Pest Management Plan
Critical Ecosystem Partnership Fund (CEPF)

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Pest Management Plan
Critical Ecosystem Partnership Fund (CEPF)

Background

Project Description

Everyone depends on Earth's ecosystems and their life-sustaining benefits, such as clean air, fresh water and healthy soils. Founded in 2000, the Critical Ecosystem Partnership Fund (CEPF) is a global leader in enabling civil society to participate in and benefit from conserving some of the world's most critical ecosystems.

CEPF provides grants for nongovernmental and private sector organizations to help protect biodiversity hotspots, Earth's most biologically rich yet threatened areas.

The convergence of critical areas for conservation with millions of people who are impoverished and highly dependent on healthy ecosystems for their survival is more evident in the hotspots than anywhere else. Enabling a stronger voice, influence and action by civil societies is the hallmark of our approach. CEPF's support equips civil society groups to conserve their environment and influence decisions that affect lives, livelihoods and, ultimately, the global environment for the benefit of all.

Grant recipients range from small farming cooperatives and community associations to private sector partners and international organizations.

CEPF grants:

- Target biodiversity hotspots in developing and transitional countries.
- Are guided by regional investment strategies developed with stakeholders.
- Go directly to civil society groups to build this vital constituency for conservation alongside governmental partners.
- Create working alliances among diverse groups, combining unique capacities and eliminating duplication of efforts.
- Achieve results through an ever-expanding network of partners working together toward shared goals.

Current and anticipated pest problems relevant to the project

Invasive species and biodiversity

Invasive species damage the lands and waters that native plants and animals need to survive. They hurt economies and threaten human well-being. The estimated damage from invasive species worldwide totals more than $1.4 trillion – five percent of the global economy.

The growing attention to the problem of invasive species often focuses on their costs to agriculture, ranching, forestry, and industry. The price they exact from our natural forests, grasslands, and waterways, however, is at least as great. Invasive species are now regarded as the second-leading threat to imperiled species, behind only

habitat destruction. Of 40 North American freshwater fishes that have become extinct over the past century, for example, invasive species were a contributing factor in more than two-thirds of these extinctions.
Invasive species affect our native biodiversity in a number of ways. They may compete directly with native species for food or space, may compete indirectly by changing the food web or physical environment, or may prey on or hybridize with native species. Rare species with limited ranges and restricted habitat requirements are often particularly vulnerable to the influence of these alien invaders. This is especially acute in island environments, such as Hawaii, where most species evolved in isolation—without continental competitors, predators, and pathogens—and lack defenses against foreign invaders.

Invasive species and great ocean states

Great ocean states are biologically unique, because the often isolated islands provide ideal conditions for the evolution of new species. As a consequence, many of these island nations have high numbers of "endemic" species - species that are restricted to only one or a few islands and found nowhere else in the world. Birds and plants illustrate this outstanding biological uniqueness – for example, the Pacific has more than 400 endemic bird species, while about 30% of the native plant species are endemic. Many of the unique plants and animals of this region are amongst the most endangered in the world, mainly because the tiny sizes of most of the islands also means the total populations of many species are naturally very small, which makes them especially vulnerable to any disturbance. For this reason, most of the recently extinct species were from islands. The Pacific currently has about 25% of the world's threatened bird species and has already lost many species. One of the key threats to species and ecosystems worldwide is land clearing or habitat loss. But on islands, invasive species pose an even greater risk.

Invasive species and CEPF

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 key biodiversity areas (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 – the documents on which investment priorities are identified – 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 for pest management must be identified, shared, followed and monitored.

Situations where pest management practices would 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 invasive species 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.

Current Pest Management Practices and Common Pesticides

To eradicate invasive species, especially on small islands, pesticides are a necessary complement to biosecurity and other IPM approaches. In general, there are several types of invasive species that may be eradicated under the project, including rats, birds and invasive plants and trees.

Rat eradication

Rodent eradication usually requires the use of broad-spectrum anti-coagulants. The most common is **brodificoum**, a Class 1a pesticide.

Mechanism of Action

Brodifacoum is a second-generation, 4-hydroxycoumarin anticoagulant, which is contained in rodent control products. It is an anticoagulant with a similar mode of action to its historical predecessors dicoumarol and warfarin. However, due to very high potency and long duration of action (elimination half-life of 20 – 130 days), it is characterized as a "second generation" or "superwarfarin" anticoagulant. It is structurally related to a naturally occurring coumarin (an aromatic substance found in many plants) that causes cattle to haemorrhage if they eat moldy sweet clover.

Brodifacoum, like other anticoagulant toxicants, works by increasing (or decreasing) the clotting time of blood, leading to death from hemorrhaging. Brodifacoum is absorbed through the gastrointestinal tract and can also be absorbed through the skin. It inhibits the enzyme Vitamin K epoxide reductase. This enzyme is needed for the reconstitution of the vitamin K in its cycle from vitamin K-epoxide, and so brodifacoum steadily decreases the level of active vitamin K in the blood. Vitamin K is required for the synthesis of important substances including prothrombin, which is involved in blood clotting. This disruption becomes increasingly severe until the blood effectively loses any ability to clot.

In addition, brodifacoum (as with other anticoagulants in toxic doses) increases permeability of blood capillaries; the blood plasma and blood itself begins to leak from the smallest blood vessels.

Toxicity

Brodifacoum is highly lethal to mammals and birds, and extremely lethal to fish. It is a highly cumulative poison, due to its high lipophilicity and extremely slow elimination. A poisoned animal will suffer progressively worsening internal bleeding, leading to shock, loss of consciousness, and eventually death.

Given these extremely high toxicities in various mammals, brodifacoum is classified as "extremely toxic" (LD_{50} < 1.0 mg/kg b.w.) and "very toxic" (T+; LD_{50} < 25 mg/kg b.w.), respectively. Because of its persistency, cumulative potential and high toxicities for various wildlife species, it is also considered an environmental pollutant (N; noxious to the environment). In the USA, brodifacoum was made a “restricted use” pesticide in 2008 by EPA , meaning it can only be used by certified pesticide applicators.

Baits containing brodifacoum can remain toxic for months, with the rate of decay depending on the amount of rainfall. As baits disintegrate, brodifacoum is absorbed into the soil where it is then slowly degraded over weeks to months by soil bacteria. Soil type, temperature, and the presence of soil micro-organisms capable of degrading brodifacoum will all influence the degradation time. The low solubility of brodifacoum in water means that plant up take is unlikely.

Brodifacoum is persistent in soils with a half-life of 157 days. It is relatively immobile in soil and the potential for groundwater and surface water contamination is low. It is stable to hydrolysis at pH 5, 7, and 9. Brodifacoum has a very low solubility in water, so leaching from soil into water is unlikely to occur. Only the erosion of soil itself would result in brodifacoum reaching water. If soil containing brodifacoum reached a waterway, the brodifacoum is likely to remain bound to organic material and settle out in sediments. Brodifacoum degrades slowly (weeks to months) in natural water and the presence and type of sediment layers in a waterway will affect the degradation of brodifacoum in aquatic environments. When baits were sown directly into streams during pest eradication operations, brodifacoum residues have not been recorded in water.

