ESS3 - Pest Management Plan

Pest Management Plan

11 May 2023

CEPF Grant 113840

The Peregrine Fund

A Conservation Action Plan and Implementation for the Critically Endangered Ridgway's Hawk in the Dominican Republic

Dominican Republic

Grant Summary

1. Grantee organization: The Peregrine Fund

2. Grant title: A Conservation Action Plan and Implementation for the Critically Endangered Ridgway's Hawk in the Dominican Republic

3. Grant number: 113840

4. Grant amount (US dollars): $159,590.76

5. Proposed dates of grant: 1 August 2023 – 31 January 2025

6. Countries or territories where sub-project will be undertaken: Dominican Republic

7. **Summary of the sub-project**

Over 20 years ago, biologists from The Peregrine Fund made their first visit to the Dominican Republic to assess the status of the Ridgway's Hawk population on Hispaniola. After thorough surveys across the Dominican Republic, we found only one extant population located in DOM-20 Parque Nacional Los Haitises with approximately 250-300 individuals. The small and isolated nature of this population put it at great risk of extinction. Indeed, without management actions, the species was predicted to go extinct by 2031.

In 2008, we began intensively studying and working to conserve and augment the Ridgway's Hawk population in DOM-20 Parque Nacional Los Haitises. Early on, we discovered that parasitic flies were laying their eggs in bird nests. The fly larvae then burrow into the flesh of nestlings, consuming their muscle tissue and blood, often leading to death. In 2011 we began intensive hands-on management of nest flies. In 2015, with the guidance of Dr. Martin Quiroga, an expert in parasitic nest flies, we developed a simple and highly effective protocol that uses Permacap (permethrin) to treat nests. This treatment reduces fly abundance by 89%, leading to up to four times the number of fledglings per nest. We continue to treat nests annually to increase breeding productivity of this Critically Endangered species.

8. Date of preparation of this document: 11 May 2023

Pest Management Approach:

9. Current and anticipated pest problems relevant to the sub-project.

Parasitic nest flies *Philornis spp*. are a driving force threatening the extinction of bird species endemic to Neotropical islands such as the Galapagos, where introduced *Philornis downsi* negatively impacts reproductive success of naive avian hosts. Elsewhere in the Neotropics, such as in the Caribbean region where *Philornis* nest flies are native, their effects on host productivity are poorly known.

In 2011, we discovered that high mortality in nestling Ridgway's Hawks was caused primarily by nest-flies (*Philornis spp.*), and we have found them to be a problem ever since. The true extent of

their impact is perhaps best seen when they are removed: Annual spraying of nests with the insecticide permethrin has resulted in up to a four-fold increase in fledglings per nest. Despite our efforts to mitigate this one-sided host-parasite interaction, the risk from *Philornis* parasitism remains high. Parasitic flies are abundant in the Dominican Republic and could rapidly reverse over a decade of mitigation efforts if nests are left untreated.

10. Current and proposed pest management practices.

Current practices
To reduce the risk of extinction, we have implemented a holistic conservation strategy which includes: monitoring and management of the wild population in Los Haitises National Park, specifically developing treatments and treating nestlings for nest-flies, and most recently, we have embarked on the journey to learn more about the life history of parasitic nest-flies, so that we can actively seek broad scale solutions to this problem.

Early during the breeding season, field workers search for and identify active Ridgway's hawk's nests. Then, once during the incubation period, Permacap is sprayed onto nests (briefly removing any eggs during application). Permacap is a slow release form of permethrin, a broad spectrum insecticide that targets adults and larvae of many invertebrates and has been shown to effectively control mites, fleas, and parasitic flies. This slow release form of permethrin can last up to 60 days, allowing us to minimize nesting disturbance while still ensuring nestling protection throughout the most sensitive period of their development. We maintain a small control group of nests which receive no treatments for comparison, as well as to collect valuable data to help us understand variables which may increase or decrease the intensity of parasitism in unmanaged nests.

Later in the season, nestlings are banded and productivity is compared between treated and untreated nests.

Proposed practices
Practices are expected to remain the same throughout the 2024 breeding season.

11. Relevant integrated pest management experience within the sub-project area, country or region.

The Peregrine Fund has been working directly to conserve Ridgway's hawks in the Dominican Republic since 2008. Biologists began developing a protocol to reduce mortalities caused by *Philornis* in 2011 and made significant improvements to it in 2013 in collaboration with ZOODOM, the Dominican Republic National Zoo, to ensure treatments were safe.

