

**FINDING OF NO SIGNIFICANT IMPACT**

**MOSQUITO MANAGEMENT PLAN**

**LOWER FLORIDA KEYS NATIONAL WILDLIFE REFUGES**

**National Key Deer Refuge**  
**Key West National Wildlife Refuge**  
**Great White Heron National Wildlife Refuge**  
*Monroe County, Florida*

**U.S. Department of the Interior**  
**Fish and Wildlife Service**  
*Southeast Region*  
**Atlanta, Georgia**



# U.S. Fish and Wildlife Service

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## **FINDING OF NO SIGNIFICANT IMPACT** **Mosquito Management Plan** **Lower Keys National Wildlife Refuge Complex** **May 2014**

### **Background**

The U.S. Fish and Wildlife Service (Service) proposes to update, develop and implement a Mosquito Management Plan (plan) for the Lower Keys National Wildlife Refuge Complex (Refuge). The plan addresses mosquito management operations for the entire Refuge and encompasses a five year program period of those operations. The Refuge proposes to implement a mosquito management plan that consists of a phased approach to mosquito management and is consistent with the principles of integrated pest management. The plan includes ongoing coordination with the Florida Keys Mosquito Control District (District) and incorporates the draft policy issued by the U.S. Fish and Wildlife Service for mosquito-borne disease management pursuant to the NWRS (Federal Register, Vol.72, No. 198, 10/15/07) and also incorporates compliance with the Service policies described in the Environmental Assessment (Section 1.5). The policies provide a standard process for Refuges to follow and criteria to consider when making decisions regarding management of mosquitoes and mosquito-borne disease. Mosquito control management plans and documentation of management actions on refuges are necessary to protect both threatened and endangered plants, fish, and wildlife and to ensure the health and safety of surrounding human populations. Thus, this action develops a long-term Mosquito Management Plan consistent with Service regulation and policies that will reduce or eliminate impacts of the mosquito adulticides and mosquito control activities to non-target species on and adjacent to refuge lands, while still helping to ensure public health and safety concerns are addressed.

### **Alternatives Evaluated**

FWS analyzed a number of alternatives to the proposal in the Environmental Assessment (EA) including: Alternative A is the No Action Alternative, representing *status quo* mosquito control operations; Alternative B is the Proposed Alternative – Phased Mosquito Management Plan Alternative; Alternative C is a larvicide only Alternative; and Alternative D is a no treatment alternative.

Alternative A, No Action Alternative (*status quo* mosquito control operations) - The No Action alternative was presented as a requirement of the National Environmental Policy Act (NEPA), and is the baseline condition with which proposed activities are compared. This alternative represents a continuation of current management actions as last conducted in 2012; it does not mean an absence of active management of mosquitos. Under the no-action alternative, mosquito control and management would consist of Larvicide distribution in aquatic larval development areas, truck based fogging of pyrethroids, and aerial applications of naled products. Treatments would occur when the District deemed appropriate under certain environmental constraints such as wind and other constraints such as "no spray" zones determined by the Refuge and regulated

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by an annual Special Use Permit. Under alternative A, 2,956 acres of habitat and 28.7 miles of road adjacent to the Refuge would be considered "no spray" in order to protect sensitive species and habitats.

Alternative B. Implement Phased Mosquito Management Plan Alternative - (Preferred Alternative) - Under Alternative B, an integrated approach would balance the missions of both the District and the Service by allowing for a level of flexibility in mosquito control operations with site specific requirements based on natural resources concerns and environmental conditions. No spray zones designated under Alternative A would be expanded to include proposed critical habitat for the Bartram's hairstreak and Florida leafwing butterflies. In addition, no spray zones would include buffer zones to account for expected distances of pesticide drift from treatments to adjacent private properties. Mosquito control operations would only occur if designated thresholds are met or if there is a real threat of, or actual human health or safety risks to the community associated with mosquitoes at the Refuge.

Alternative C. Larvicide Application Only Alternative -- This alternative would only utilize larvicidal treatments to manage mosquito populations except under emergency human health conditions. During public health emergency conditions, no restrictions would be made on treatment type or specific restrictions to treatment locations assuming the emergency was declared by a public health agency or their designated representative and mosquitoes at the Refuge were considered a vector of human disease/threat. However, activities would be subject to emergency consultation with the Service for endangered species issues.

Alternative D. No Mosquito Control Alternative - No actions would be undertaken to manage mosquito populations except under emergency conditions. During public health emergency conditions, no restrictions would be made on type of treatment used or specific restriction on treatment locations assuming the emergency was declared by a public health agency or their designated representative and mosquitoes at the Refuge were considered a vector of human disease/threat. However, activities would be subject to emergency consultation with the Service for endangered species issues.

