

Suppression of Non-native Mosquito Populations to Address the Impacts of Avian Malaria on Threatened and Endangered Forest Birds on Maui

Public Scoping Comment Summary Report

February 17, 2022

Introduction

Mosquitoes are not native to the Hawaiian islands, and transmit diseases that threaten native wildlife and human health. The Southern house mosquito (*Culex quinquefasciatus*) is the primary carrier of avian malaria, a disease that is decimating Hawaiian forest bird populations. A single bite from a mosquito infected with the parasite that causes avian malaria can lead to rapid death of a native forest bird within just nine days. Ninety-five of 142 endemic Hawaiian bird species have become extinct; 15 of Hawai'i's native forest bird species are listed under the Endangered Species Act. Many of Hawai'i's native birds, including those on Maui, are federally listed as endangered or threatened because they have high endemism, evolved without continental threats, and lack defenses against invasive organisms, parasites, and diseases. Until recently, elevations above 5,000 feet on East Maui served as a relatively disease-free forest refuge for native forest bird species because avian malaria and mosquitoes were limited by the lower temperatures found at higher elevations. However, changing climatic conditions including increasing temperatures and altered rainfall patterns are allowing mosquitoes to disperse into higher elevations, further spreading avian malaria and compounding the threats to native forest birds.

Purpose and Need

The purpose of the proposed project is to substantially suppress or eliminate non-native mosquitoes and thus avian malaria in threatened and endangered forest bird populations on East Maui, thereby reducing extinction risks and contributing to the recovery of these species. Immediate or timely management action needs to be taken to prevent the extinction of listed forest birds on East Maui. Mosquito populations and thus avian malaria have recently expanded into higher elevation habitat (the last refugia for these species) which is contributing to these endangered species' rapid decline and inability to recover.

Proposed Action

The proposed action consists of releasing incompatible *Wolbachia*-carrying male Southern house mosquitoes within an approximately 262-square-kilometer (64,660-acre) project area on East Maui, Hawai'i. This approach is based on the safe and effective insect incompatibility technique which uses a naturally occurring bacteria called *Wolbachia* that is often present in the eggs and sperm of many insect species, including the Southern house mosquito.

The proposed insect incompatibility technique is supported by a growing body of evidence that suggests it is one of the only potential methods to reduce or eliminate mosquitoes and thereby suppress avian malaria infection and thus prevent the ongoing decline of native Hawaiian forest bird communities. If a male carrying an incompatible strain of *Wolbachia* and a wild female mate, then the fertilized eggs will not hatch. This essentially renders the incompatible *Wolbachia*-carrying male mosquitoes incapable of producing viable offspring after mating with wild females. If sufficient numbers of incompatible males are released in an area to outnumber the wild males, this method can result in landscape-scale population suppression of mosquitoes.

Three methods of release would be used depending on available technology and other factors:

- 1) helicopter-assisted pedestrian release
- 2) helicopter long line aerial release
- 3) helicopter-assisted drone aerial release

The proposed action is designed to include efforts that would be implemented quickly and then sustained over time. Release actions and frequency would be based on mosquito population monitoring, until significant suppression of mosquitoes has been achieved. Implementation would be overseen by the Park on federal lands and the State of Hawai'i on State and private conservation lands that are managed independently or by The Nature Conservancy. The proposed approach is based on specific considerations including Park and State of Hawai'i statutory missions and responsibilities; environmental factors; existing travel infrastructure; and input from agency personnel, technical experts, and the public.

Key Notes about the Proposed Action

1. Male mosquitoes do not bite humans. For this project, only males with an incompatible strain of *Wolbachia* would be released.
2. *Wolbachia* are not transmitted to other species (including humans) bitten by females.
3. Southern house mosquitoes are not native to East Maui and they are not a significant dietary source for bats, birds, or other insects.