Brodifacoum residues have been recorded in both sub-lethally and lethally poisoned animals. Brodifacoum is retained in the tissues at high rates, sometimes remaining in organ systems during the entire lifetime of an exposed animal. In a study that measured the retention of radioactive brodifacoum in the livers of single-dosed rats, 34% of the single dose is found in the liver after 13 weeks, and 11% of the dose remained in the liver for 104 weeks, approaching the normal lifespan of a rat (U.S. EPA MRID 42007502).

Trade names

Brodifacoum comes packaged as meal bait, paraffinized pellets, rat and mouse bait ready-to-use place packs, and paraffin blocks. All end-use products contain 0.005 percent active ingredient. It is marketed under a large variety of trade names, including Biosnap, d-Con, Finale, Fologorat, Havoc, Jaguar, Klerat, Matikus, Mouser, Pestanal (Sigma-Aldrich BT), Pestoff, Ratak+, Rodend, Ratsak, Talon, Volak, Vertox and Volid.

Danger to non-target wildlife

Brodifacoum is not readily metabolized and is stored in the liver of sub-lethally exposed animals, where it can remain for many months. Brodifacoum is extremely dangerous to all mammals and birds through secondary exposure, especially raptors and other predators feeding on poisoned rats and mice. However, residues do not appear to persist in arthropods (insects, spiders, crustaceans) beyond a few days. Brodifacoum is perceived to lack insecticidal properties due to the different circulatory physiology of invertebrates.

Native non-target deaths, and residues, have been reported in a wide range of species after the use of brodifacoum. However, a study in 1996 monitored reef fish populations at Kapiti Island during an aerial poisoning operation using brodifacoum. Blue cod and spotties were studied and the surveys produced no evidence that their densities were affected by the poison application (Cole and Singleton1996).

In 2001 a truck crashed into the sea at Kaikoura in New Zealand spilling 18 tonnes of Pestoff 20R (20 mg/kg brodifacoum) cereal pellets into the water. Samples of marine invertebrates (mussels and paua) taken from the immediate location retained measurable residues for up to 31 months. This result was probably confounded by the animals being re-exposed to brodifacoum bait particles through wave action. Effects of the spill were only measurable within a 100m2 area surrounding the crash site (Primus et al.2005).

Overall, there is a very high risk of secondary poisoning from the use of this type of product.

Danger to human health

The estimated average fatal dose for an adult man (60 kg) is about 15 mg, without treatment. However, due to low bait concentrations (usually 10 – 50 mg/kg bait, i.e. 0.001 — 0.005%) and slow onset of symptoms, and the existence of a highly effective antidote (appropriately dosed vitamin K_1), brodifacoum is considered to be of relatively low hazard to humans, though the risk to children (and pets) is very high. Moreover, the poisoning must be identified specifically, so that vitamin K supplementation and monitoring may be maintained for periods that range up to months. The same is true for pets or other domestic livestock which ingest the substance.

The readiness of brodifacoum to penetrate intact skin should be noted, and brodifacoum and commercial preparations containing it should be handled with respective care and precaution because of its skin resorptivity. Nonetheless, the risks to human health are very low in a well-planned and controlled poison operation. Brodifacoum is a slight skin irritant and a mild eye irritant and it is classified as non-mutagenic and unlikely to be carcinogenic. Vitamin K1 is recognized as an effective treatment, however it has to be maintained for a relatively long treatment period.

Domestic animals are at risk and owners are advised not to allow animals access to areas where they may come into contact with brodifacoum baits or poisoned carcasses. Feral and domestic non-target deaths (cats, pigs and sheep) have been reported following both bait station and aerial applications of brodifacoum. Surveys of feral animals have shown that extensive contamination has occurred where there has been sustained use of brodifacoum. Again, Vitamin K is an effective antidote for domestic animals poisoned with brodifacoum and should always be kept on-hand.

Another rodent eradication pesticide is **Diphacinone** (3-chloro-4-methylaniline hydrochloride), another Class 1a pesticide. Diphacinone is sold under the trade names Diphacine, Ditrac, Gold Crest, Kill-Ko, P.C.Q., Promar, Ramik, Rat Killer, Rodent Cake. Technical diphacinone is an odorless, pale yellow powder. Diphacinone is stable under normal temperatures and pressures. It may burn, but does not ignite readily. Thermal decomposition of diphacinone may release carbon monoxide and carbon dioxide.

Mechanism of action

Diphacinone is an anti-coagulant rodenticide bait used for control of rats, mice, voles and other rodents. It is available in meal, pellet, wax block, and liquid bait formulations, as well as in tracking powder and concentrate formulations.

Toxicity

The amount of a chemical that is lethal to one-half (50%) of experimental animals fed the material is referred to as its acute oral lethal dose fifty, or LD50. The oral LD50 for technical diphacinone in rats is 0.3 to 7 mg/kg, 3.0 to 7.5 mg/kg in dogs, 14.7 mg/kg in cats, 150 mg/kg in pigs, 50 to 300 mg/kg in mice, and 35 mg/kg in rabbits. The dermal LD50 in rats is 200 mg/kg, and in rabbits is greater than 3.6 mg/kg. The lethal concentration fifty, or LC50, is that concentration of a chemical in air or water that kills half of the experimental animals exposed to it for a set time period. The 4-hr inhalation LC50 in rats is 2 mg/m3.

Danger to non-target wildlife

Diphacinone is slightly toxic to birds. The oral LD50 for diphacinone in mallard ducks is 3158 mg/kg (2, 5), and in bobwhite quail is 1630 mg/kg. Diphacinone is slightly to moderately toxic to fish. The 96-hour LC50 for technical diphacinone in channel catfish is 2.1 mg/l, for bluegills is 7.6 mg/l, and for rainbow trout is 2.8 mg/l. The 48-hour LC50 in Daphnia, a small freshwater crustacean, is 1.8 mg/l.

Danger to human health

Diphacinone is highly toxic to humans and other mammals by inhalation, dermal absorption, and ingestion. It causes internal hemorrhaging that can lead to death. It acts by inhibiting enzymes involved in blood clotting. Animals given lethal doses exhibited labored breathing, muscular weakness, excitability, fluid in the lungs, and irregular heartbeats. Other signs of poisoning include spitting of blood, bloody urine or stools, internal hemorrhaging, and widespread bruising or bleeding into the joints. When a lethal dose does not cause immediate death, then death tends to be delayed and due to massive hemorrhage.

Diphacinone does not irritate the skin and it is not a skin sensitizer. It is a mild eye irritant.

Bird Eradication

Avicides are also sometimes necessary to eradicate invasive birds, especially **DRC1339** ('Starlicide').

The name Starlicide originated as a registered trademark of the animal feed manufacturer Ralston-Purina in St. Louis, Missouri. Starlicide is a small molecule in which a central benzene ring is modified by amine, chloro and methyl substituents in a specific pattern. Because special names exist for benzene rings modified with one or two of these functional groups, several synonymous chemical names may be encountered: 3-chloro-4-methylaniline or 3-chloro-4-methylbenzenamine, 2-chloro-4-aminotoluene, or 3-chloro-*p*-toluidine. Numbered groups (2-chloro, 4-amino) also may be named out of order; the numbers of such groups equal the number of carbon atoms in the benzene ring separating them from the group implied in the special name. Preparations of this chemical may be named as a hydrochloride (e.g. "3-chloro-*p*-toluidine hydrochloride", CPTH), indicating that hydrochloric acid has been used to neutralize the molecule to a salt in which the amine group is protonated and a chloride counterion is present; otherwise the free base is indicated. The chemical salt is also known as DRC-1339.