Alternatives were evaluated based on impacts to natural resources; aesthetic resources and visitor experience; public use and surroundings; and health and safety. The preferred alternative (Alternative B) was selected based on its balance of impacts indicating less overall negative impacts associated with natural resources than Alternative A (*status quo*), while still providing for overall greater beneficial impacts to visitor experience, public use, public health and safety. Alternative A may provide additional beneficial impacts associated with these latter impact topics but was found to result in greater negative impacts to natural resources. Alternative C (larvicide only) was found to be the environmentally preferred alternative given the lesser use of chemical treatments and its commensurate protections to natural resources, while still providing some protection to visitors and the surrounding community. Alternative D was considered to be protective of natural resources but provided only minor protections to the aesthetics, comfort, or health and safety of the community and the visiting public.

*Environmentally Preferable Alternative:* Alternative C (larvicide only) was selected in the Environmental Assessment as the environmentally preferred alternative given the lesser use of

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chemical treatments and its commensurate protections to natural resources, while still providing some protection to visitors and the surrounding community. After additional consideration, the value of Alternative C as the Environmentally Preferred Alternative is diminished by the acknowledgement that adulticide activity could be conducted on private lands adjacent to the Refuge without benefit of the buffers and no-spray zones as proposed in Alternative B. Thus, it is the determination of the Refuge that Alternative C may not represent a condition that is Environmentally Preferred. Alternative B represents a condition that would define sensitive areas, and institute safeguards, and thus may be more protective overall of resource and the human environment.

### **Rationale for the Selection of the Proposed Alternative**

The proposal was developed to meet the purpose and need, using guidance from several pertinent information sources. These include relevant scientific literature, the Service's 2007 Draft Mosquito and Mosquito-Borne Disease Management Policy and the Service integrated pest management (IPM) policy. A significant amount of information was provided by the District and included mosquito ecology, history of mosquito populations and their management on the Refuge, cultural tolerances for mosquitoes, past and current historical human health threats, monitoring techniques, treatment thresholds and disease surveillance. Substantial information was obtained on sensitive species life history information from the South Florida Ecological Services Office of the USFWS in the development of the alternatives.

The proposal is to implement a mosquito management plan that would allow the Refuge to respond to public health issues due to mosquitoes on the Refuge as identified by a current monitoring data by a public health agency or their designated authorized representative. The mosquito management plan would consist of a phased approach to mosquito management and is consistent with the principles of integrated pest management. The proposal emphasizes design, and management of Refuge lands in a manner beneficial to wildlife consistent with the mission of the Refuge and so as to minimize mosquito production and specifically the public health threat due to Refuge mosquitoes. Monitoring and surveillance will be the first front to identify mosquito source areas and status. This approach is different than used historically and the phasing and the use of multiple tools in mosquito control represents a different way of managing mosquitoes and is more responsive to the changing environmental conditions that occur in the Florida Keys.

District activities will focus on identifying changes in hydrology, weather and vegetation that form mosquito habitat and develop improvements in monitoring and use advances in pesticide methods to reduce the potential for exposure to non-target species. The methods employed should minimize chemical control measures and to decrease mosquito production, seeking the least invasive approach given the current environmental conditions. This proposal is consistent with an IPM approach. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks. When practical, the approach may include compatible actions that reduce mosquito production and do not involve pesticides. We consider the procedures described within the proposal as long-term practices to reduce persistent potential mosquito-associated health threats that Federal, State, and/or local public health authorities have identified while still

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recognizing the ecological importance of these native species. The proposal uses some level of health based concerns in consideration of which control tool to use, and is different than that which past practice would dictate. While it is not possible to link the magnitude of mosquito activity to disease occurrence the local health department has made it clear that mosquito control is a key component to disease reduction in the Keys.

The emphasis of this selected alternative is to minimize chemical control measures and protect non-target resources, through monitoring, surveillance and the potential application of pesticides. Application of pesticides would be approved based on the phased (threshold based) approach as outlined in the EA. Human and wildlife treatment threshold levels (e.g., numbers per sample) are determined by considering several factors unique to an area. These factors, in conjunction with sheer abundance of biting mosquitoes, including allergic response, potential magnification of disease in mosquito and host populations, and potential passage of disease even if mosquitoes have not yet been determined to contain a pathogen are considered. The principle goal of a phased approach to mosquito management is to minimize effects on refuge resources to fulfill the Refuge mission, while addressing legitimate human health concerns and complying with Service regulations and policy. The implementation of a phased-response program represents a standardized approach that would result in a consistent mosquito management program that adheres to Service and District guidelines. Because occurrences of human health issues resulting from mosquitoes are sporadic, phases of mosquito management implemented on the Refuge would vary through time. The other alternatives evaluated did not include this consideration.