Throughout the subsequent decade, we conducted experiments not only to assess the effectiveness of our pest management strategies, but also to compare alternative insecticides. In 2015, with the guidance of Dr. Martin Quiroga, an expert in parasitic nest flies, we developed a simple and highly effective protocol that uses Permacap (permethrin) to treat nests. We have been using this protocol exclusively since 2018.

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

As outlined above, our current protocols for management of *Philornis* have been extensively assessed and monitored, but most importantly, they have been successful at reducing nest parasitism and vastly improving productivity in Ridgway's Hawks. Despite this success, it is always prudent to collectively review protocols, highlight experience and lessons learned, identify current threats and needs, and develop a rigorous positive feedback loop system of training and review. All project employees involved in insecticide application will receive the necessary training and appropriate PPE to conduct their work safely.

Pesticide Selection and Use:

13. Description of present, proposed and/or envisaged pesticide use and assessment of whether such use is in line with international good practice.

Permacap (permethrin) will be the only insecticide used to treat Ridgway's Hawk's nests at a concentration of 1.0%. No personnel will be permitted to handle and spray permethrin until they have been trained to do so. At no time will it be accessible to the general public.

According to a review of chemical control methods against *Philornis* by the Charles Darwin Foundation (2014), permethrin, as used in our protocols, is recommended for use against nest parasitism. Permethrin is one of the most commonly used insecticides in bird nests, shown to successfully reduce *Philornis spp.* while posing low risk to avian species when used in low doses (Causton and Lincango. 2021).

Part of our holistic conservation strategy is to continue to treat nests, while actively learning more about the life history of parasitic nest-flies, so that we can actively seek broad scale solutions to this problem.

14. Indication of the type and quantity of pesticides to be financed by the CEPF grant (in volume and dollar value) and/or assessment of increase in pesticide use resulting from the sub-project.

We will not use CEPF funding to purchase Permacap or any other pesticides.

15. Chemical, trade and common names of pesticide(s) to be used.

Permethrin, $C_{21}H_{20}Cl_2O_3$, Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-, (3-phenoxyphenyl)methyl ester. Common synonyms and trade names: A13-29158, Ambush, BW-21-Z, Ectiban, FMC 33 297, NRDC 143, Outflank, Permethrina, Pounce, PP 557, S-3151, SBP-1513, Stockade, Talcord.

16. Form(s) in which pesticide(s) will be used (e.g., pellet, block, spray).

For this project, permethrin will be used as a microencapsulated spray under the trade name Permacap CS Controlled Release, which contains 23.0% permethrin.

17. Specific geographic description of where the pesticide(s) will be applied: province, district, municipality, landowners [do not give names of individual persons], and map coordinates (if available); and the total area (hectares) to which the pesticide(s) will be applied.

Permethrin will be used uniquely to spray the immediate nest area used by Ridgway's hawks within Los Haitises National Park, consisting of negligible geographic area coverage.

18. 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.

Permethrin is used worldwide primarily in agriculture to control insects. Permethrin is considered low risk to humans and other mammals and birds. It is relatively non-toxic for humans after a single ingestion, short-term skin contact, or short-term inhalation. In rats, the median lethal dose (LD50) for ingestion and dermal exposure to permethrin is over 5,000 mg/Kg, and the median lethal concentration (LC50) for inhalation is over 2.07 mg/L. No mortalities were observed in rats. https://www.cdms.net/ldat/mpASK004.pdf

This product is extremely toxic to aquatic organisms. In laboratory tests, the LD50 for fish is 0.012 mg/L and the half maximum effective concentration (EC50) for invertebrates is 0.000019 mg/L. However, this potentially high toxicity is rarely observed during field tests and in actual use.

Permethrin application will be carefully contained to the nest surface without overspraying, and no spraying will be conducted near water. Following exposure, if any permethrin leaks, it will often adsorb strongly to soil particles, therefore leaching and contamination of groundwater is not expected.

There is very little movement of permethrin in the environment because it binds to sediment and also because it degrades rapidly: in less than 24 hours from ponds and streams, in 7 days from sediment, and in 58 days from soil and foliage in forests. Similarly, it is rapidly metabolized if consumed, making its toxic effects temporary. Additionally, the degradation processes of permethrin in the environment often lead to less toxic products.