Mechanism of Action

In 1966 it was reported that Starlicide is lethal to starlings with an acute oral LD_{50} of 3.8 milligrams per kilogram body weight, but less toxic to most other birds. Grain-eating game birds [such as bobwhite quail, pheasants *(Phasianus colchicus)* and rooks *(Corvus frugilegus)*] were acknowledged to be more vulnerable. Hawks and mammals were resistant to the poison. Starlings were killed in a slow, "nonviolent" death by uremic poisoning and congestion of major organs. The effect was described as "a grayish white, frost-like material of uric acid overlaying the serosal surfaces of the various organs, accompanied by sterile inflammation and necrosis in the affected and adjacent tissues" akin to avian visceral gout. The site of action is believed to be in the kidney.

Uses for CPTH include killing blackbirds on sprouting rice and on corn and soybean fields. For these and other uses the poison is often given with brown rice. Research continues to improve the effectiveness of delivery on brown rice by causing the poison to be retained on the bait longer and resist degradation by sunlight. The effect of the poison is believed to be cumulative: for example, the LC_{50} for starlings was 4.7 ppm over 30 days, but only 1.0 ppm when fed for 90 days.

Toxicity

Reported half-lives of DRC-1339 range from 1-3 days and are highly dependent upon climatic conditions. The half-life in soil under aerobic conditions is approximately 25 hours. The aquatic photolysis half-life is between 6.5 and 4 1 hours. DRC- 1339 is highly soluble in water but does not hydrolyze. High affinity to soil organic matter explains the low soil mobility of DRC- 1339.

Danger to non-target wildlife

The mode of action of DRC-1339 in sensitive birds is irreversible kidney and heart damage, occurring 1-3 days following ingestion. In nonsensitive species, the mode of action is quite different, and the process requires 10-100 times more DRC-1339. Although it is possible that a cat or owl could ingest a lethal dose of DRC-1339 if fed birds poisoned by the compound exclusively for more than 100 days, the actual risk is normally minimal because exposure to DRC0339-poisoned birds occurs over a few weeks or less. To reduce any potential hazard, poisoned birds should be retrieved, then burned or buried, whenever possible.

There is very little danger to human health.

Plant Eradication

The most usual herbicides used for invasive eradication include Triclopyr and Glyphosate.

Triclopyr, a Class 2 pesticide,is a selective systemic herbicide used to control woody and herbaceous broadleaf plants along right-of-ways, in forests, and in grasslands and parklands. It has little or no impact on grasses. Triclopyr controls target weeds by mimicking the plant hormone auxin, causing uncontrolled plant growth. There are two basic formulations of triclopyr - a triethyamine salt, and a butoxyethylester. In soils, both formulations degrade to the parent compound, triclopyr acid. Degradation occurs primarily through microbial metabolism, but photolysis and hydrolysis can be important as well. The average half-life of triclopyr acid in soils is 30 days. Offsite movement through surface or subsurface runoff is a possibility with triclopyr acid, as it is relatively persistent and has only moderate rates of adsorption to soil particles. In water, the salt formulation is soluble, and with adequate sunlight, may degrade in several hours. The ester is not water-soluble and can take significantly longer to degrade. It can bind with the organic fraction of the water column and be transported to the sediments. Both the salt and ester formulations are relatively non-toxic to terrestrial vertebrates and invertebrates. The ester formulation, however, can be extremely toxic to fish and aquatic invertebrates. Because the salt cannot readily penetrate plant cuticles, it is best used as part of a cut-stump treatment or with an effective surfactant. The ester can be highly volatile and is best applied at cool temperatures on days with no wind. The salt formulation (Garlon 3A) can cause severe eye damage.

Trade names

There are two basic formulations of triclopyr: a triethylamine salt (triclopyr amine or salt), and a butoxyethyl ester (triclopyr ester). The amine formulation is sold under the trade name Garlon 3A and is marketed in garden shops and hardware stores as Turflon Amine or as Brush-B-Gone. The ester formulation is sold under the trade name Garlon 4 and is marketed in garden shops and hardware stores as Turflon Ester. Other trade names include Access, Crossbow, ET, PathFinder II, Redeem, and Remedy. These products also may be mixed with picloram or 2,4-D to increase their versatility.

Danger to wildlife

Triclopyr is regarded as only slightly toxic to birds and mammals. The oral LD50 for rats is 630-729 mg/kg. The LD50s for mallard ducks and bobwhite quail are 1,698 mg/kg and 2,935 mg/kg, respectively. Newton et al. (1990) predicted that triclopyr would not be present in animal forage in doses large enough to cause either acute or chronic effects to wildlife, and concluded that the tendency for triclopyr to dissipate quickly in the environment would preclude any problems with bioaccumulation in the food chain. Garlon 3A can cause severe eye damage to both humans and wildlife, due to the high pH of its water-soluble amine salt base. Care must be taken during mixing and application to prevent accidental splashing into eyes.

Danger to humans

The salt formulation in Garlon 3A can cause severe eye damage because of the high pH of its water-soluble amine salt base. Care should be taken to prevent splashing or other accident contact with eyes.

Glyphosate (*N*-(phosphonomethyl)glycine), a Class 3 pesticide, is a broad-spectrum systemic herbicide used to kill weeds, especially annual broadleaf weeds and grasses known to compete with crops grown widely across the Midwest of the United States. Initially patented and sold by Monsanto Company in the 1970s under the tradename *Roundup*, its U.S. patent expired in 2000. Glyphosate is the most used herbicide in the USA. While glyphosate has been associated with deformities in a host of laboratory animals, its impact on humans remains unclear.

Glyphosate is a non-selective herbicide, meaning it will kill most plants. It prevents the plants from making certain proteins that are needed for plant growth. Glyphosate stops a specific enzyme pathway, the shikimic acid pathway.

The shikimic acid pathway is found only in plants and some microorganisms. Glyphosate's mode of action is to inhibit an enzyme involved in the synthesis of the aromatic amino acids: tyrosine, tryptophan and phenylalanine. It is absorbed through foliage and translocated to growing points. Because of this mode of action, it is only effective on actively growing plants; it is not effective as a pre-emergence herbicide.

Some crops have been genetically engineered to be resistant to it (i.e. *Roundup Ready*, also created by Monsanto Company). Such crops allow farmers to use glyphosate as a post-emergence herbicide against both broadleaf and cereal weeds, but the development of similar resistance in some weed species is emerging as a costly problem. Soy was the first *Roundup Ready* crop.

Trade names

Glyphosate comes in many forms, including an acid and several salts. These can be either solids or an amber-colored liquid. There are over 750 products containing glyphosate for sale in the U.S. alone.

Threat to wildlife and/or humans

Pure glyphosate is low in toxicity, but products usually contain other ingredients that help the glyphosate get into the plants. The other ingredients in the product can make the product more toxic. Products containing glyphosate may cause eye or skin irritation. People who breathed in spray mist from products containing glyphosate felt irritation in their nose and throat. Swallowing products with glyphosate can cause increased saliva, burns in the mouth and throat, nausea, vomiting, and diarrhea. Pets may be at risk if they touch or eat plants that are still wet with spray from products containing glyphosate. Animals exposed to products with glyphosate may drool, vomit, have diarrhea, lose their appetite, or seem sleepy.

