CRITICAL ECOSYSTEM PARTNERSHIP FUND

Pest Management Plan

May 2012

CEPF Grant 60933

Environmental Awareness Group Inc.

Offshore Islands Conservation Programme: Maintaining Rat-Free Islands for the Benefit of Antigua's Biodiversity and People.

Antigua and Barbuda

CRITICAL ECOSYSTEM PARTNERSHIP FUND

Pest Management Plan

Objective

The pest management plan (PMP) will describe CEPF requirements to ensure the use of best practice in the control and removal of alien and invasive plants, insects, and animals in compliance with World Bank Safeguards. This is included in the CEPF Operational Manual.

The objective of these guidelines is to avoid, minimize, or mitigate potentially adverse effects of the application of pesticides, insecticides, and herbicides (herewith referred to in the unitary as "pesticides") in efforts to restore natural habitats.

This document describes the requirements and planning procedures for applicants/grantees in the preparation and implementation of alien and invasive species (AIS) control projects funded by CEPF, as well as the role of CEPF in ensuring compliance with these guidelines.

The spread of alien and invasive plants and animals is the second greatest cause of biodiversity loss after habitat destruction. In the context of CEPF, many of the KBAs and corridors targeted for investment suffer from, in particular, non-native plants which have opportunistically taken over natural landscapes, and from non-native animals that upset island ecosystems. Many Ecosystem Profiles specifically include the control and removal of such alien and invasive species as an investment priority. The control of alien and invasive species in KBAs and corridors is not an exception, but a standard part of CEPF operations in some hotspots, and as such, applicable guidelines must be followed.

Situations where these guidelines apply include grants which:

- Pay for the direct purchase or expenses related to the manufacture, acquisition, transport, application, storage, or disposal of pesticides, including the costs of materials, equipment, and labor.
- Pay for the direct purchase or expenses related to the control or removal of animals by chemical means.
- Pay for the planning, management, or supervision of work which involves the general use of pesticides or animal control as described in the two points above.

Examples of the types of grants to which these guidelines apply include, but are not limited to:

- A grant that involves the employ of labor and application of herbicide to restore a degraded landscape and allow endemic vegetation and animals to return.
- A grant that involves the supervision of teams conducting AIS control by chemical means, where those teams are operating with funding from a host country government or other donor.
- A grant that involves the eradication by chemical means of non-native rats, cats, reptiles (e.g., Brown Tree Snake), birds (e.g., Common Myna), and invertebrates (e.g., Golden Apple Snail) from an island or isolated natural habitat.

These guidelines do **not** apply to the physical removal of alien and invasive plant and animals through physical means as part of the restoration of degraded habitat or the maintenance of KBAs and corridors.

A single set of guidelines cannot anticipate every scenario under which a grantee will propose to remove alien and invasive species. The conditions of the habitat, the type of species, the method of control, the capacity of the organization, the latest knowledge of environmental impacts, and even the definitions of "best practice" will change over time. Thus, these guidelines establish a process that grantees must follow, rather than a specific set of AIS control measures.

Components of the PMP

Any CEPF project that proposes to use a pesticide must prepare a pest management plan with six sections, outlined below. These projects should benefit from the accumulated knowledge on the use of pesticides in invasive eradication, including those that are available at:

- The IUCN Invasive Species Specialist Group (http://www.issg.org /index.html), which provides dozens of resources, including the Global Invasive Species Information Network List of Invasive Alien Species Online Information Systems (http://www.gisinetwork.org/Documents/draftiasdbs.pdf).

- For Polynesia-Micronesia Hotspot, the Pacific Invasives Initiative Resource Kit for Rodent and Cat Eradication (http://www.pacificinvasivesinitiative.org/rk/index.html), which contains multiple templates and guidelines on animal control in the region.

- For Maputaland-Pondoland-Albany Hotspot, in particular in South Africa, the Expanded Public Works Programme Working for Water, managed by the Department of Water Affairs (http://www.dwaf.gov.za/wfw/), including the Position Paper on Biocontrol (http://www.dwaf.gov.za/wfw/Control/docs/article1.2.pdf), the Project Operating Standards (http://www.dwaf.gov.za/wfw/Control/docs/ProjectOperatingStandards%28May%202007%29Version3.pdf), and the treatment tables for aquatic and terrestrial invasives, available at the same website.

- The World Health Organization's Recommended Classification of Pesticides by Hazard, updated every two years (http://www.who.int/ipcs/publications/pesticides_hazard/en/).

The pest management plan consists of six sections comprising 34 questions.

Grant Summary

1. Grantee organization: Environmental Awareness Group Inc
2. Grant title:
   Offshore Islands Conservation Programme: Maintaining Rat-Free Islands for the Benefit of Antigua's Biodiversity and People.
3. GEM number (*to be completed by CEPF)*: 60933
4. Grant amount (US dollars): $ 117160.00
5. Proposed dates of grant: 01.07.12 - 30.06.14
6. Countries or territories where pesticides will be applied:
   Several uninhabited offshore islands of Antigua and Barbuda. These include:
   -Great Bird Island
   -Rabbit Island
   -Redhead Island
   -Galley Major
   -Galley Minor
   -Lobster Island
   -Green Island
   -York Island
   Plus,
   two more islands where rat eradication will take place. Among two of the following: Codrington and Smith, or Smith and Pelican.
7. Full name, title, telephone numbers, and electronic mail address of Grantee personnel responsible for the pest management plan:
   Natalya Lawrence
   Project Coordinator
   (268) 462-6236; (268) 771-3255
   eagantigua@gmail.com; skn_h@yahoo.com

8. Summary of the project:

The long term Goal of this CEPF project is "Antigua's Offshore Islands effectively conserved for the benefit of indigenous biodiversity and local people". Its immediate focus is to eradicate invasive black rats from at least two different offshore islands (Smith and Pelican or Codrington) then to maintain habitats (on 8 previous islands [Great Bird, Redhead, Rabbit, Lobster, Green, York, Galley Major, Galley Minor] plus the 2 new islands) which are free of invasive predators (*Rattus rattus*) in order to promote continued restoration of fragile ecosystems found on the offshore islands, one of the country's KBAs.