The Planning Process

This public scoping period represented the first opportunity for the public to be involved in the planning process. During this 45-day scoping period beginning December 6, 2021, through January 20, 2022, the project planning team received comments on the proposed action, alternatives, affected resources, project area, etc. Information gathered during public scoping will assist the Park and State during preparation of an EA to comply with NEPA and the Hawaii Environmental Policy Act, tentatively planned for publication during the summer of 2022.

Public Scoping Process

During the public scoping process, NPS invited the public to attend two virtual meetings on December 14, 2021, and January 6, 2022, to learn more about the project and ask Park and State representatives questions. In total, 51 people attended the public meetings, including 34 on December 14, 2021, and 17 on January 6, 2022. The content was the same for both meetings and included a Power Point presentation followed by a "Question and Answer" session. The public was also invited to view additional information on the NEPA process, public meetings, and how to provide comments please visit the project website at: <https://parkplanning.nps.gov/HALE-mosquito>. Video recordings of the public scoping meetings were posted on the project's PEPC website.

Public notices of the comment period and meetings were distributed through the following sources:

- A news release posted on the park website
- A project newsletter posted to the NPS's Planning, Environment and Public Comment (PEPC) website: <https://parkplanning.nps.gov/HALE-mosquito>
- A news release sent electronically (via email) to various stakeholders, agencies, and media groups
- A news release posted on the park's social media accounts (Facebook and Instagram) and postings to the Hawai'i DLNR newsfeed, as well as the Oahu and Kauai DOFAW Facebook pages.

In December 2021, NPS sent initial letters establishing the Area of Potential Effect (APE) and identifying historic properties to consulting parties. No substantial comments were received by consulting parties.

Public Comments

Correspondences

The NPS received 72 correspondences during the 45-day scoping period. All 72 were submitted through the NPS PEPC website. Most correspondences were from residents of Hawai'i.

The following non-governmental organizations or businesses submitted correspondences during the review period:

- American Bird Conservancy (ABC)
- The Nature Conservancy (TNC)
- National Parks Conservation Association (NPCA)

Comments Overview

During the review period, 72 comment correspondences were submitted to the NPS. Comments were evaluated in each correspondence and coded into categories. From the 72 correspondences, 36 substantive comments were coded based on categories determined by the project planning team (see Table 1 below for the list of codes and descriptions).

The project planning team was pleased to receive feedback from the public who took the time to engage in the process and to provide meaningful comments on this project. These public comments will help inform the EA project planning process. General comment themes are provided in the sections below.

Wildlife and Habitat

Members of the public were generally in support of this project. Many encouraged the Park and State to implement this project as soon as possible to suppress mosquito populations on Maui and to help prevent extinction of Maui's threatened and endangered forest birds.

Health and Human Safety

Members of the public recognize that there is an inherent risk associated with helicopter use and other implementation strategies that may be necessary for this project. They also understand that by suppressing mosquitoes on Maui, health and safety benefits can be promoted through the decreased risk of human disease transmission through mosquitoes.

Ethnographic Resources

Members of the public had questions about whether a Cultural Impact Assessment was being conducted and/or wanted to ensure that these resources were evaluated during the project planning process and local cultural groups were consulted because there could be ethnographic issues to consider in regard to implementation and monitoring.

Alternatives

Members of the public had questions about the proposed action or suggested ideas to consider regarding implementation of the proposed action or potential alternatives. These ideas included captive breeding programs, resettlement programs, gene drive, and sterilization of female mosquitoes. However, there was broad support for the proposed mosquito suppression technique because it is the most readily available technique that makes mosquito suppression a near-term possibility.

Funding

Some members of the public expressed concern regarding the costs versus benefits of this project. Others had questions about funding sources and/or permanence of funding for this project to ensure success is achievable.

Other Issues and Concerns

Members of the public also provided a range of general comments about alternatives and potential impacts. These topics included questions or ideas regarding the proposed mosquito suppression techniques and general impacts associated with the project. Many of the general comments also overlapped with the topic themes previously discussed.