Pest Management Issues at CEPF

Prior to 2012, CEPF did not have a Pest Management Plan. However, a June 2011 joint CEPF Secretariat and World Bank supervision mission revealed that CEPF had provided some support for projects conducting invasive species eradication, including financing for the purchase, storage and application of a range of pesticides, and that such projects trigger the Bank's safeguard on Pest Management (OP 4.09). A summary list of the projects supported is included as Table 1 below.

Despite the lack of a Pest Management Plan, best practice approaches were used by grantees, including the production of pest management plans, health and safety plans for the applicants, consultations with local communities, and monitoring and evaluation of both target morbidity and non-target deaths. A summary of due diligence documents for ongoing projects using pesticides is included as Annex 1. Annexes 2-6 describe the approaches taken by the grant recipients for each of these eradications.

As a result of the June 2011 supervision, the project has (i) performed due diligence on ongoing projects that have purchased pesticides in order to confirm good practice; and (ii) prepared a pest management plan to guide future investments. This plan is found in the next chapter.

Table 1. Summary of CEPF pest management projects to-date

Proponent	*Grant Title*	*Pacific Island Country / Territory*	*Pesticide*	*In-country regulations, laws and international good practice*
BirdLife International CEPF Grant #58202	Managing Invasive Species at Key Biodiversity Areas in Palau and Fiji	Palau and Fiji	Fiji: "Pestoff 20R" Rodent Bait containing 20ppm brodifacoum Palau: Diphacinone	Fiji: Brodifacoum is registered for use and we also have a Permit for its application from the regulatory authority (Ministry of Agriculture) Palau: Legal status for toxins follows US law. Palau Conservation Society has a specific permit for the operation.
Conservation Society of Pohnpei CEPF Grant #56222	Conserving the Biodiversity of the Pohnpei Watershed Forest Reserve by Managing Invasive Weeds	Pohnpei	Roundup, Active Ingredient: glyphosate Glyphosate,N-(phosphonomethyl) glycine 41% Other Ingredients 59% Garlon 4, Active Ingredient triclopyr; Triclopyr 2,5,6-trichloro-2-pyrididinyloxyacetic acid butoxyethyl ester 61.6% Inter Ingredients 38.4%	The grantee has received approval from Pohnpei EPA. Both herbicides have US registration numbers and are for general use
Cook Islands Natural Heritage Trust CEPF Grant #58065	Biodiversity Management and Ecotourism Development on Atiu, Cook Islands	Cook Islands	Myna Poison: The avicide is DRC1339 ('Starlicide') Rodenticide is "Talon" containing Brodifacoum in wax pellets at 0.005%.	Starlicide is registered for use in US and NZ. Cook Islands has no regulations concerning this avicide. Talon is the standard form used for rat eradication in NZ and on various Pacific Islands, including in the Cook Islands. This Rodenticide is stored on Atiu, as a prevention program, in case an incursion of Ship Rat is detected.
Pacific Expeditions, Limited CEPF Grant #55099	Habitat Restoration of Priority Islands in the Phoenix Islands Protected Area	Kiribati	"Pestoff 20R" Rodent Bait containing 20ppm brodifacoum	Permit obtained from Kiribati authorities.
Secretariat of the Pacific Regional Environment Programme CEPF Grant #55104	Restoration of the Aleipata Islands, Samoa Through the Management of Introduced Rats and Ants	Samoa	"Pestoff 20R" Rodent Bait containing 20ppm brodifacoum	Permitted by national authorities for specific uses including those supported by these projects.
Secretariat of the Pacific Regional Environment Programme CEPF Grant #55105	Holding the Lines — Restoration of the Northern Line Islands, Kiribati	Kiribati	"Pestoff 20R" Rodent Bait containing 20ppm brodifacoum	Permitted by national authorities for specific uses including those supported by these projects.
Projects where CEPF funds are associated with eradication campaigns supported by other Donors				
Royal Society for the Protection of Birds CEPF Grant #56258	Safeguarding the Endemic Henderson Crake (Porzana atra) During the Restoration of Henderson Island World Heritage Site	Pitcairn Islands (UK Territory)	"Pestoff 20R" Rodent Bait containing 20ppm brodifacoum	Permitted by the UK authorities for specific uses including those supported by these projects.

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.
2. Grant title.
3. GEM number (*to be completed by CEPF).*
4. Grant amount (US dollars).
5. Proposed dates of grant.
6. Countries or territories where pesticides will be applied.
7. Full name, title, telephone numbers, and electronic mail address of Grantee personnel responsible for the pest management plan.
8. Summary of the project.
9. Date of preparation of the pest management plan.

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.
11. Current and proposed pest management practices.
12. Relevant integrated pest management experience within the project area, country or region.
13. Assessment of proposed or current pest management approach and recommendations for adjustment where necessary.

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.
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.
16. Chemical, trade, and common name of pesticide to be used.
17. Form in which pesticide will be used (e.g., pellet, spray).
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.
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.
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.
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.).
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).
23. Name and address of source of selected pesticides.
24. Name and address of vendor of selected pesticides.
25. Name and address of facility where pesticides will be stored.

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.
27. Description and assessment of national capacity to develop and implement ecologically-based AIS control.
28. Description and assessment of the country's regulatory framework and institutional capacity for control of the distribution and use of pesticides.
29. Proposed project activities to train personnel and strengthen capacity (list # of people and what they are being trained in).
30. Confirmation that the appropriate authorities were approached (who and when) and that the appropriate licenses and permissions were obtained by the project.

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

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

Implementation Strategy

Proposal Stage

1. The Letter of Inquiry and Grant Writer proposal should indicate that the Pest Management Safeguard has been triggered.
2. The proponent should prepare a Pest Management Plan, to be submitted to CEPF at the same time as their full proposal.
3. The proposal should include, in its section entitled Project Rationale, relevant information justifying the inclusion of pest management activities in the project.
4. The proposal should include, in its section entitled Project Approach, a summary of relevant information from the pest management plan.
5. The Logical Framework should include, as a clear and separate Component, implementation of a pest management plan, with associated Products/Deliverables.
6. If the proponent requires funding for any of the following, the Budget should clearly show the costs of purchase of AIS control equipment and chemicals, labor for their application, and the cost of expert consultation to ensure proper selection of method, among others.

Implementation Stage

The Grantee shall implement a Pest Management Plan adhering to the sections described above, Components of the PMP. During implementation:

1. The Grantee shall follow the prescriptions of its Pest Management Plan and make regular reports to the Regional Implementation Team (RIT, the CEPF Secretariat's proxy in a hotspot). These reports will constitute Products/Deliverables in the project's Logical Framework.
2. CEPF requires that concerns raised through consultations with communities and management authorities be documented and addressed in the Pest Management Plan. Where applicable, letters of endorsement from appropriate management authorities are required.
3. The Grantee will allow regular reviews by the RIT, CEPF Secretariat, or their outside experts to review implementation of the Pest Management Plan and adherence with World Bank standards, international best practice, and local law.