The objectives of this project are as follows:

1. Alien invasive rodents, which seriously threaten biodiversity and livelihoods, are successfully prevented from reinvading Rabbit, Redhead, York, Green, Great Bird, Lobster, Galley Major and Minor Islands.
2. At least two more islands (Smith and either Pelican or Codrington) within the Offshore Islands KBA cleared of alien invasive rodents for the lasting benefit of biodiversity and livelihoods, and EAG gains the technical capacity to lead future eradications.
3. The institutional capacity of the EAG to address current and future biodiversity conservation needs in the Offshore Islands KBA is strengthened, with resources in place to continue this work after the CEPF project ends.

Expected results to be achieved at the end of this two-year project are as follows:

1. The 8 most important offshore islands kept permanently free from alien invasive rodents, with outstanding benefits for biodiversity and livelihoods.
2. At least two more offshore islands will be cleared of alien invasive mammals (Black Rats and, if present, Asian Mongooses) to enable the recovery of native biodiversity.
3. EAG staff and volunteers gain the technical capacity to plan and implement alien species eradications, with a view to restoring more islands in the future.
4. A stronger, more resourceful EAG with greater capacity and a clear vision for meeting conservation needs in the Offshore Islands KBA and other parts of Antigua and Barbuda.

9. Date of preparation of the pest management plan: 12.05.12 (Latest version)

Pest Management Approach: This section should describe the applicant's understanding of the problem, their experience with pest management issues, and their proposed actions during the project. Specifically, what do you intend to do and how will you do it? The information presented should include methods of application, e.g. by hand or via aerial spraying.

10. Current and anticipated pest problems relevant to the project.

Alien invasive black rats are certainly the biggest pest problem encountered on the offshore islands. These invasive rats were first brought to Antigua and Barbuda in the 17th century by European settlers. Rats have since gained access to the offshore islands via several means (1) Rats are good swimmers, and if the island is close enough to the mainland, the rats may cross to get to it. (2) Rats can float across on debris found in the water after storms. (3) Perhaps the easiest and most common way to reach the offshore islands is by coming across as stowaways in boats and in camping gear and equipment.

After eradicating rats from 13 offshore islands, a marked difference could be noticed, almost immediately, in wildlife found on rat-free islands compared to rat-infested islands. For example, having eradicated rats from Great Bird Island, the Antiguan Racer Snake population doubled in one year, from ~50 individuals to more than 100 individuals, and has steadily increased ever since (Daltry et al., 2001, Oryx 35(2), 119–127). There are other examples as well: 4-fold increase in red-billed tropic birds (Phaethon aethereus), 10-fold increase in brown pelicans (Pelecanus occidentalis) and 16-fold increase in near-threatened white-crowned pigeons (Patagioenas leucocephala). Native plant biomass on the same islands has also increased by at least 25%. A comparative study in 2010 and 2011 found a significantly higher density and diversity of birds, and three times the density of endemic lizards, on rat-free islands than on neighboring rat-infested islands. Rats can be

successfully eliminated from even large islands, but the problem of reinvasion must also be addressed, because rats are adept at swimming between islands (albeit rarely further than 1km) and can be easily carried on boats from rat-infested ports.

Failure to implement continued invasive predator control on the offshore islands would increase the likelihood of reinvasion on islands that have had rat-eradications done. This would completely and quickly undo almost two decades of conservation work in the area, and would even limit the possibility of increasing the work area to include restoration work on other offshore islands. On the other hand if public outreach campaigns and invasive species control continue to be in effect, the likelihood of rat re-invasion is slim.

11. Current and proposed pest management practices:

Current Practices - Biosecurity:

Rats have been eradicated from more than a dozen islands in Antigua since 1995, and the focus of current practices on these islands are on basic biosecurity only i.e. preventing rats from reinvading these islands. The EAG carries out regular bait station checks as well as public outreach campaigns to educate persons about the dangers of invasive predators, and to solicit their help in the fight to prevent re-invasions. Presently, there is a network of 80 bait boxes (on 8 offshore islands) affixed a few inches (2-3) off the ground on cemented PVC stands. Each bait box is supplied with several waxed bait blocks (Klerat 20gr sourced from Syngenta). Both the bait and the boxes are checked for any signs of rats (teeth marks, faecal matter, etc.) on a 5-weekly basis. Bait is changed once it has degraded. If there is any indication of the presence of rats, samples (wax bait with tooth marks, faecal matter) are collected for confirmation, and rat bait is manually distributed in areas surrounding the particular bait station. This is checked daily until there is no longer any evidence of the presence of rats.