This product is not classified as a dangerous good under land transport regulation, but it is classified as a Hazard class 9 and must be labeled as an "Environmentally Hazardous Substance" for sea and air transport. The permethrin used for this sub-project will be acquired in the US and transported to the Dominican Republic by air, following the required transport regulations. This product will be stored in a cool, well ventilated location, locked up for safety, per manufacturer recommendations. A copy of the label and the safety data sheet will be available for reference. Any empty containers will be triple rinsed, in accordance with EPA recommendations, punctured to prevent reuse, and disposed of at an approved waste disposal facility.

The Permethrin Health and Safety Guide (No. 33), published by the United Nations Environment Programme, the International Labour Organisation, and the World Health Organization, concludes that this product is "unlikely to present a hazard" both to the general population and to those occupationally exposed, and that "it is unlikely that permethrin or its degradation products will reach levels of environmental significance when used as recommended." https://www.inchem.org/documents/hsg/hsg/hsg033.htm#SectionNumber:3.2

19. Description of plans and results for tracking of damage to natural ecosystems and/or harm to nontarget species prior to pesticide application and subsequent to pesticide application.

Not even one non-target death of a bird, reptile, or any other native animals has been observed in any previous nest treatments using the same or similar methods. That is in spite of intensive monitoring on the ground, which we expect to continue to be a feature of the CEPF project.

All nests, whether treated or not, will be monitored regularly throughout the breeding season, both prior to and subsequent to permethrin application. Nestlings will be assessed in-hand for any signs of illness prior to fledging. In over a decade monitoring Ridgway's Hawks in the Dominican Republic, we have never observed differences in adult survival or breeding behavior between nestlings from treated and untreated nests. On the contrary, nestlings are vastly more likely to perish from *Philornis* parasitism, than from being exposed to permethrin.

Although no suspicious deaths have been recorded to date, we will continue monitoring the Ridgway's hawk population. If any animal is suspected to be suffering from permethrin, the Environmental Education and Field Program Director will be notified immediately, and the project team will halt spraying operations until a suitable mitigation measure has been identified.

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

All persons handling permethrin and spraying nests will receive appropriate safety training and wear the recommended personal protective equipment (PPE), including eye and face protection, long-sleeved shirts, long pants, shoes, and socks. All PPE will be removed immediately after handling this product and washed separately from other laundry. Handlers will change into clean clothing as soon as possible. No personnel will be permitted to handle and spray permethrin until they have been trained to do so. At no time will it be accessible to the general public.

All facilities used to store permethrin will be locked, and access to keys will be restricted to only a few individuals directly involved in this project. The storerooms do not need to be refrigerated, but the product should not be exposed to unduly high temperatures, as it is combustible.

21. Basis of selection of pesticide(s) authorized for procurement under the sub-project, taking into consideration the World Bank Group's Environmental, Health, and Safety Guidelines and the World Health Organization's Recommended Classification of Pesticides by Hazard9 , the risks identified under Section 19, and the availability of newer and less hazardous products and techniques (e.g. biopesticides, traps).

Permethrin was selected for this project primarily due to its relatively low toxicity towards humans, other mammals, and birds, and its success at reducing nest parasitism by *Philornis spp.*. Additionally, this product has been widely used for this purpose, including in the Caribbean. Permacap, in particular, was selected because of its slow release microcapsules lasting up to 60 days, resulting in a reduced number of applications, therefore minimizing the risks associated with this product.

22. Name and address of source of selected pesticides [do not give names of individual persons].

Badische Anilin und Sodafabrik (BASF) (Mfg. Number: 59011986)
BASF Agricultural Products Group
14385 West Port Arthur Road, TX 77705 Beaumont, USA

23. Name and address of vendor of selected pesticides [do not give names of individual persons].

DoMyOwn
725 Old Norcross Rd., Suite A
Lawrenceville, GA 30046
USA

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

Fondo Peregrino - DR Field House, Los Limones, Hato Mayor, Dominican Republic

Policy and regulatory framework, and institutional capacity:

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

Permethrin is practically non-toxic to animals and plants when used in small concentrations and following recommendations for use. This project complies with all existing legislation that refers to animal protections and treatment of animals in the Dominican Republic:

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- The Animal Protection Act (Law No. 248-12) adopted in 2012 prohibits exposing animals to poison without taking reasonable precautions, however their definition of animal does not include insects.
- The General Law of Environment and Natural Resources (No. 64-00; GENRL), enacted in 2000, establishes the basic principles of environmental protection, management and use of natural resources, and the civil and criminal liabilities and penalties. It does not specifically mention insects as a protected category. No protected species will be harmed by this project.