Roles and Responsibilities

During preparation

Proponents are responsible for:

- Writing plans, following plans and updating them when necessary, reporting against plans and informing potentially affected communities.

The CEPF Secretariat is responsible for:

- Training Regional Implementation Teams in the use and application of these guidelines.

- Screening projects to determine if they trigger applicable safeguards and require a pest management plan prior to formal approval.
- Informing proponents of these guidelines.
- Assessing the pest management plans, including the adequacy of the assessment of project impacts and the proposed measures to address issues pertaining to invasive species removal. If environmental or social impacts outweigh the potential benefits, cannot support the project.
- Providing clearance on every PMP that proposes to use a class 3 or lower pesticide.

The World Bank is responsible for:
- Providing training to the CEPF Secretariat and proponents on the preparation of PMPs.
- Reviewing and providing clearance on every PMP that proposes to use a class 1 or 2 pesticide.

During implementation

Proponents are responsible for:
- Reporting to affected communities, local authorities, and CEPF on project progress and on any unexpected and unintended events affecting local communities.
- The costs of clean-up or mitigation measures due to unintended negative impacts of pesticide use.

The CEPF Secretariat is responsible for:
- Review of project-specific PMPs during implementation. If CEPF finds that a proponent is not following a pest management plant or local requirements, then CEPF's responsibility is to withhold payment, or suspend or cancel the grant as appropriate.

The World Bank is responsible for:
- Reviewing the implementation of the PMP in the field.

Grievance mechanism

As a first stage, grievances should be made to the applicant or grantee, who should respond to grievances in writing within 15 working days of receipt. Claims should be filed, included in project monitoring, and a copy of the grievance should be provided to the CEPF Secretariat. If the claimant is not satisfied with the response, the grievance may be submitted to the CEPF Executive Director at cepfexecutive@conservation.org or by mail to: Critical Ecosystem Partnership Fund, Conservation International, Attn: Executive Director, 2011 Crystal Drive, Suite 500, Arlington, VA 22202, USA. CEPF will respond within 15 calendar days of receipt, and claims will be filed and included in official project files.

Disclosure

The Pest Management Plan and/or the documents required in countries where adequate policies exist are public documents. The Grantee should share them with local authorities and with potentially affected communities. Once the final documents have been approved, the Grantee will be required to disclose them, again, locally, and CEPF will place them on its website, www.cepf.net.

Monitoring and Evaluation

The CEPF Secretariat, using information from each grantee and appropriate RIT, will provide an update on pest management activities in its quarterly reporting.

Budget

The budget for M&E is included in the overall CEPF Secretariat budget for overall supervision. Each RIT will similarly supervise pest management as part of its regular supervision budgets. The grantee must include the full costs associated with the preparation, implementation and monitoring of their PMP in their application (either as a cost to be charged to CEPF or as co-financing).

Annexes

Annex 1. Summary of Due Diligence Documents in Ongoing CEPF Projects Using Pesticides

Project name	Grantee	CI Grant Reference #	Start date	End date	Pest management documents sent	CEPF budget
Managing Invasive Species at Key Biodiversity Areas in Palau and Fiji	BirdLife International	58202	Apr 1, 2011	Mar 31, 2013	Completed Pest Management Plan Questionnaire Environmental Quality Protection Board Regulations (EQBP) Pesticide Regulations.pdf Kayangle Rodent operation Health and Safety Plan.docx Safety letter to EQBP.docx	$194,350.00
Conserving the Biodiversity of the Pohnpei Watershed Forest Reserve by Managing Invasive Weeds	Conservation Society of Pohnpei	56222	Apr 1, 2010	Mar 31, 2013	Completed Pest Management Plan Questionnaire	$184,329.00
Biodiversity Management and Ecotourism Development on Atiu, Cook Islands	Cook Islands Natural Heritage Trust	58065	Jan 1, 2011	Dec 31, 2012	Completed Pest Management Plan Questionnaire	$97,516.00
Habitat Restoration of Priority Islands in the Phoenix Islands Protected Area	Pacific Expeditions, Limited	55099	Nov 1, 2009	Dec 31, 2012	Completed Pest Management Plan Questionnaire Assessment of Environmental Effects of Pest Eradications In The Phoenix Islands (Enderbury-Birnie AAE Apriol 2011.doc) Environmental Licence (1).pdf News Letter Aug 2011 Final Phoenix Islands Conservation Survey.pdf PIPA People, gear and safety.docx PIPA_2009_Technical_report.pdf	$292,000.00

Restoration of the Aleipata Islands, Samoa Through the Management of Introduced Rats and Ants	Secretariat of the Pacific Regional Environment Programme	55104	May 1, 2009	Dec 31, 2011	Completed Pest Management Plan Questionnaire	$227,898.00
Holding the Lines — Restoration of the Northern Line Islands, Kiribati	Secretariat of the Pacific Regional Environment Programme	55105	Oct 1, 2009	Dec 31, 2012	Completed Pest Management Plan Questionnaire	$165,000.00
Safeguarding the Endemic Henderson Crake (Porzana atra) During the Restoration of Henderson Island World Heritage Site NB This project CEPF's were used for mitigation measures and not used for the eradication campaign directly. The eradication activities were supported by other Donors	Royal Society for the Protection of Birds	56258	Oct 1, 2010	Dec 31, 2011	Environmental Impact Assessment in which detailed discussion of the potential negative effects of brodifacoum use, along with mitigation measures, is discussed. Ethical Review, in which the ethics of using brodifacoum bait on Henderson Island are assessed and found to comply with the principles of Humane Vertebrate Pest Control as outlined by RSPCA Australia. Health & Safety Plan, which includes detailed risk assessments and safety procedures for all aspects of the bait application process. Henderson Expedition Report 2010 Henderson EIA March 2011 Henderson Newsletter 05 Henderson Pesticide Permit Application Local Government (Amendment) Regns 20111 Permit page 1.jpg Permit page 2.jpg REPB-ACP Receipt	$129,425.00

Annex 2. Biodiversity Management and Ecotourism Development on Atiu, Cook Islands

Grantee	Cook Islands Natural Heritage Trust
Grant Title	Biodiversity Management and Ecotourism Development on Atiu, Cook Islands
GEM Number	58065
Grant Amount	$97,516
Duration	1 January 2011 to 31 December 2012
Countries or Territories where the project is being implemented	Cook Islands
Description of grant	Maintain the pristine state of Atiu Island by raising the consciousness at all levels of society about the threats of invasive species combined with restoration activities. In addition, develop multimedia materials to promote this island as a tourist destination to the benefit of the island's threatened species.

Description of the pesticide(s) used:

Trade name of the pesticide:	Starlicide
Chemical name of the active ingredient and concentration	DRC1339 (3-chloro-4-methylaniline hydrochloride)
What form it was the pesticide used? e.g. pellet, spray,	The compound is mixed in cooked rice at 0.1-0.5% concentration
Legal status of those pesticides in each applicable country	Registered for use in US and NZ, and Cook Islands has no regulations concerning this avicide

Description of where the pesticide was sourced:

Where and when the pesticide was purchased?	New Zealand, 16 Nov 2010
Date of purchase (Day Month Year)	16 Nov 2010
Full name of the supplier of the pesticide	Animal Control Products Ltd
Address of the supplier of the pesticide	Private Bag 3018, Wanganui, NZ
The quantity of the pesticide purchased	100x 2.5g sachets

Description of how the pesticide was applied:

How was the pesticide applied?	mixed with cooked rice to make what?
Who applied the pesticide?	George Matearikі
What training was given the people applying the pesticide and over what period of time	Training for one month and a few days follow-up at about six monthly intervals.
How has the pesticide was stored	Manager's office at Atiu Villas (Is this proper storage?)
Provide a detailed description of the area in which the pesticide was used (e.g. uninhabited island or school playground?)	Used throughout the inland of Atiu in the countryside and in the village. It is distributed on special trays that are positioned off the ground to reduce access by feral fowls.