Proposed Practices – Improved Biosecurity:

EAG has already been looking into additional ways of monitoring and controlling invasive rodents. They include re-training and training current and prospective volunteers, introduction of new techniques such as the use of chocolate wax blocks (This will require the use of fewer quantities of rodenticide). Local support will continue to play a vital part in invasive predator control. Thus, public awareness campaigns will continue to be used to garner local participation.

Proposed Practices – Eradication:

EAG also has plans to eradicate rats from two islands during the CEPF grant period: Smith island and either Pelican or Codrington island, pending the findings of the feasibility study in Year 1. In all rat eradication operations, rodenticide in the form of Klerat™ will be distributed by hand at an average total dose rate of 9.5 kg/ha. Bait will be replaced every day for up to 21 days or until uptake by rats has ceased to ensure the complete eradication of all rats. The bait will be distributed every 30-40 meters across the island, in a perfect grid formation: the exact specific dimensions and frequency will be finalized in the Operational Plans for the rat eradications in question (e.g. if alien house mice *Mus musculus* are also detected on the islands, the grid size will be reduced to not more than 25x25 m to eradicate them at the same time). If the island is densely vegetated, narrow trails will be cut to reach all parts of the island. Every bait site ('station') will then be individually numbered, have its position recorded using GPS and added into a GIS-linked database. Maps will be produced of the bait station grid for all phases of the operation. Any gaps in the grid can be detected and corrected prior to the poisoning phase. It is important that bait stations are also placed on any neighboring cays that have vegetation, plus any cliffs and caves.

After rat-eradication has taken place on two additional offshore islands, biosecurity measures similar to ones implemented on other offshore islands will be set up on the newly restored islands.

12. Relevant integrated pest management experience within the project area, country or region.

EAG has worked with Fauna & Flora International (FFI) and other project partners to eradicate rats on 13 offshore islands since as early as 1995. Since then, EAG has maintained regular invasive species monitoring on 8 offshore islands (~60 hectares):

-Great Bird Island
-Galley Major
-Galley Minor
-Redhead Island
-Rabbit Island
-Lobster Island & Lobster Island Extension
-Green Island
-York Island

The project's partner FFI has also gone on to execute similar work in St. Lucia, Anguilla, and the Bahamas.

13. Assessment of proposed or current pest management approach and recommendations for adjustment where necessary.

    Currently, the OICP works to maintain rodent-free conditions on 8 offshore islands. We are now focusing on expanding our work area by eradicating alien invasive predators from two more offshore islands, then implementing biosecurity measures and monitoring exercises on those two islands in addition to the 8 islands that we presently work on.

Assessment	Recommendations
Eradication coupled with continual bait station monitoring and public outreach have proven to be quite effective and even more so than rat-eradication only.	Continue regularly scheduled bait station monitoring activities public outreach campaigns.
A large quantity of bait is used each month to restock bait stations.	Supply the bait box with a mixture of both the rodenticide, and a non-toxic substance (chocolate wax block) to detect rats.
Quantities of bait are consumed by hermit crabs*. *Bait does not adversely affect invertebrates.	Position bait boxes in a way which makes it difficult to be accessed by crabs but easily accessible, and enticing for rats.
Some persons who monitor bait stations think that the purpose of bait stations is eradication instead of early detection.	Retrain and train current and prospective field officers
Insufficient stock of rodenticide kept in case of emergency (reinvasion)	Project Partner FFI is working with supplier to organize a steady source of bait for use on the islands.

Pesticide Selection and Use: This section aims to get a comprehensive understanding of the pesticide that will be selected, why it was selected and what efforts were made to assess risk. Note that in this section the applicant will also be required to present information on the potential risk that the selected pesticide will have on non-target species.

14. Description of present, proposed and/or envisaged pesticide use and assessment of whether such use is in line with best management practices.

Present Pesticide Use: Biosecurity only

- Bait used: 0.005 % Brodifacoum in the form of 20gr wax blocks
- Frequency of Use: Continuous. The bait, which is held in locked permanent bait stations, is replenished every five weeks for biosecurity purposes (to prevent rat re-invasions) on 8 islands.
- Distribution: For biosecurity purposes: 80 locked permanent bait stations distributed on 8 islands, with an average of 8 blocks per bait box..
- Access to rodenticide: Project Coordinator, Field Officers and Volunteer Programme Assistant.
- Storage of Equipment and rodenticide: Storage in Seatons Village. The storage unit is a one room building with one entrance facing the main Seatons Village Road, in plain view of watchful neighbours. The only set of keys is held by the project coordinator. Entrance to the shed is regulated by the coordinator. Handling of the rodenticide is done strictly by the coordinator and the 3 current field officers: Sean Peters, Tahambay Smith , and temporary volunteer, Thomas Aveling. The rodenticide, Brodifacoum, is kept in its original container in one section of the room.