The Refuge and the District would work jointly in the implementation of a mosquito management program. The District would have the lead for monitoring, disease surveillance, and pesticide applications; however, the evaluation of monitoring data and approval for the management actions proposed would be the responsibility of the Refuge. While this would require additional staff time, it is necessary to ensure that the conditions for compatibility are met and the program is implemented so as to avoid or minimize effects on Refuge resources. This partnership allows both agencies to best understand how to minimize impacts to resources while still being responsive to human health concerns in the community.

### **Effects of Implementation of the Proposal**

The Environmental Assessment provides more detail on the environmental consequences of the selected alternative. Each topic area evaluated in the EA is summarized below:

*Natural Resources:* Direct and indirect impacts to resources associated with pesticide use would be similar to that observed under the *status quo* condition. However, the impacts would be reduced because adulticide use would be decreased based on quantitative need for pesticide use and implementation of buffer zones and no-spray zones. These controls would be adjusted based on research to mitigate risk, and would minimize or eliminate spray into the Refuge thus vastly reducing impacts to resources. The selected alternative B would have short-term and long-term moderate benefits to natural resources compared to the baseline of *status quo* because of the reductions in adulticide use and due to the buffer areas. This benefit would impact multiple species, and have secondary beneficial impacts to additional species based on a reduction in adulticide use in the area by using a threshold based performance criteria and conducting habitat

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restoration activities. The proposal would likely have negligible to minor cumulative beneficial impacts to multiple resources, such as invertebrates whose populations may be reduced directly by mosquito control of the past. While these species would not benefit from the accompanying ongoing restoration actions in the Refuge they still would likely show improvement. No other actions in the area have been identified that would result in any additional cumulative impacts to this proposal.

*Aesthetic resources and visitor experience:* The bulk of mosquito control activities would be conducted during periods of lower visitation (majority in summer) or in areas of restricted public access (backcountry) and managed to create little visual impact or change when visiting the Refuge in the short-term. Visitor experience would benefit from the short-term and long-term mosquito control and increased efficacy. Visitor access to the Refuge would not be curtailed during any control operation; consequently there would be no direct adverse impacts to visitors. Indirect adverse effects would include the sound of fogging trucks or aircraft associated with pesticide application for very short periods of time in a limited area. This alternative would have slightly less fogging truck activity in neighborhoods and within the refuge because of the application of buffer zones around critical and occupied habitat compared to the *status quo* situation. Option 1 and 2 would slightly differ in that zonation but both would be considered minor localized and short-term in nature. Therefore, the adverse direct impacts of this proposal on visitor experiences would be short-term, localized, and minor. Longer-term indirect impacts would include a reduced potential for large mosquito hatches due to preventative larvicide and adulticide applications and subsequent reduced potential for substantive impacts to access to trails and other outdoor areas; these indirect impacts would be minor and beneficial. In the long-term visitor experiences and aesthetic resources may increase if natural resources benefit from this proposal, as predicted. Alternatively, the percentage of visitors that seek rare butterfly or plant encounters or value their inherent aesthetic value could benefit in their experience if populations increase. Cumulative impacts to aesthetic resources and visitor experience may represent a negligible to minor benefit overtime as mosquito populations will be managed under alternative B along with other restoration projects and the likelihood sightings of rare species may incrementally increase.

*Public Use and Surrounding Community:* The selected alternative B would have negligible short-term adverse impacts since there would be limited disruption of surrounding community area given the approach is similar to the *status quo* and would allow the adaptive ability to treat mosquitos when needed. There would be consistency in approach as the decision to apply adulticides would be based on a more localized and individual neighborhood area needs dependent on field conditions. Under this proposal, it is expected that there would still be only occasional, temporary surge of mosquito activity based on environmental conditions in the area but adulticide application may be used when elevated mosquito populations are detected and pose an actual health threat. Larvicide operations would largely take place in unpopulated areas (backcountry) but some developed areas will experience short-term moderate adverse effects associated with the noise of low flying aircraft. Similarly, short-term minor adverse impacts would be noted in association with truck fogging operations with adulticides while short-term moderate adverse effects would be noted with aerial application of adulticides. Few short-term adverse or positive impacts would be impacted for public use of the Refuge or the surrounding community. Long-term impacts would be largely driven by a reduction in mosquito populations

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overtime because of enhanced efficiencies and a wide variety of operational tools to reduce mosquito populations. However, these improvements may go unnoticed by a large segment of the surrounding community for a majority of the year. In addition, it is estimated that alternative B would reduce insecticide use by private landowners as the District would be providing a consistent service to customers. Preventing private use of pyrethroid products, which are widely available may prevent over use and benefit the surrounding community of the general public. These cumulative benefits are considered negligible beneficial.

