7	X	CRII		Forestry Supply

Supplies	Flagging Tape(red)	20	X	CRII	TWO colors	Forestry Supply
Supplies	Fox Pro		x			ICSanta Cruz
Supplies	Mechanical Pencils	20	X	CRII		IC Santa Cruz
Supplies	Nitrile Gloves (M, L)	1 box each	X	CRII	Not latex-allergies	Forestry Supply
Supplies	Parafilm	1	X	Island Conservation		IC Santa Cruz
Supplies	Rechargable batteries and charger for FoxPro	16	X		Unit takes 8 AA batts	
Supplies	Rite in the Rain Notebook	12	X	CRII		Forestry Supply
Supplies	Sample Vials with buffer	50	X	Island Conservation		IC Santa Cruz
Supplies	Small Ruler	1	X	CRII		IC Santa Cruz
Supplies	Vionex Wipes	100	x	For genetic samples		Web
Supplies	Work gloves	8	X		Size to person	
Tools	150mm/0.1mm Caliper	2	X	Island Conservation		IC Santa Cruz
Tools	Folding 8" Pruning saw	5	X	CRII	Pls purchase in USA	Forestry Supply
Tools	Hammer	1	X	Ship channel		Ship Channel
Tools	Machete Gerber Gator	5	X	CRII	Pls purchase in USA	Forestry Supply
Tools	Plastic sealed container (for genetic samples)	1	X	Island Conservation		IC Santa Cruz
Tools	Spring Scales (mice) 50g Pisola	2	X	CRII		IC Santa Cruz
Camping equipment	clothes line				rope	
Camping equipment	clothespins	60			Nassau	have some-need more
Camping equipment	cooler			Powerboat Adventures?		

Camping equipment	Dish liquid	2		Joy	buy 1 - Nassau	Grocery store
Camping equipment	Large Heavy Duty garbage bags					Purchase in US, Contractor bags, hardware store
Camping equipment	paper towels	8				Grocery store in Nassau
Camping equipment	Shade Tarps	2				
Camping equipment	sponges / dishcloths	3				Grocery store in Nassau
Camping equipment	Stove Fuel			Denny		
Camping equipment	stove lighter	2		Nassau		Grocery store
Camping equipment	t.p.	Lots		Nassau		Grocery store
Electrical	Solar Panel grid/converter	1				Will we get these again? How to get to AC?
Equipment	Chainsaw Safety Gear- chaps, gloves, glasses			BNT		
Equipment	Pesticide Application Sign	1				
Storage	Action packers for weatherproof storage	TBD		2 stored at Denny		Costco
Supplies	AA batteries	140			for GPS	Costco
Supplies	AAA batteries	100			for headlamps	Costco
Supplies	Mouse bait (oats and PB)	1			Buy in Nassau	Grocery store
Supplies	Sharpies	12		2 per person	Pls purchase in USA	Office Max
Supplies	Super Glue	1			Nassau??	Hardware Store
Supplies	Twine	1			Nassau??	Hardware Store
Supplies	Ziploc- gallon and quart	100			Pls purchase in USA	costco

11. OPERATIONAL TEAM

11.1 Roles and Responsibilities

The Allen Cay baiting operation will be managed by a team of four people that will work together to oversee, direct, and evaluate bait operations. Will Mackin, Aurora Alifano, Wes Jolley, and Predensa Moore will take on leadership responsibilities throughout the operation. The responsibilities described for each position are the primary responsibilities; additional activities may be assigned to any of the positions as needed. Personnel should familiarize themselves with the different roles and responsibilities and practice good communication and information flow during operations.

Name	Role	Responsibilities
Tamica Rahming	Lead Project Coordinator	• Act as Point of Contact for on-island personnel • Resolve any deviations from the Operational Plan • Develop and implement Biosecurity Plan
Predensa Moore	Lead Field Coordinator	• Manage external communication from the field with BNT and partners • Advice to Operations Facilitator in planning • Selection of staff for camp roles and delegation of camp tasks • Directs placement of Notice of Application Sign • Cut and flag transects • Spread bait according to instruction
Will Mackin	Lead Ornithologist	• Planning and reporting on the project • Equipment and supplies procurement • Lead field team to capture owls • Lead shearwater monitoring efforts • Manage boat activity • Cut and flag transects • Spread bait according to instruction
Aurora Alifano	Operations Facilitator	• Facilitation of project and project team • Preparation of Operational Plan, Task Lists, Monitoring and Evaluation Plan • Bait Ordering and Transportation • Provide pre-operational briefings • Brief all personnel on daily plan • Health and safety of the team • Manage GIS analyses and documentation • Manages bait application tracking spread sheet • Cut and flag transects • Spread bait according to instruction