Proposed Pesticide Use: Biosecurity and rat eradications

- Bait used: 0.005% Brodifacoum in the form of 20gr wax blocks plus non-toxic substance such as chocolate wax-blocks.
- Frequency of Use: Continuous. The bait, which is held in locked permanent bait stations, will be replenished every 5 weeks for Biosecurity purposes on 10 islands. For rat eradications, the bait will be deployed in temporary bait stations for approximately 3 weeks.
- Distribution: For biosecurity, 80 bait stations on 8 islands, with 4- 8 blocks per bait box. The number of bait stations will increase by between 5 and 20 when two more islands (Smith and Pelican or Codrington Island) is eradicated of invasive rats. For eradications (2 islands), bait will be distributed by hand at an average total dose rate of 9.5 kg/ha every 30-40 metres across the island in a perfect grid formation (the exact specific dimensions and frequency will be finalized in the Operational Plans for the rat eradications in question. If alien house mice *Mus musculus* are also detected on the islands, the grid size will be reduced to not more than 25x25 m to eradicate them at the same time).
- Access to rodenticide: Project Coordinator, Field Officers and one temporary volunteer Programme Assistant
- Storage of Equipment and Brodifacoum rodenticide: Storage in Seatons. The storage unit is a one room building with one entrance facing the main Seatons Village Road, in plain view of watchful neighbours. The only set of keys is held by the project coordinator. Entrance to the shed is regulated by the coordinator. Handling of the rodenticide is done strictly by the coordinator and the 3 current field officers: Sean Peters, Tahambay Smith , and temporary volunteer, Thomas Aveling. The rodenticide, Brodifacoum, is kept in its original container in one section of the room

The use of these methods is in line with best management practices for the following reasons:

- Rodenticide remains the only effective means of completely eradicating rats from an area, and the methods used by this project have passed previous close inspections by, among others, the IUCN/SSC Invasive Species Specialist Group, Island Eradication Advisory Group and Royal Society for the Protection of Birds.
- All planned eradications will first entail (a) a Feasibility Study, including detailed risk assessment and analysis of the options in consultation with local stakeholders, following international guidelines; and (b) A written Operational Plan, which details the methods, equipment, transport, personnel, training, logistics, timetable, etc., and discussed with local stakeholders and peer-reviewed by independent experts. All eradications also require (c) Biosecurity Program and (d) Monitoring and Evaluation Program, which will continue after the eradication is completed. Careful planning and close monitoring of the pesticide's use and effects both during and after the eradication will ensure risks to non-target species are minimized, if not removed entirely
- A low dosage is needed to kill an average sized black rat compared to the use of other forms of rodenticide. Additionally, a rat that has consumed the bait dies in a matter of a few days.

- No non-target species have been noted to be adversely affected by our use of the specific rodenticide. This conclusion is based on the fact that species monitored shortly after the beginning of the program include (Program began in 1995)
  -Seabirds (regularly monitored)
  -Landbirds (regularly monitored)
  -Ground Lizards (regularly monitored)
  -Tree Lizards (regularly monitored)
  -Antiguan Racer Snake (regularly monitored)

Hermit crabs have accessed the bait in the boxes, but again, no adverse effects have been noted.

- Bait boxes are kept locked, and the only humans that have access to the bait are the coordinator and field officers who all hold keys for the bait boxes.

15. Indication of type and quantity of pesticides envisaged to be financed by the project (in volume and dollar value) and/or assessment of increase in pesticide use resulting from the project:

    EAG is working with FFI to source a regular supply of donated rodenticide, Brodifacoum, directly from the supplier, Syngenta. Thus, CEPF funds will not be used to acquire the rodenticide.

    Pesticide use may slightly increase to approximately 290kg over the space of two years for the following reason:

    To replenish 80 bait stations, an annual stock of approximately 120kg is required. After rat eradication has taken place on two additional offshore islands (Codrington and Smith, or Smith and Pelican) permanent bait stations will be installed depending on the number of bait stations needed (between 5-15), Brodifacoum use may increase by 25kg up to 145kg annually or 290kg for the 2 years. It is important that the Offshore Islands Conservation Programme (OICP) store a reserve stock of brodifacoum bait in the Seatons storage, as part of its contingency plan to quickly combat any rat-reinvasions. An additional 500 kg will be sought from Syngenta for this purpose. This reserve stock will be maintained in its original packaging and labels.

    Eradication of invasive rats from additional offshore islands (Codrington and Smith, or Smith and Pelican) will require the use of Brodifacoum, although the amount is determined by the island size as well as how the length of time it will take to clear the island of rats.