*Health and Safety:* A short term minor to major beneficial impacts would be experienced along with negligible adverse impacts associated with the low probability of chemical exposure and major benefits associated with reduced disease spread from mosquito vectors. A greater relative benefit to health and safety may be experienced resulting from a potential for lowered probability for secondary infections or disease as a likely result of increased capability to control mosquitos. Chemical control is lessened than that that currently occurs and thus exposure to pesticide products is minimized. The difference in control of mosquitoes and impact on health and safety would minor to major beneficial considering the options that the District will improve methodology through monitoring and use of thresholds to trigger action under this proposal. Cumulative impacts with other proposed actions are likely to be negligible adverse in association with the potential for health and safety issues as a result from the exposure of the general public to other sources of potentially harmful chemicals. These might include chemicals used in pest control on private lands, noxious weed control chemicals and potentially smoke from prescribed fire operations. However, the probability of any one person receiving a harmful exposure to all actions is exceedingly rare, and therefore negligible. In addition, it is estimated that the proposal would curtail insecticide use by private landowners by the District continuing to provide the same level of service to customers. Preventing private use of adulticide products, which are widely available may prevent over use and benefit health and safety.

A complete evaluation and listing of the impacts can be found in the EA (page 104), but have been summarized below. Note: impacts are not necessarily additive.

Impact Topic	Selection Alternative (B)
<b>Natural Resources (Water, Vegetation and Wildlife)</b>	<p><b><u>Short-term:</u></b> no significant effect or no effect depending on level implemented and species</p> <p><b><u>Long-term:</u></b> no significant effect</p> <p><b><u>Cumulative:</u></b> no significant effect</p>
<b>Visitor Use and Aesthetics</b>	<p><b><u>Short-term:</u></b> no significant effect</p> <p><b><u>Long-term:</u></b> no significant effect</p> <p><b><u>Cumulative:</u></b> no significant effect</p>
<b>Public Use and Surrounding Community</b>	<p><b><u>Short-term:</u></b> no significant effect</p> <p><b><u>Long-term:</u></b> no significant effect</p> <p><b><u>Cumulative:</u></b> no significant effect</p>
<b>Health and Safety</b>	<p><b><u>Short-term:</u></b> no significant effect</p> <p><b><u>Long-term:</u></b> no significant effect</p> <p><b><u>Cumulative:</u></b> no significant effect</p>

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## Measures to Mitigate and/or Minimize Adverse Effects

Mitigation measures are available for potential impacts of the proposal even if those impacts are minor. Mitigation may be required under the special conditions of the SUP (special use permit) issued by the Refuge. The conditions of the permit may include mitigation measures if and when the environmental parameters exist to meet the conditions of a particular phase of the proposed action if implemented or as routine practice. Possible mitigation measures could be, but are not limited to, the following topics. The Refuge has the authority through the issuance, oversight and management of the special use permit to implement these mitigations and it is the District's responsibility to implement these permit requirements and comply with the intent of these requirements including the potential financial commitments.

- A. **Planting of host plant-** Host plant augmentation could mitigate impacts to critical habitat by creating habitat or enhancing habitat quality. Bartram's hairstreak and Florida leafwing butterflies are known to require the host plant *Croton linearis* to occupy an area (Salvato 1999). Bartram's scrub hairstreak butterflies that currently occupy Big Pine Key have been observed in areas greater than 1 hectare in size with an average density of croton plants of 0.1 plants/m<sup>2</sup> (USFWS unpublished data). To achieve this density of host plant, 1000 *Croton linearis* plants would be installed within a 1 hectare area. Monitoring and performance standards will be developed and included as a condition of the SUP. Any additional compliance (i.e., Section 106 of NHPA) that might be required to fulfill host plant augmentation mitigation would be addressed through the completion a detailed mitigation strategy.
- B. **Monitoring-** Monitoring will be considered to be a method to reduce or eliminate the amount of potential impacts to resources over time. Studies that lead to improvement of management techniques, maximize efficiencies (refine buffer areas), refine protocols, or more effectively detect effect of mosquito management techniques on the environment will be used in an adaptive method to reduce and/or eliminate impacts to resources. Topics such as, but not limited to, monitoring of pesticide drift, product application rate and concentration efficacy, and impacts to resources may be required as mitigation under the special conditions of the SUP. Performance standards for monitoring projects will be defined under the conditions of the SUP when implemented. See bullet #3 and #4 below for more details.
- C. **Habitat Improvement-** Habitat with the Refuge has changed drastically overtime leading to reductions in habitat for the Bartram's scrub hairstreak, Cape Sable thoroughwort, semaphore cactus, Florida leafwing, sand flax, wedge spurge, Big Pine partridge pea, and Blodgett's silver bush (USFWS 1998, USFWS 1999, USFWS 2013 (Fed. Reg. 79 FR 1551 1590 and 78 FR 49878 49901)). Mitigations which improve habitat would compensate for any potential impact by replacing or providing additional habitat which has been shown to benefit the aforementioned species. Habitat could be improved through exotic treatments, prescribed fire or mechanical treatments; the rare