List of potential risks described for the use of each of the pesticides (primary risks and second generation given the longer half-life of brodificoum for example, including to people and non-targeted wildlife).

1. Threat to non-target birds

2. Threat to mammals
3. Threat to people

Describe the mitigation measures undertaken by each project to identify, minimize, manage and offset those risks (e.g. the use of bait stations; training; public awareness) should be described for each project and then distilled into a general mitigation plan for moving forward.

1. Distributed in rice which is not eaten by any of the native landbirds and there are no predatory landbirds. The rice is sometimes consumed by feral fowls and although the community accepted that some would be poisoned there is very little evidence that this has occurred. It also biodegrades rapidly in sunlight and in the environment and is therefore not persistently available to either birds or mammals.
2. It is essentially non-toxic to mammals and it biodegrades within the victim thereby reducing risks to predators.
3. The distributor of the poison has been well trained in handling, mixing and distributing the poison and has suitable equipment. The project has a high profile on the island and widespread community support which means that throughout two years we have had no cases of the poison being interfered with.

Annex 3. Managing Invasive Species at Key Biodiversity Areas in Palau and Fiji

Grantee	BirdLife International
Grant Title	Managing Invasive Species at Key Biodiversity Areas in Palau and Fiji
GEM Number	58202
Grant Amount	US $194,350
Duration	Period: Apr 1, 2011-Mar 31, 2013
Countries or Territories where the project is being implemented	Fiji and Palau
Description of grant	Improve well-being and livelihoods for communities on Kayangel atoll, Palau and Mabualau, Vatu-I-Ra and seven of the Ringgold islands by removing invasive rodents from these islands, put in place effective bio-security mechanisms to prevent recolonization and generate income through tourism and promoting artisanal crafts. In addition, assess the opportunities to declare these sites as community protected areas Pest eradication (and toxin use) is only proposed for Palau (Kayangel Atoll) under this Grant. The project sites identified for Fiji have been treated previously.

Description of the pesticide(s) used:

Trade name of the pesticide:	PestOff 20R Rat Bait 50D
Chemical name of the active ingredient and concentration	Brodifacom Diphacinone
What form it was the pesticide used? e.g. pellet, spray,	Pellet
Legal status of those pesticides in each applicable country	

Description of where the pesticide was sourced:

Where and when the pesticide was purchased?	New Zealand
Date of purchase (Day Month Year)	31 March 2011
Full name of the supplier of the pesticide	Animal Control Products Ltd
Address of the supplier of the pesticide	408 Heads Road, Balgownie Whanganui 4501 New Zealand
The quantity of the pesticide purchased	3125kgs Diphacinone 2800kgs Brodifacom

Description of how the pesticide was applied:

How was the pesticide applied?	Hand broadcast at 20x20m intervals and through bait stations
Who applied the pesticide?	Palau Conservation Society, Kayangel community, Palau State Government partners
What training was given the people applying the pesticide and over what period of time	All people applying the bait were trained prior to the bait application (using placebo) and again at the commencement of the operation. Training covered application techniques and safety procedures.

	Recommended safety equipment was available (and used) gloves, face mask, eye protection, water
How has the pesticide was stored	In original containers in a secure building
Provide a detailed description of the area in which the pesticide was used (e.g. uninhabited island or school playground?)	Baits were applied to the entire 160ha area of Kayangel Atoll (4 islets). Diphacinone was hand broadcast to 60ha (3 islets) and for the 100ha islet of Kayangel Brodifacoum was hand broadcast in forest areas and applied through bait stations around buildings (which included approximately 50 private residences and associated buildings, and 1 school)

List of potential risks described for the use of each of the pesticides (primary risks and second generation given the longer half-life of brodificoum for example, including to people and non-targeted wildlife).

- Domestic wildlife (pigs, chickens, dogs) at risk from bait ingestion
- People potentially at risk form bait ingestion and eating contaminated wildlife
- Micronsesian megapode, waders and shorebirds are potentially at risk from bait ingestion

The mitigation measures undertaken by each project to identify, minimize, manage and offset those risks (e.g. the use of bait stations; training; public awareness) should be described for each project and then distilled into a general mitigation plan for moving forward.

- Risks to domestic wildlife are managed through containment (tying up animals, securing in pens or cages as appropriate). Bait is then applied through bait stations in the proximity of these animals preventing their exposure but still enabling access by the target species
- Risks to people from direct ingestion and secondary poisoning is prevented through prior consultation with every resident on the island so they're familiar with what the bait looks like, details of the operation including application methods and period the bait will be present for, that bait must not be handled and the foods that may be a source of secondary poisoning (terrestrial crabs, and feral chicken) and a 6 month withholding period for consumption
  Warning signs established at all entry points to the island which include information on what the bait looks like and foods that must not be eaten
  A Palau Conservation Society contact person present in the community for the duration of the operation.
  Bait applied through secure bait stations for all inhabited areas preventing access by non-targets, localizing the bait distribution, and minimizing the volume of bait distributed this further reducing the risk of contamination.
  Resident health officials familiar with diagnosis of poisoning symptoms and treatment available
  Wider community awareness for the operation including warning information publicized through national television and radio
- To prevent poisoning of Megapodes a toxin with low toxicity to birds Diphacinone, was selected for use (Megapodes only occupy 3 of the 4 islets). Bait application rates are based on the minimum expected necessary to eradicate the target species, low bait volumes further reducing the potential for a negative impact on the Megapode population
  To safe guard shorebirds and waders bait is not applied to beach areas

Annex 4. Habitat Restoration of Priority Islands in the Phoenix Islands Protected Area

Grantee	Pacific Expeditions, Limited
Grant Title	Habitat Restoration of Priority Islands in the Phoenix Islands Protected Area
GEM Number	55099
Grant Amount	US $292,000
Duration	1st November 2009 to 31st December 2012
Countries or Territories where the project is being implemented	Kiribati
Description of grant	Improve the breeding success of indigenous seabirds on Enderbury and Birnie Islands in the Phoenix Island Protected Area by eliminating invasive species Pacific rats). Also enact measures that keep these important seabird breeding sites pest-free in perpetuity. The lessons learned from these activities will be published and assist in improving pest management techniques on other tropical islands.