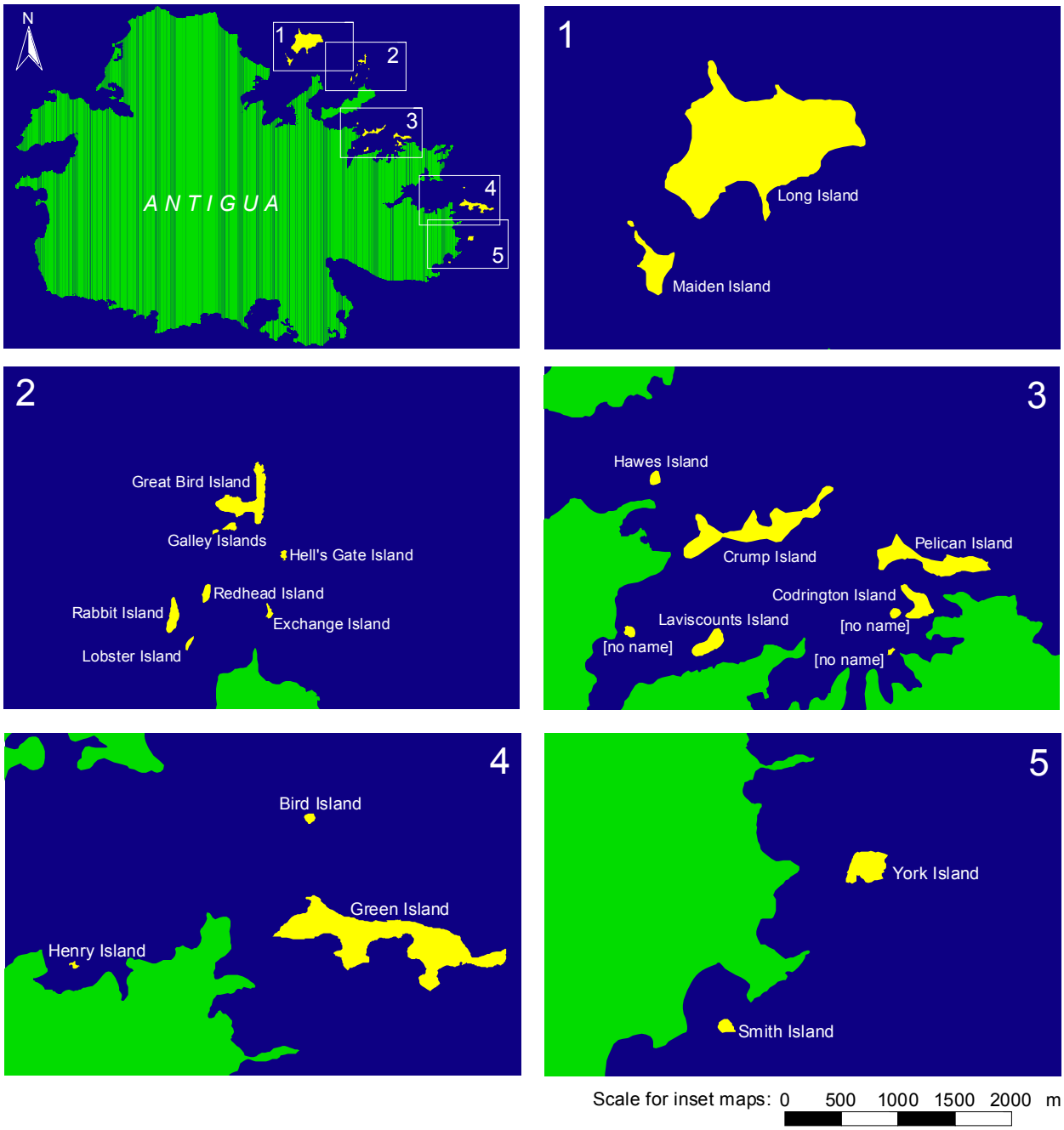
16. Chemical, trade, and common name of pesticide to be used:
Chemical Name: 0.005 % Brodifacoum in the form of 20gr wax blocks
Trade Name: Klerat™ is used in this project, but the same rodenticide is the active ingredient in Biosnap™, d-Con™, Finale™, Fologorat™, Havoc™, Jaguar™, Matikus™, Mouser™, Pestanal™, Pestoff™, Ratak+™, Rodend™, Ratsak™, Talon™, Volak™, Vertox™ and Volid™

17. Form in which pesticide will be used (e.g., pellet, spray):
20gr Wax Blocks

18. Specific geographic description of where the pesticide will be applied: name of province, district, municipality, land owners, or map coordinates (if available); and the total area (hectares) to which the pesticide will be applied:

Island	Ownership	Size (ha)
Green	Private	45.19
York	Private	6.99
Great Bird	Private	8.4
Galley Major	Private	0.59
Galley Minor	Private	0.17
Lobster	Private	0.46

Rabbit	Private	2.14
Redhead	Private	0.91



Courtesy Dr. Matt Morton

19. Assessment of environmental, occupational and public health risks associated with the transport, storage, handling and use of the proposed products under local circumstances, and the disposal of empty containers.

The rodenticide used is toxic to humans and other vertebrates, but has no adverse effects on invertebrates. If handled improperly, the toxin can accumulate and remain in the liver for several months.

Once the wax blocks have become mouldy, they have degenerated and no longer pose a toxic threat.

To minimize the risk of poisoning by ingestion by any vertebrate, the manufacturers have produced bait that is practically unappealing to non-target species. Moreover, to deter humans, Bitrex, a human taste deterrent, is included, and to further deter humans from ingesting the substance, the symbol  is stamped on each block. The concentration of brodifacoum in the bait is only 0.005% (thus an adult human would need to eat 300 grams, or 15 blocks, for a potentially fatal dose). In our 17 years' experience of using this bait in Antigua, our team has never observed any native birds, reptiles or other vertebrates showing the slightest interest in this bait, even when presented to the animals in crumbs rather than complete blocks.

The bait is transported in waterproof containers with tight-fitting lids (this is particularly important when moving the bait to the islands by boat). Every pail holds 10kg and is clearly labeled in English with details of the contents and a safety sheet (including what to do if any bait is consumed). An example bait label for Klerat™ is available from the following link: http://www.pestcontrol.basf.co.uk/agroportal/pc_uk/media/migrated/products_1/downloads/rodents/labels_1/KLERAT_WAX_BLOCKS_35KG.pdf.

After being removed from the containers, the bait leaves almost no residue (<1 gram), and these containers are washed out using plenty of water. Any waste bait, include bait that is past its sell-by date, will be incinerated and buried in secure landfill sites in accordance with the manufacturer's guidelines. The United Nations Environmental Program and World Health Organisation endorse this approach (http://www.inchem.org/documents/hsg/hsg/hsg093.htm#SectionNumber:4.6). "Burn or bury any uneaten bait. Do not dump it in water. Look for dead rats and mice and burn or bury them." Brodifacoum is fully combustible and fumes from incineration are harmless at the very low concentration and quantity involved in this project.