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plant species listed above have been shown to benefit from and require disturbance to maintain sub-climax pine rockland (Carlson et al. 1993, Snyder 2005, Liu et al. 2005, Slapcinsky et al. 2010, Anderson et al. 2012). Monitoring and performance standards will be determined annually through the SUP process. The Refuge will complete consultations as appropriate under section 106 of NHPA when plans are confirmed and sites are selected.

In addition to the mitigations stipulated above (stipulated in the EA), the Refuge and the District must comply with the following terms and conditions resulting from the ESA Conference Opinion (see Attachment C), which further describes and outlines reporting and monitoring requirements. These terms and conditions are non-discretionary. Note: In the Plan, areas referred to as “occupied” represent locations where the Bartram’s hairstreak butterfly can be reliably found in the greatest numbers. The Bartram’s hairstreak may occur elsewhere on the Refuge and use habitat outside of the “occupied” areas. For this reason, the “occupied” areas will be referred to as core areas throughout the remainder of this section.

- 1) All proposed critical habitat within the Refuge shall be established as a no-spray zone with a 50-m no-spray buffer when mosquito landing rates are below 10 mosquitoes per minute. All proposed critical habitat is considered potential butterfly habitat, so no truck-based applications of pyrethroids shall be permitted within the 50-m buffer without meeting the appropriate landing rate threshold.
- 2) Pyrethroid residues have been measured over 225 m from truck routes (Pierce 2012). Therefore, no truck-based applications shall occur within 250 m of core areas occupied by the Bartram’s hairstreak at any time. If any new core areas for the Bartram’s hairstreak habitat are discovered or if the Florida leafwing is discovered on the Refuge, then truck-based mosquito control operations should immediately cease within 250 m of the identified areas.
- 3) A monitoring strategy for truck-based pyrethroid applications is to be developed and submitted to the South Florida Ecological Services Office (SFESO) for approval. The monitoring should serve to confirm the presence/absence of pyrethroid residues in the core areas and to examine drift distances into the proposed critical habitat. As core areas shift over time, it will be important to understand truck-based drift distances as buffers and no-spray zones need to be redrawn. The strategy should be developed during the 2014 mosquito control season and be ready for implementation in 2015.
- 4) A single aerial application of naled may be administered on the Refuge. Prior to such application, a comprehensive monitoring strategy must be developed and submitted to the SFESO for approval. The monitoring should serve to primarily ensure that drift into core areas is not occurring and to examine aerial drift distances in general. This information will be used in the development of appropriate buffer distances to be placed around core areas during aerial applications. A 400-m buffer is to be established around core areas during this initial aerial event. The results of the monitoring will be evaluated by the District, Refuge, and SFESO to determine if further monitoring is required to adequately

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designate buffer distances. No additional aerial applications shall be conducted until the results of the initial trial have been evaluated by the SFESO.