Additionally, all field work by The Peregrine Fund in the Dominican Republic is conducted in compliance with the *Guidelines for the Use of Wild Birds in Research* and with permission granted by the Ministry of the Environment and Natural Resources of the Dominican Republic.

26. Description and assessment of national capacity to develop and implement ecologically based invasive alien species control.

No invasive alien species control will be conducted under this project.

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

This project complies with all existing legislation in the Dominican Republic that refers to toxins:

- Pesticides Law (1968): Provides for the regulation of import, manufacture, sale, storage, and use of pesticides.

- Decree No. 217-91: Pesticides banned.
- Rule No 322-88: Use and Control of Pesticides.

No regulations have been issued that apply to permethrin.

28. Proposed sub-project activities to train personnel and strengthen capacity [list # of people and what they are being trained in].

Activity 2.1.1: Meet with 4 local field leads and 12 local technicians and team supervisors (the field team working in Los Haitises, (89%men, 11%women) to review safeguards before the onset of Ridgway's Hawk's breeding season. Train any new employees. (January 2024)

At least 16 local Dominican conservationists will be trained in monitoring and management of Ridgway's Hawks, including safe handling, use, storage, and disposal of permethrin in association with nest treatment activities.

29. Confirmation that the appropriate authorities were approached and that the appropriate licenses and permissions were obtained by the sub-project.

All our work is carried out under a research permit provided by the Ministry of the Environment and Natural Resources. Each year, we provide a written report summarizing our work, accomplishments, any setbacks, and future plans for the project.

Consultation:

30. Dates, and results of expert consultations, if necessary.

In 2013 we consulted with ZOODOM, the Dominican Republic National Zoo, on the topical application of fipronil for nestling hawks. They recommended treating nestlings topically with 14 mg/kg fipronil per week for the first three visits, and on alternating weeks thereafter. We also used 5cc of fipronil (0.25% solution) to spray nests weekly. Results from the 2015 and 2016 breeding seasons revealed that treated nestlings contained 89% fewer parasites than untreated nestlings.

In 2015 we consulted with Dr. Martin Quiroga, an expert in parasitic nest flies, to develop a simple and highly effective protocol that uses Permacap (permethrin) to treat nests. Permacap is a slow release insecticide with a longer active period than Fipronil, allowing us to reduce spray applications to one per nest, and topical applications on nestlings were no longer needed.

31. Dates, and results of consultations with local communities.

We have not conducted consultations with local communities about pesticide use for this project.

Monitoring and evaluation:

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

The most important monitoring activity for this project is to regularly check nesting locations for

signs of hawk productivity, as well as any unexpected effects on target and non-target species. This will be conducted under Activity 2.1.2: Weekly nest checks for the entire known Ridgway's Hawk population in Los Haitises National Park conducted by 16 Dominican field workers and overseen by project supervisors (89% men / 11% women). (January – June 2024)

Permacap (permethrin) will be purchased once prior to the 2024 breeding season. The Program Director and Field Leads will monitor the appropriate storage and application of the chemical, and any spills or misuse will be reported immediately. Ridgway's hawks nests, including parents and young, will be monitored regularly and any suspicious behavior will be investigated.

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

Monitoring of the pesticide's use is primarily the responsibility of the Program Director. Field Leads will monitor the implementation of the Pest Management Plan on the ground and report any issues to the Program Director. Most of the field technicians hired for this project have already been fully trained in the safe use and handling of permethrin. Any inexperienced technician will receive the appropriate training prior to project implementation and be supervised by a Field Lead.

Monitoring costs are integrated into the operational costs of the project. Wherever possible, monitoring and supervision are combined with other project activities, to minimize costs. (For example, visits will combine routine supervision with providing training and working on other project activities, and field personnel will monitor hawk nests and wildlife on the islands during the same field trips).

34. Disclosure: CEPF requires that environmental and social instruments are disclosed to affected local communities and other stakeholders prior to sub-project implementation. Please describe the efforts you have taken to disclose this plan

This Pest Management Plan will be disclosed to local communities and other stakeholders at field trainings and workshops conducted in 2023, prior to implementation of the plan during the 2024 breeding season. Information will be provided in Spanish, English, and Haitian Creole.