20. Description of plans and results for tracking of damage to and/or deaths of non-target species prior to pesticide application and subsequent to pesticide application.

During rat eradications, personnel will remain on the island for 24 hours a day while bait is deployed by hand (for approximately 21 days) and for several weeks after the rats have been killed, and monitor all parts of the island at least once a day. Any dead or sick non-target animals will therefore be detected promptly and carcasses examined for evidence of internal bleeding and for the presence of blue substances in the alimentary canal to indicate they have consumed the bait.

During regularly scheduled bait station checks, field officers are not only trained to monitor for the presence of rats, but detailed data sheets are also filled out for and in the vicinity of each bait station. Detailed records are kept of fauna found in aforementioned areas, and these are monitored for any signs of negative impacts arising from consumption of, or interaction with the pesticide. Photographic data is also taken and filed. Additionally, yearly wildlife surveys of both fauna and flora are carried out in order to determine the health and status of plants and animals found on the islands. Comparisons are made with the wildlife found on other offshore islands where no bait is applied.

Should anything suspicious be detected in either case, field officers and biologists are taught to contact the project coordinator immediately. In that instance, application of the pesticide will be stopped until further investigation has taken place, and recommendations have been submitted.

21. Pre-requisites and/or measures required to reduce specific risks associated with envisaged pesticide use under the project (e.g., protective gear, training, upgrading of storage facilities, etc.):

    Precautionary measures taken:

- Field officers handling the bait are encouraged to use gloves and to wash their hands thoroughly. Field officers handling bait have been trained to do so by Dr. Jenny Daltry of Fauna & Flora International, Donald Anthonyson (former program coordinator), and Elizabeth (Biz) Bell of Wildlife Management International. Both Jenny and Elizabeth have extensive knowledge of use and handling of the Brodifacoum wax bait, and have trained Donald Anthonyson and current project coordinator and field officers.
- Bait boxes are locked with only project coordinators and 2 field officers holding keys.
- Bait supplies are stored in their original packaging containers in a locked storeroom only accessible by field officers and project coordinator.
- Bait is carried to the bait stations in waterproof, plastic containers solely used for storing the bait.
- Empty bait packaging containers are kept locked in the shed until proper disposal supplied by the health department collects them.
- Non-target wildlife is closely monitored to determine (1) if they consume the bait (2) if the bait has any adverse effects on them.
- Field officers are given a supply of Vitamin K_1, as a double precautionary measure. The rodenticide used is a 2^{nd} generation anticoagulant. Vitamin K_1 supplements counteract the work of the anticoagulant by assisting the blood to properly clot.

22. Basis of selection of pesticides authorized for procurement under the project, taking into consideration WHO and World Bank standards, the above hazards and risks, and availability of newer and less hazardous products and techniques (e.g. bio-pesticides, traps).

This project must use rodenticide to eradicate rats. There are no bio-pesticides, traps or other measures that are sufficiently powerful to completely eradicate rats from an island – at best, they are merely a temporary means of reducing the population size.

Rats are not picky eaters but will become suspicious of a particular substance if when consumed, other rats begin to die. The pesticide used has the advantage of being a rapid enough eradicator of target species (the toxin works over a course of several days), but not rapid enough to raise suspicion among the rat population. In other words, its effects are suitably delayed to cause the rats to continue consuming it, but fast enough that the eradication can take place in an adequate amount of time.

Project partners, namely FFI, who have years of experience with eradicating rats in islands all over the world recommend Brodifacoum as their top choice, even after 2 decades of eradication and invasive predator control efforts. Brodifacoum has been used successfully in over 70% of the eradications completed worldwide and on most of the eradications within the Caribbean region (Howald et al. 2007, Varnham 2010).

EAG and other project partners have decided to continue using Brodifacoum for several reasons:

-This pesticide, Brodifacoum in the form of Klerat or Talon has been approved for use in Antigua and Barbuda by the Pesticides and Toxic Chemicals Control Board. It can be freely accessed and purchased from most pest control operators on the mainland, but the OICP has the direct support of the manufacturer, Syngenta, cutting out the need to purchase the Brodifacoum locally.
-Long history of use and success both in eradication and then in invasive rat control in islands all over the world.
-Acquired free of cost directly from manufacturer, Syngenta with whom the project has developed good relations.
-Symptoms arising, in the case of improper handling can be quickly rectified with the use of the easily acquired Vitamin K_1 supplement.
-Rats have not become immune to the particular pesticide used.
-Pesticide arrives well packaged and is easily stored.
-Pesticide packaging includes detailed handling, use, and safety instructions in English (official language of Antigua). A material safety data sheet is also provided by manufacturer upon request.
-The form of pesticide used was purposely made up in a form that would be unattractive to non-target species. Non-target species that do consume it (hermit crabs) are not adversely affected.

-The form of the pesticide used does not dissolve in water.

23. Name and address of source of selected pesticides:

    Syngenta International AG P.O. Box CH-4002 Basel, Switzerland. The rodenticide is actually produced in Hungary and from there flown or shipped by the manufacturer to the Caribbean. The mode and cost of transport is the responsibility of the manufacturer.

24. Name and address of vendor of selected pesticides:

    The pesticide is sourced directly from the manufacturer, Syngenta.