- 5) Truck-based and aerial applications shall not occur when sustained winds are forecasted to exceed 10 mph, or gusts exceeding 15 mph. Wind direction shall be such that drift is carried away from the no-spray zones and buffers.
- 6) Personnel conducting the barrier treatment shall be trained to field-identify pineland croton. Application of the barrier treatment shall not occur on or within 10 m of pineland croton.
- 7) Coordination between the District, Refuge, and SFESO will be necessary for determining accurate butterfly core area locations. A yearly evaluation of core areas shall be conducted prior to the issuance of a special use permit for the initiation of mosquito control activities and submitted to the SFESO. New core areas may be added at any time at the discretion of the Refuge and SFESO with added protections even if the Bartram's hairstreak or Florida leafwing are not present.
- 8) Reporting and disposition of dead or injured animals (salvage):
  - a. Upon locating a dead, injured, or sick federally listed species, initial notification must be made to the referenced project biologist and the nearest Service Law Enforcement Office (U.S. Fish and Wildlife Service; 1339 20<sup>th</sup> Street, Vero Beach, Florida; 772-562-3909). Secondary notification should be made to the FWC, South Region; 8535 Northlake Boulevard, West Palm Beach, Florida; 33412-3303; 561-625-5122; 1-888-404-3922.
  - b. Care shall be taken in handling sick or injured specimens to ensure effective treatment and care, or, in the handling of dead specimens, to preserve biological material in the best possible state for later analysis as to the cause of death. Dead specimens should be placed on ice and frozen as soon as possible. In conjunction with the care of sick or injured specimens or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.
  - c. Report all Bartram's hairstreak injuries or deaths, resulting from the proposed action to the referenced project biologist. This report shall contain the location (latitude and longitude), dates, times, prevailing environmental conditions, and the circumstances surrounding all sightings and the disposition of all animals found. A site map with observation locations shall also be included in this report. If no Bartram's hairstreak butterflies are encountered, a report shall be submitted indicating that fact.

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## Effects on Wetlands and Floodplains

Executive Orders 11988 ("Floodplain Management") and 11990 ("Protection of Wetlands") requires the Service and other agencies to evaluate the likely impacts of actions in floodplains and wetlands. Section 1 of Executive Order 11988 directs Federal agencies to "take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities."

The proposal is not expected to have any significant adverse effects on wetlands and floodplains, pursuant to Executive Orders 11990 and 11988. While floodplains and wetlands do play a role as mosquito habitat, the alternatives would not involve the filling or alterations of floodplain or wetland areas, and would not require the construction of any structures. Earthwork and construction activities that could adversely affect flood-prone areas are not part of the proposal. No significant effects are expected to impact natural resource values, and there will be no loss of floodplains or wetlands as a result of the proposal.

## Effects on the Human Environment

"Human environment" shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment (definition from CEQ - Regulations for Implementing NEPA, Sec. 1508.14). The following criteria was be used to further distinguish the potential effect to the human environment as a whole. These criteria reflect a summary of broad factors that can assess the human environment objectively and were derived from those used by the National Park Service in their documentation.

- *Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.*
  - The proposal will potentially result in minor to moderate short-term adverse impacts with a potential for minor to major adverse impacts to natural resources as discussed in the EA. However, the proposal provides added protections beyond those that than are currently in play for the protection of natural resources and provides for a phased implementation of the application of the pesticides (only used when at greatest need). The proposal also provides directly for protections to listed species. For example under a larvicide only scenario, buffers would not be in place to protect listed species and the District could potentially spray adulticides on private lands adjacent to the Refuge with no requirement to avoid sensitive habitats associated with drift. For this reason, the selected alternative (B) will provide greater safeguards to Refuge resources resulting in an agreement to avoid harm to listed species through direct application restrictions (i.e., buffers and no spray zones).

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- *Ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.*
  - The proposal provides the most balanced approach to ensure all Americans are healthful and productive by ensuring control of mosquitoes using an integrated pest management approach. The selected alternative will improve the aesthetics within the community by reducing adulticide loads to the environment and using the more ecologically efficient larvicide application for the bulk of control needs but still allow for some level of use of adulticide based on aesthetics needs (mosquito thresholds).
  
- *Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.*
  - The selected alternative will reduce the impact to the natural communities through reduction in adulticide application, while still providing for the health and safety of the community. This alternative is cognizant of health and safety issues and provides safe procedures in implementing mosquito management. Buffers and no-spray areas should assist in avoiding unintended negative consequences to non-target organisms in the Refuge.
  
- *Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.*
  - The proposal will not impact historic, cultural and natural aspects of our heritage. It will provide for protections to cultural and natural environments in a way that will enhance the Refuge visitor's understanding, use, appreciation, and enjoyment of these resources by allowing access and visitation and an understanding of the importance of maintaining the Refuge's diversity.
  
- *Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and*
  - The proposal will improve mosquito control using integrated pest management practices and thus increase opportunities for visitors and residents to enjoy the natural features in the Refuge.
  
- *Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.*
  - The proposal will not have any adverse impact on renewable resources or depletable resources. Mosquitos are a natural component of the ecosystem and adding options for addressing mosquito management only enhances the District's ability to be more efficient in mosquito management, thereby reducing waste of depletable resources (i.e., fossil fuel use in administering control options).