Description of the pesticide(s) used:

Trade name of the pesticide:	Pestoff 20R Rodent Bait
Chemical name of the active ingredient and concentration	20ppm brodifacoum
What form it was the pesticide used? e.g. pellet, spray,	Pellet
Legal status of those pesticides in each applicable country	Permit required - we obtained one from Kiribati

Description of where the pesticide was sourced:

Where and when the pesticide was purchased?	Wanganui, New Zealand, 2011
Date of purchase (Day Month Year)	7 April 2011
Full name of the supplier of the pesticide	Animal Control Products
Address of the supplier of the pesticide	Private Bag 3018, Wanganui, New Zealand
The quantity of the pesticide purchased	26 tonnes of bait

Description of how the pesticide was applied:

How was the pesticide applied?	From helicopter using bait buckets. The bait was loaded into bait buckets from the deck of the vessel all following a detailed operational plan
Who applied the pesticide?	EcoOceania Pty Ltd using contractors for each of helicopter, vessel charter, operational manager and operational team
What training was given the people applying the pesticide and over what period of time?	Full safety briefings and training prior to the operation. All had been involved in previous operations of a similar nature, including all of the boat crew at Palmyra Island immediately prior to this work
How was the pesticide stored?	Transported in 25 kg pesticide bags (designed by ACP) contained in locked shipping containers
Provide a detailed description of the area in which the pesticide was used (e.g. uninhabited island or school playground?)	Uninhabited islands – desert islands of 50 and 600 ha. Sparse vegetation of mainly prostrate plants, localized trees on the large island. Important seabird populations of shearwaters, boobies,

	tropicbirds, frigatebirds, terns, noddies. Difficult to land on with coral reefs
When did the application happen (over what time frame and what time of the year) and where exactly (over what extent of land - an entire island? a small part of a larger island?)?	July 2011; Enderbury 600 ha and Birnie 50 ha, Phoenix Islands, Kiribati. Whole of each island was covered in two applications each, 5 days apart.
What training did the applicators have (were they licensed - if so please forward a copy of the license; have they done spraying before?)	Yes, all involved were experienced at baiting and no licence is required to distribute brodifacoum. Pilots had appropriate rating to undertake the work (no spraying done here). Baiting team leader holder of NZ Controlled Substances Licence.
What personal protective equipment did they wear (forward a copy of any accident plan or safety plan they used while spraying)	Applicators in recommended and approved safety gear - coveralls, gloves, respirators. Safety plan attached
Where did they store the pesticide and how did they dispose of the empty containers after the application?	In approved rodent bags from factory and stored inside shipping containers. Bags burnt on target site after the operation according to recommended best practice.
How are they monitoring target deaths (e.g. rats) and non-target fatalities (either directly or through secondary pathways from eating targeted wildlife)	Rat deaths observed ashore during the operation but final outcome will not be known till late 2012 or 2013. Non-targets addressed by observation as per Assessment of Environmental Affects (attached)
What studies did they complete beforehand to assess the pros and cons (to non-targeted wildlife and humans) of using a pesticide?	There had been previous studies on two neighbouring target islands (Rawaki and McKean, Phoenix Islands) where the same bait was used in 2008; 2008 non-targets were evaluated as described in the 2011 AEE. Curlews (the main non-target concern) were monitored on the ground in 2011.
Please forward a copy of the applicable laws and regulations that the grantees followed (with a summary of what they did to follow them exactly).	Copy of Government of Kiribati environment licence and conditions attached

List of potential risks described for the use of each of the pesticides (primary risks and second generation given the longer half-life of brodificoum for example, including to people and non-targeted wildlife).

The assessment of environmental effects (AEE) completed for the project identified risks as follows:

Primary risks

1. direct disturbance of nesting seabirds by aircraft and ground operators
2. direct poisoning of bristle-thighed curlew (EN) and other shorebirds that migrate to the islands in the northern winter.

Secondary risks

3. local people consuming crabs that may have consumed some bait
4. potential persistence of pesticide in soil
5. potential increase in weed species following removal of rats

Describe the mitigation measures undertaken by each project to identify, minimize, manage and offset those risks (e.g. the use of bait stations; training; public awareness) should be described for each project and then distilled

into a general mitigation plan for moving forward.

Mitigation

1. The AEE outlined practices to minimize disturbance to seabirds (e.g. flight paths away from colonies of frigatebirds) and these were applied in the field and outcomes were monitored for potential deaths, nest desertions, etc. Only a very few impacts were detected and the future benefits to these species more than offset any negative impact.

2. The AEE considered that poisoning of curlews was a potential but manageable. The timing of the operation was chosen to coincide with the period that adult curlew and other shorebirds are on their Alaskan breeding grounds. This was important and as it turned out there were surprisingly very few curlew present at the two target islands (two birds on Birnie and none on Enderbury) and so no contingency plans, e.g. scaring off island, were required.

3. The islands are uninhabited, dangerous to land on and a permit is required to do so. The likelihood of them being visited during and after this operation is very low. No large crabs (often eaten by locals) were present. However we erected precautionary poison warning signs (in I-Kiribati) on both islands.

4. The AEE considered that there could be very low levels of brodifacoum present in the soils. Some soil samples from a previous operation were collected for subsequent analysis.

5. The AEE considered that an increase in weeds was unlikely given the islands are uninhabited and seldom visited. However, future monitoring visits will include surveillance for invasives generally.

Safety

In addition there were significant operator risks from working on a vessel, helicopters, remote islands, baiting etc. These were addressed in the Operational Plan and a general health and safety plan together with specific safety briefings for work around the vessel, helicopters and baiting.

General approach in future

The approach will be similar to that which we have undertaken in the past and involves completion of an AEE (in support of an Operational Plan) that covers:

- Summary of preferred operational approach
- Full risk assessment of operational approach (requires knowledge of the physical and biological systems on the islands and potential human visitation)
- Detailed mitigation adapted for each island's circumstances
- Appropriate monitoring in the field during and after operations
- Reporting to ensure we learn form good and poor approaches.

Annex 5. Conserving the Biodiversity of the Pohnpei Watershed Forest Reserve by Managing Invasive Weeds

Grantee	Conservation Society of Pohnpei
Grant Title	Conserving the Biodiversity of the Pohnpei Watershed Forest Reserve by Managing Invasive Weeds
GEM Number	56222
Grant Amount	US $184,329
Duration	Apr 1, 2010-Mar 31, 2013
Countries or Territories where the project is being implemented	Pohnpei Federated States of Micronesia
Description of grant	On the island of Pohnpei, support the removal of five invasive plant species from the Pohnpei Watershed Forest Reserve and improve the management of the Pohnpei Central Forest, a key biodiversity area that is home to nine globally threatened species. Promote awareness and education of these threats through community conservation officers to prevent the reintroduction of invasive species of plants and animals onto the island.

Description of the pesticide(s) used:

Trade name of the pesticide:	Garlon 4
Chemical name of the active ingredient and concentration	*Triclopyr, trichlopyr:3,5,6-trichloro-2-pyridinyloxyacetric acid butoxethyl ester 61.6 %* *Other* Other Ingredients 38.4%
What form it was the pesticide used? e.g. pellet, spray,	Triclopyr is mainly used for foliage application for the 5 selected plant species. In some cases it is used for stem application. For foliage application *triclopyr* is diluted to 0. 4 % For stem application 100% (undiluted) *triclopyr* is applied with a small sprayer.

Legal status of those pesticides in each applicable country	The Pohnpei Environmental Protection (EPA) requires an pesticide registration for restricted use pesticides. Pohnpei EPA is aware of the use of *triclopyr* Applicator have been trained in the use of herbicides.