Comment Categories

Table 1 includes the list of comment codes, descriptions, and number of comments received for each code. Concern statements were drafted based on the codes and descriptions provided in Table 1. There were a total of 36 substantive coded comments. Additionally, 65 other miscellaneous non-substantive comments were submitted. Of these, 64 of the comments were simply expressing support for the project and one was neutral.

Table 1. Mosquito Suppression Public Scoping Comment Codes

Code	Description	Quantity of Comments
AE1	Affected Environment - Wildlife and Habitat	1
A1	Alternatives - General Comments	10
A2	Alternatives - Range of Alternatives	2
A3	Alternatives - New Alternatives or Alternative Elements	2
A4	Alternatives - Project Area	1
A5	Alternatives - Considered but Dismissed	1
I1	Impacts to Wildlife and Habitat	6
I2	Impacts to Wilderness	1
I3	Impacts to Health and Safety	6
I4	Impacts to Ethnographic Resources	3
I5	Impacts - General Comments	1
PF1	Project Funding	2
Total	Substantive	36
NS	Miscellaneous Topics: non-substantive	1
NS	Miscellaneous Topics: Supportive (non-substantive)	64
Total	Non-substantive	65
Total	Substantive and Non-Substantive Combined	101

Concern Statements

Concern statements were developed for each category of comment to summarize the basic intent or content of public comments.

Affected Environment - Wildlife and Habitat

Concern Statement: (Code: **AE1**) A question was raised about other mosquito borne ailments affecting T&E forest birds on Maui.

Alternatives - General Comments

Concern Statement: (Code: **A1**) Many comments urged the Park to “act quickly” to approve the proposed action because of the dire situation facing threatened and endangered forest birds on Maui.

Concern Statement: (Code: **A1**) One commenter provided a range of questions regarding mosquito ecology, the use of *Wolbachia*, and effectiveness of the proposed methodologies.

Concern Statement: (Code: **A1**) One commenter suggested that this project would likely be a short-term solution due to the “maintenance” associated with the proposed methodologies.

Concern Statement: (Code: **A1**) One commenter suggested that based on fruit fly studies, laboratory-reared (lab) male mosquitoes might not be sexually selected by wild female mosquitoes because lab males may be ecologically and behaviorally less adapted than wild male mosquitoes.

Concern Statement: (Code: **A1**) A comment was provided with a variety of questions regarding project implementation and methodology.

Alternatives - Range of Alternatives

Concern Statement: (Code: **A2**) Commenters urged the Park Service to consider a range of alternatives.

Alternatives - New Alternatives or Alternative Elements

Concern Statement: (Code: **A3**) Commenters urged the Park Service to consider new alternatives or additional alternative elements.

Alternatives - Project Area

Concern Statement: (Code: **A4**) Concerns were raised regarding the project area only including a portion of Maui and not the remainder of Hawai'i.

Alternatives - Considered but Dismissed

Concern Statement: (Code: **A5**) A commenter urged the Park to evaluate and thoroughly explain each alternative that was considered and dismissed as part of the NEPA project planning process.

Impacts to Wildlife and Habitat

Concern Statement: (Code: **I1**) Commenters provided questions or comments regarding potential impacts (both beneficial and adverse) to wildlife and habitat from implementation of the project.

Impacts to Wilderness

Concern Statement: (Code: **I2**) One commenter asked about the legal constraints of working in a wilderness.

Impacts to Health and Safety

Concern Statement: (Code: **I3**) Commenters raised questions or comments regarding potential impacts (both beneficial and adverse) to health and safety concerns associated with implementation of the project.

Impacts to Ethnographic Resources

Concern Statement: (Code: **I4**) Commenters wanted assurance that potential impacts to ethnographic resources would be analyzed during the NEPA process.

Impacts - General Comments

Concern Statement: (Code: **I5**) General comments were provided and questions were raised about the impacts associated with the project.

Project Funding

Concern Statement: (Code: **PF1**) Comments and questions were raised about costs, benefits, and funding of the project.