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The proposal is intended to minimize impacts to resources, while still being responsive to human health concerns in the community. The Refuge has determined that implementation of the selected alternative will not result in any significant effect on the human environment based on its analysis and the fact that it is consistent with Refuge and Service policies and procedures. This conclusion is based on a thorough analysis of the environmental impacts described in the EA; the professional judgment of the decision-maker; and consistency with our Comprehensive Conservation Plan (CCP). It has been determined that there will be no significant impact to Refuge resources or values based on the following considerations, the proposal is necessary to fulfill specific purposes identified in the CCP; and the proposal is compatible with the purposes and mission of the Refuge.

### **Public Involvement**

The Refuge coordinated closely with the District in the development of the EA. In April of 2013, the Refuge met with the District informing them the ongoing practice of issuing annual Special Use Permits without NEPA review was not appropriate given the long-term nature of the activity and that National Environmental Policy Act considerations would need to be included in future mosquito control planning. During the ensuing months, the Service's Ecological Services Office (South Florida Ecological Service Office, Vero Beach, FL) and the District have had an ongoing dialog on methods and measures to minimize harm to trust species and their habitats. In September and October of 2013, the Refuge met with members from the Florida Keys Mosquito Control Board to discuss the need to proceed with this planning process and subsequently received concurrence with this approach.

The Refuge has also had ongoing correspondence with the North American Butterfly Association, who has expressed concerns associated with mosquito control operations and their potential for impacts to sensitive and listed butterfly species.

Local representatives have also been contacted relative to this issue. Scoping meetings were held on December 9, 2013 (2:00 pm and 6:30 pm) at the Lower Keys Home Owners Association building on Big Pine Key and information was posted in local newspapers, as well as through other media including radio. Input from scoping was open from December 9, 2013 to January 9, 2014. No comments were received during the scoping period other than those provided during the December 9, 2013 meetings.

Scoping meetings generally focused on the communication of the methods and approaches used in mosquito control in the lower Keys. Comments were provided that suggested alternatives and also in suggesting additional study that should be done to assist in understanding more on the biology and impacts of adulticide on the sensitive species.

Alternatives proposed during scoping included the concept of evaluating larvicide use only (no adulticide). Comments included the development of an alternative or alternatives that evaluated efficiencies in reducing adulticide applications by altering spatial and temporal application rates, as well as evaluating whether concentrations used are appropriate for the target species of mosquito (to reduce non-target impacts). Discussions also resulted in some dialog on developing trigger points for mosquito adulticide application rationalizing that there are differing sensitivities with individuals requesting adulticide service in the area.

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Scoping comments indicated interest in refining the effectiveness of larvicide application so as reduce adulticide use and need. Increased understanding of adulticide application and drift impacts outside the target area was desired, as well as additional information on the effectiveness of adulticide in controlling mosquitos. Some discussion also surrounded the desire not to see a backslide to mosquito levels seen prior to 2003 before larvicide use was initiated. Additional thoughts were provided relative to developing improvements to timing of adulticide application and the concentrations used.

Other scoping comments surrounded efforts the refuge could take to improve sensitive species success by making improvements to habitat, mitigation and in evaluating other threats to these species outside the scope of mosquito control operations.

The EA was released on March 10, 2014 and was made available for public comment through April 10, 2014. Six written comments were received and one phone call was received with verbal comments within the public comment period. Each letter received was individually responded to in writing with greater detail and the comment and response can be found in Attachment A. The single phone call asked for the Service to consider using Neem oil as an alternative pesticide formulation because of its natural origin. Neem oil is a non-specific pesticide and would harm non-target species. We have provided that input to the District for additional consideration for use in non-Refuge areas.

### **FINDINGS**

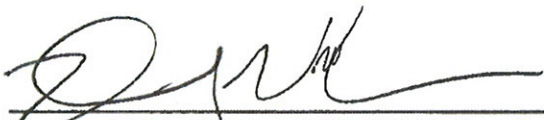
It is my determination that the management action does not constitute a major federal action significantly affecting the quality of the human environment under the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969 (as amended). As such, an environmental impact statement is not required. This determination is based on the following factors (40 C.F.R. 1508.27), as addressed in the Environmental Assessment for the Lower Florida Keys National Wildlife Refuge Complex:

1. Both beneficial and adverse effects have been considered and this action will not have a significant effect on the human environment (Environmental Assessment, page 92).
2. The actions will not have a significant effect on public health and safety (Environmental Assessment, page 96).
3. The project will not significantly affect any unique characteristics of the geographic area such as proximity to historical or cultural resources, wild and scenic rivers, or ecologically critical areas (Environmental Assessment, starting on page 92 and see Attachment C).
4. The effects on the quality of the human environment are not likely to be highly controversial (Environmental Assessment, page 21).
5. The actions do not involve highly uncertain, unique, or unknown environmental risks to the human environment (Environmental Assessment, starting on page 92).