Description of where the pesticide was sourced:

Where and when the pesticide was purchased?	For the last two (2009 and 2010) years *triclopyr* has been ordered from the US Forestry suppliers. The quantities are 2 gallon per year (total of 4 gallon)
Date of purchase (Day Month Year)	26/11/2010
Full name of the supplier of the pesticide	Forestry Suppliers, Inc.
Address of the supplier of the pesticide	Email address: cs@forestry-suppliers.com http://www.forestry-suppliers.com/ phone 800 752-8460 Forestry Suppliers Inc P.O.Box 8397 Jackson MS 392884 8397
The quantity of the pesticide purchased	Garlon 4 Ultra, 2 x 2.5GL

Description of how the pesticide was applied:

How was the pesticide applied?	For foliage application *triclopyr* is diluted to 0. 4 % For stem application 100% (undiluted) *triclopyr* is applied with a small sprayer.
Who applied the pesticide?	CSP Staff
What training was given the people applying the pesticide and over what period of time	They received a 3 days herbicide applicator training which is based on the pesticide applicator certification training of the University of Guam
How has the pesticide was stored	The herbicides are stored at the CSP pesticide store in a locked cabinet.
Provide a detailed description of the area in which the pesticide was used (e.g. uninhabited island or school playground?)	The herbicides are used on farm land and sometimes in remote mountain areas.

List of potential risks described for the use of each of the pesticides (primary risks and second generation given the longer half-life of brodificoum for example, including to people and non-targeted wildlife).

There is an environmental risk if *triclopyr* is applied to groundwater. People who apply herbicides are aware that *triclopyr* must not be applied to rivers or streams.
Triclopyr must be avoided to get in contact with eyes. Safety measures are followed.

Describe the mitigation measures undertaken by each project to identify, minimize, manage and offset those risks (e.g. the use of bait stations; training; public awareness) should be described for each project and then distilled into a general mitigation plan for moving forward.

Public is aware of the use of the use herbicides, they are informed not to enter the spayed area at the day of application. We do not apply herbicides to food crops therefore there is no waiting period for the date of harvest is necessary.

Annex 6. Restoration of the Aleipata Islands, Samoa Through the Management of Introduced Rats and Ants

Grantee	Secretariat of the Pacific Regional Environment Programme
Grant Title	Restoration of the Aleipata Islands, Samoa Through the Management of Introduced Rats and Ants
GEM Number	55104
Grant Amount	US $227,898
Duration	1st May 2009 to Dec 31, 2011
Countries or Territories where the project is being implemented	Samoa
Description of grant	Improve the status of the threatened native birds and invertebrates on Nu'utele and Nu'ulua islands through the management of Pacific rats and yellow crazy ants. This is a flagship invasive species management project in the Pacific and involves a large number of committed partners with the expectation of significant demonstration value in the region on islands that are a natural sanctuary.

Description of the pesticide(s) used:

Trade name of the pesticide:	Pestoff rodent bait 20R
Chemical name of the active ingredient and concentration	Brodifacoum, 20 ppm
What form it was the pesticide used? e.g. pellet, spray,	10 mm extruded cereal-based pellets, dyed green
Legal status of those pesticides in each applicable country	Permitted (for restricted use)

Description of where the pesticide was sourced:

Where and when the pesticide was purchased?	2009, New Zealand
Date of purchase (Day Month Year)	May 2009
Full name of the supplier of the pesticide	Animal Control Products
Address of the supplier of the pesticide	Wanganui, NZ
The quantity of the pesticide purchased	6 tonnes

Description of how the pesticide was applied:

How was the pesticide applied?	by spreader from helicopter
Who applied the pesticide?	Northshore Helicopters
What training was given the people applying the pesticide and over what period of time	Operators were already highly experienced (experts) with the methods, equipment and supplies used.
How has the pesticide was stored	in the supplier's packaging (25 kg bags), shrink-wrapped on pallets, in a locked shipping container
Provide a detailed description of the area in which the pesticide was used (e.g. uninhabited island or school playground?)	Two uninhabited islands, Nu'utele and Nu'ulua. Largely lowland tropical forest vegetation, some cliffs. Total area c. 200 ha.
Provide a detailed description of the area in which the pesticide was used (e.g.	Three days in August-September 2009. The coverage of the two islands Nu'utele Island (108 hectares) and Nu'ulua Island (25

uninhabited island or school playground?)	hectares) a total of 133 hectares. Both islands are uninhabited, steep and covered in thick, largely unmodified native coastal forest and lowland rainforest.
When did the application happen (over what time frame and what time of the year) and where exactly (over what extent of land - an entire island? a small part of a larger island?)?	Highly experienced helicopter company, pilot and support team, including a specialist advisor from the New Zealand Dept of Conservation. All had done this type of work before.
What training did the applicators have (were they licensed - if so please forward a copy of the license; have they done spraying before?)	Pilot licenses have been requested.
What personal protective equipment did they wear (forward a copy of any accident plan or safety plan they used while spraying)	The bait handlers loading spreader wore full protective clothing including cover-all suits, gloves and face masks.
Where did they store the pesticide and how did they dispose of the empty containers after the application?	The Operational plan addressed safety procedures. Bait was packed in bags, stored in a locked shipping container. Personnel operating with bait wore overalls, gloves and dust masks. Empty bags were disposed of by waste management section of Ministry of Natural Resources and Environment - in incinerator at landfill.
How are they monitoring target deaths (e.g. rats) and non-target fatalities (either directly or through secondary pathways from eating targeted wildlife)	Target and non-target mortality was recorded during surveys on both islands immediately after the bait drops had been completed.
What studies did they complete beforehand to assess the pros and cons (to non-targeted wildlife and humans) of using a pesticide?	Full independent Environmental Impact Assessment which was updated based upon follow-up site visits.

List of potential risks described for the use of each of the pesticides (primary risks and second generation given the longer half-life of brodificoum for example, including to people and non-targeted wildlife).

> Consumption of large quantities of the bait could produce illness in humans. Consumption of pellets by birds could result in death. No other susceptible wildlife on or around the islands.

Describe the mitigation measures undertaken by each project to identify, minimize, manage and offset those risks (e.g. the use of bait stations; training; public awareness) should be described for each project and then distilled into a general mitigation plan for moving forward.

> Local communities supported the project and were fully informed of risks ahead of the operation. Briefing sessions were organized prior to the operation and signage erected on the edges of the treated areas (landing places on the islands), warning not to consume animals from the islands or to fish offshore (even though no hazards from bait falling in the sea have ever been identified from any similar operation). Bait loading team wore protective clothing (masks, cover-alls) throughout the operation, to avoid inhalation of and skin contact with bait dust.

26 Friendly Ground Doves *Columba stairii* (a threatened species which was not thought to be seriously at risk from the operation but whose population on the two islands is of high conservation value) were trapped on Nu'utele prior to the operation, kept in captivity on Upolu Island and released back on Nu'utele after the bait had broken down. However, none of the many doves left on the islands was found dead, and the population increased substantially through successful breeding immediately after it. The only non-target wildlife effect detected was the death of two Banded Rails *Gallirallus philippensis*, a common species in Samoa, and the only wild species thought to be at possible risk from eating the bait. Most of the rails on the islands were unaffected, and their population there is also healthy.