Wes Jolley	Baiting Chief	• Provide back up to the Operations Facilitator • Implement training of bait spreading team (GPS use/spreading technique) • Lead and oversee transect cutting and bait-spreading team • Direct bait staging across the cay • Lead Monitoring Operations • Oversees demobilization
Cameron Saunders	Track Cutter/Bait Specialist	• Cut and flag transects • Spread bait according to instruction • Monitoring Crew • Haze gulls • Assist Baiting Chief with leading the Monitoring Operations
Arlington Johnson	Transect Cutter/Bait Specialist	• Cut and flag transects • Operate Chainsaw • Monitoring Crew • Haze gulls • Spread bait according to instruction • Lead mouse trapping effort
Scott Johnson	Transect Cutter/Bait Specialist	• Cut and flag transects • Spread bait according to instruction • Monitoring Crew • Haze gulls • Manage wildlife observations and operation records
David Cooper	Transect Cutter/Bait Specialist	• Cut and flag transects • Spread bait according to instruction • Operate chainsaw • Monitoring Crew • Lead gull harassment efforts

11.2 Meetings, Briefings, and Trainings

Introductory Project Briefing (45 min)
Once all personnel have arrived at Allen Cay, an introductory project meeting will be held at base camp to inform all personnel about the schedule, activities, and ensure all personnel are notified of biosecurity procedures.

Radio and GPS training (30 min)
Participants will require training in both VHF radio communications and handheld GPS use to enable the operations to be carried out safely and effectively. All personnel should attend this training, to be conducted by the Baiting Chief.

Basic Radio transmission Protocol:

- Be specific: Before transmitting, know what you are going to say.

- Indicate objectives: Personnel should know exactly where to go, to whom they should report, the task and its objective.
- Use clear tone/effective rate: Speak clearly at a normal rate, not too fast or too slow.
- Well timed/spaced transmissions: Prioritize your messages. Do not waste valuable airtime with unimportant messages and insignificant details. Maintain an awareness of the overall situation and how you fit in. Wait until a message transaction has been completed before transmitting.
- Pause between concurrent messages: A pause makes it clear when one message has been completed and another started. It will also give other personnel a chance to transmit important messages.

Safety Briefing (15 min)
The Operations Facilitator will review the safety plan, hazards, first aid equipment and evacuation procedures, and safe practices for handling toxic rodent bait.

Monitoring Overview (30 min)
Once the first bait application is complete, the Operations Facilitator will schedule a training session for the monitoring crew. The purpose and goals of monitoring will be discussed, and participants will practice the monitoring techniques first hand.

Operations Debrief and Demobilization
A general operations debrief will be held with the remaining operations crew on Allen Cay prior to departure. Due to the departure of participants after the first bait drop and the immediate return of team members to various islands after the operation, a Project Debrief will be held remotely within two weeks of the completion of operations, all project participants will be invited to participate via Skype.

Project demobilization will occur in two phases. Project participants returning to Nassau will assist with cleaning, organizing, and packing of gear for shipment or storage at the BNT Retreat. If a skeleton team remains on the cay to complete monitoring or hazing efforts, a second round of demobilization will be necessary.

12. TASK SCHEDULE

2012 Allen Cay Operation Gantt	May																						June	
	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F
	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1
Team arrives in Nassau		X																						
Purchase consumables, gear inventory, pack for transit			X																					
Field team transit to Allen Cay (RV/CRII)				X																				
Set up camp: orientation, safety, gull hazing briefings					X																			
GPS & VHF radio training					X																			
Sweep camp for trash and collect all potential mouse food				X	X																			
Locate, count & destroy gull gests/eggs				X	X																			
Photograph, count, and collect shearwater carcasses				X	X																			
Trap mice for genetic samples					X	X	X																	
Cut transects through vegetation					X	X	X																	
Mark bait points in grid (N= 600)					X	X	X																	
Stage bait depots around the cay							X																	
Install Notice of Application warning sign							X																	
Pick up Park Boat						X	X																	
Bait Application Day								X									X	X						
Monitoring overview briefing									X															
Bait availability: establish/mark transects					X	X	X																	
Bait availability: activate transects								X																
Bait availability: monitor transects									X	X	X	X	X	X	X	X			X	X	X	X	X	
Mouse carcass searches									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Direct and opportunistic non-target carcass searches									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Incidental non-target observations					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Gull Harassment					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Owl Roost Location/Disruption											X	X	X	X	X								
Owl Capture Efforts													X	X	X								
Establish shearwater census plots										X	X	X	X	X	X								
Will Mackin and Predensa Moore depart Allen Cay																X							
Pack up camp (am)																			X				
Field team (4 people) & supplies to Nassau (pm) (RV/CRII)																			X				
Demobilization/Debrief (BNT Retreat)																				X	X	X	
2 BNT staff depart Allen Cay																						X	
AA and WJ departs Nassau																						X	
	W	**Th**	**F**	**S**	**Su**	**M**	**T**	**W**	**Th**	**F**	**S**	**Su**	**M**	**T**	**W**	**Th**	**F**	**S**	**Su**	**M**	**T**	**W**	**Th**	**F**
	9	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**1**

13. BAIT TRACKING WORKSHEET

Application Number	Date	Baiter	Bait Used (kg)	# of Points Baited	Area per point (m2)	Area Treated (ha)	App Rate (kg/ha)
					100		20
Total							

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