25. Name and address of facility where pesticides will be stored.

    Environmental Awareness Group Seaton's Storage Unit, Antigua, the storage in Seatons is rented indefinitely by the Environmental Awareness Group (EAG), and houses the Brodifacoum bait as well as much of the Offshore Islands Conservation Program's equipment. The OICP is best described as a program and not a project as there is no foreseeable end in sight. Both the equipment and the bait will be housed in this storage facility for as long as it is rented by the EAG.

Policy, Regulatory Framework, and Institutional Capacity: This section aims to understand the institutional and legal framework under which the pesticide will be applied, with reference to the documentation and standards required under local and national law and international good practice. Where the particular pesticide is not regulated at the target site, the proponent must identify similar pesticides and the applicable regulation, international laws in neighboring countries that could apply, and international good practice. The proponent must also explain why this particular pesticide is necessary even in the absence of national laws.

26. Policies on plant/animal protection, integrated pest management, and humane treatment of animals.

The importation of pesticides in Antigua and Barbuda must be approved by the Pesticides and Toxic Chemicals Control Board. The project's use of the particular pesticide has been approved and supported by this Board. Brodifacoum in the form of Klerat or Talon has been approved for use in Antigua and Barbuda by the Pesticides and Toxic Chemicals Control Board. It can be freely accessed and purchased from most pest control operators on the mainland. The use of Brodifacoum was carefully thought out and found to be an extremely efficient means of detecting and controlling rats. Only target species have been affected by the use of this pesticide (monitoring of non-target species occurs throughout the life of the project). The pesticide used and the mode of application was deemed most efficient, and indeed is the most humane method available to control invasive predators. This method of predator control has been adopted by several countries throughout the world, with stricter regulations for invasive predator control than what can be found in Antigua and Barbuda.

27. Description and assessment of national capacity to develop and implement ecologically-based AIS control.

The Offshore Islands Conservation Programme (OICP) staff and volunteers have been trained to control AIS through the use of pesticides. National capacity to develop and implement ecologically-based AIS control is inadequate but will be addressed as the staff and volunteers receive training. They will be trained and retrained on the basics of AIS control, and will also learn to incorporate alternative techniques to be included in their regular AIS monitoring and control operations.

28. Description and assessment of the country's regulatory framework and institutional capacity for control of the distribution and use of pesticides.

The Pesticides and Toxic Chemicals Control Board regulates the importation of pesticides in Antigua and Barbuda. According to the Pesticides and Toxic Chemicals Act (2008) the rodenticide used by this project (brodifacoum) is neither a "Controlled Product" (listed in Schedule 2) nor a "Prohibited Product" (Schedule 3).

The National Solid Waste Management Authority Act (2005) requires all waste, including toxins, to be disposed of responsibly. It lists a number of agencies with responsibility for this, including our local project partners: the Environmental Awareness Group, and the Ministry of Agriculture, Lands, Housing and Environment.

The Public Health Act (1955) makes it an offence to dispose of animal carcasses in a toilet or cesspit. (Any rat carcasses found during this project will be incinerated).

Although there are regulations limiting what pesticides are imported (Brodifacoum is not on the restricted list), presently, there is no regulation in place to monitor their distribution. However, the government has recognized the importance of regularizing pesticide use and distribution. Although no formal regulation exists on a national level to monitor distribution of pesticides, the government has signed international agreements such as the St. George's Declaration of Principles for Environmental Sustainability in the OECS[1]. Signatories to this declaration are cognisant of the commitment and obligation to uphold past and future regional and international agreements related to environmental protection and sustainable development.

It is important to note that the government, being a project partner is aware of the need for pest control in the offshore islands and has given EAG the mandate to carry out monitoring and control actions necessary in the offshore island KBA. Governing the actions of different project partners is a signed Memorandum of Agreement, most recently signed in 2010.

29. Proposed project activities to train personnel and strengthen capacity (list # of people and what they are being trained in).

Regarding pesticide use, handling, and application, at least 5 locals will be trained/ 5 retrained in storing and handling Brodifacoum (Andrea Otto, Sean Peters, Tahambay Smith, Natalya Lawrence, Joseph Prosper, Ruleo Camacho, Dr. Karron James)

The same volunteers will also be trained in specific wildlife monitoring techniques. Wildlife monitoring helps us to understand the impact that the use of pesticides has had on the recovering offshore island ecosystems.

The same persons will also be trained to implement and carry out a full rat-eradication with the help of trained personnel such as Dr. Jenny Daltry from Fauna & Flora International and Elizabeth Bell of Wildlife Management International.

30. Confirmation that the appropriate authorities were approached (who and when) and that the appropriate licenses and permissions were obtained by the project.

-All landowners (Fuller Family, Mill Reef Club, and the Government) were approached and notified of the project's intended conservation work, including the use of pesticides to control invasive predators. Full support was sought and gained. Landowners are heavily involved in the development of the OICP's conservation work, and lend assistance (sometimes in the form of transportation) when necessary.

Initial consultations with Government and Fuller Family took place in August, 1995 when permission was given for EAG and its partners to commence our conservation work on the North Sound Islands (Great Bird Island, Galley Major, Galley Minor, Rabbit, Redhead, and Lobster). Government is still a major project partner. Without them, the project is not authorized to carry out field work on the islands, import bait, or erect signage.

Initial consultations with Mill Reef Club began in early 2000, and have continued regularly ever since. The Club approved the eradication of rats from Green Island in February 2001, and the reintroduction of the Antiguan Racers in 2001. The Club also approved the eradication of rats from York Island in February 2006, and the subsequent, continued monitoring for the presence of invasive rats.
OICP;s most recent general planning meeting took place in 2011, but the most recent specific consultation with Government took place in April, 2012 and consultations with Mill Reef are scheduled to take place in the next few

[1] Organization of Eastern Caribbean States

months. Consultation meetings are used now to update these partners and stakeholders, to discuss future plans and to address any concerns that either party may have.

-Additionally, the project has an up-to-date (next renewal 2015) Memorandum of Agreement signed by all the project partners including the Antigua Government's Ministry of Agriculture, Lands, Housing and the Environment. The Ministry of Agriculture regulates pesticide use within the country (Pesticides and Toxic Chemicals Control Board). The Environment Division within the Ministry of Agriculture imports Brodifacoum directly from Syngenta on the OICP's behalf.

Consultation: This section aims to outline the range of informed consultations that the grantee has had both with experts to optimize the potential for success, and with stakeholders, particularly local communities, who are potentially affected (by proximity, by the use of certain areas for free-ranging livestock or non-timber forest product collection, etc.) by the use of pesticides.

31. Plans for, dates, and results of expert consultations, if necessary.

-The project partners and key government stakeholders will meet several times a year, including at least one major meeting per year for a general review of the pest control methods employed by the project on the offshore islands. In these meetings, reviews will be made of the current methods being employed, human handling, and environmental impacts.

-Additionally, the project will solicit the support of IUCN (International Union for Conservation of Nature)/SSC (Species Survival Commission) Invasive Species Specialist Group (ISSG) and the Islands Eradication Advisory Group (IEAG) to review invasive predator control procedures and make recommendations. The planned Feasibility Study report, Rat Eradication Operational Plan, Biosecurity protocols and other key project plans and outputs will be shared with independent members of the ISSG and IEAG in accordance with Activity 2.2. Peer-review is important to ensure, and verify, that this project is following best practice in its use of rodenticide.

Although current invasive predator control procedures have proven effective over the years, EAG hopes to be able to reduce the quantities of brodifacoum used in its biosecurity methods. While it would not be wise to stop using brodifacoum entirely, as part of this project specialists will review our current procedures to determine whether some of this can be replaced with non-toxic alternatives to monitor rat presence..

32. Plans for, dates, and results of consultations with local communities.

Local communities are considered key stakeholders in the project and are consistently advised regarding any development in the project. Consultations with them have already begun to take place in preparation for the CEPF funded activities.

Different sectors of the local communities will be approached to discuss different aspects of the project, throughout the two years as the need arises. This has already been the case for the more than sixteen years that conservation work has been carried out on the offshore islands. At least two general meetings will be held with all stakeholders, including the local communities surrounding the offshore islands. These meetings are slated to take place close to the beginning of 2013 and 2014. During these meetings, results of the previous year's work are discussed, and plans for the upcoming year are also made.

It is important to note that the local communities are not adversely affected by the use of the pesticide. The islands in which invasive predator control takes place are all uninhabited although frequently visited by locals. The bait boxes however, are firmly secured to the ground and are locked in the boxes. Only 2 field officers and the project coordinator hold keys for the bait boxes. Additionally, the storage unit holding the supply of rat bait is securely locked. Only the project coordinator holds a key to the unit.

Monitoring and Evaluation: This section aims to outline what steps the proponent will take to monitor and evaluate the purchase, storage, application and effects of the pesticide in the target area.

33. Description of activities related to pest management that require monitoring during implementation.

-Eradication

Eradication of invasive rats on two offshore islands will take place within the 2 years of the CEPF grant. During rat eradication, handling and storage of the bait will be monitored by the project coordinator, or the rat-eradication team leader.

-Pesticide handling and application:

The pesticides are handled and applied to bait stations every 5 weeks by field officers. Checks will be made by project coordinator at least four times per year to ensure that proper storage, and handling procedures are being carried out. This quote of four times per year is very modest, as the project coordinator oftentimes participates in the bait station monitoring and also monitoring activities.

-Bait station monitoring:

Pesticide handling and application must take place every 5 weeks during routine bait station monitoring. Bait station monitoring is a quick way to determine the presence of rats on offshore islands. During bait station checks, field officers are trained to check for indications of the presence of rats, check for the presence and condition of any non-target animals.

-Wildlife monitoring:

It is extremely important to monitor both fauna and flora on islands where active conservation work is being carried out. The plants and animals are environmental indicators that greatly assist in determining the impact that invasive predator control has had. Using standardized survey methods, data collected over years of wildlife monitoring are useful to understanding the importance of maintaining rat-free islands. Wildlife monitoring most frequently done on islands where OICP actively carries out conservation activities include Landbird surveys, Seabird surveys, Vegetation surveys, Racer Snake surveys, and Lizard surveys. These are done on an almost annual basis.

34. Monitoring and supervision plan, implementation responsibilities, required expertise and cost coverage.

The monitoring and supervision plan is organized by the project coordinator with the consultation of project partners. Although the field officers are quite familiar with storing and handling Brodifacoum, monitoring and supervision responsibilities are covered by the project coordinator. Project partners also review handling and storage practices when on island. The project coordinator (trained by Dr. Jenny Daltry of Fauna & Flora International) is equipped with sufficient knowledge to carry out the inspections, but also draws upon the knowledge of the project partners who specialize in the application of pesticides in invasive species control.

The costs of these monitoring activities will be very low as these activities will be twinned with other project activities, including but not limited to bait station monitoring and wildlife surveys.