## U.S. Fish and Wildlife Service

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6. The actions will not establish a precedent for future actions with significant effects nor do they represent a decision in principle about a future consideration (Environmental Assessment, page 10).
7. There will be no cumulatively significant impacts on the environment. Cumulative impacts have been analyzed with consideration of other similar activities on adjacent lands, in past action, and in foreseeable future actions. Cumulative impacts will continue to be monitored throughout the duration of the proposed hunts (Environmental Assessment, starting on page 92).
8. The actions will not significantly affect any site listed in, or eligible for listing in, the National Register of Historic Places, nor will they cause loss or destruction of significant scientific, cultural, or historic resources (Environmental Assessment, page 72).
9. The actions are not likely to adversely affect threatened or endangered species, or their habitats (Environmental Assessment, page 92 and Intra-Service Consultation Attachment C).
10. The actions will not lead to a violation of federal, state, or local laws imposed for the protection of the environment (Environmental Assessment, page 15).



Regional Chief, National Wildlife Refuge System

5-30-14

Date

## U.S. Fish and Wildlife Service

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### References:

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U.S. Fish and Wildlife Service

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**ATTACHMENT A**  
**FWS RESPONSES TO PUBLIC COMMENTS**  
for the Environmental Assessment



Anderson, Chad <chad\_anderson@fws.gov>

## comments on alternative B

2 messages

**Bargar, Timothy** <tbargar@usgs.gov>

Thu, Mar 13, 2014 at 11:04 AM

To: Chad Anderson <chad\_anderson@fws.gov>

p92, 2nd paragraph - wouldn't contamination of host plant be an effect upon critical habitat because it is a decrease in "food quality?"

p92, 3rd paragraph - I think I know the answer to this question, but it doesn't appear to be stated in the text. How was it determined that the pesticide residues in the habitat would be lethal, and how did you determine the acreage potentially impacted? It sounds like the assumption is that if the habitat is exposed, that it is a lethal exposure, and that all of the habitat is exposed to that lethal level. I would modify the fourth sentence to, "When considering all potentially suitable Bartram's hairstreak habitat (1,211.46 acres) within NKDR, anywhere from 11.65 percent (141.18 acres) to 47.27 percent (572.69 acres) could be contaminated as a result of permethrin drift, potentially affecting the Bartram's hairstreak." I'd recommend a similar modification to the following sentence referencing the Florida leafwing.

p94, 1st complete paragraph - typo in 3rd line, .....in **neighborhoods areas** while....." Last line, suggest changing "will be" to "could be."

p94, 3rd paragraph - Change the second sentence to, "Adult butterfly exposure was estimated based on naled residues measured on samplers placed in the National Key Deer Refuge." Change the third sentence to, "The probability that aerial applications would result in adult butterfly exposure to naled in excess of the estimated 10th percentile effect level was between 67 and 80%." Typo in line 8, "Based on fields measured...." Typo at the end of line 10.

p94, 4th paragraph - second, the spatial extent of impacts would be reduced.

p96, 1st line - typo, "....negligible short-term adverse **impacts on since** there..."

I don't know if you're aware that Ding Darling NWR used to implement a plan similar to Alternative C. Don't know if they changed it from what is was several years ago.

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\*\*\*\*\*

Tim Bargar, Ph.D.  
Research Ecotoxicologist  
U.S. Geological Survey  
Southeast Ecological Science Center  
7920 NW 71st Street  
Gainesville, Florida 32653  
T - (352) 264-3520  
F - (352) 395-6608  
<http://fl.biology.usgs.gov/Ecotoxicology/index.html>  
<https://profile.usgs.gov/tbargar>

\*\*\*\*\*

**Anderson, Chad** <chad\_anderson@fws.gov>

Thu, Mar 13, 2014 at 11:08 AM

To: "Bargar, Timothy" <tbargar@usgs.gov>

Thanks Tim. Will incorporate with other comments.

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Chad Anderson, Biologist  
U.S. Fish and Wildlife Service  
Florida Keys NWR complex  
28950 Watson Blvd.  
Big Pine Key, FL 33043

Fax: (305) 872-3675  
Office: (305) 872-2239 ext. 205

Chad\_Anderson@fws.gov  
Refuge Website Facebook

[Quoted text hidden]



United States Department of the Interior  
**U.S. FISH AND WILDLIFE SERVICE**  
**Florida Keys National Wildlife Refuges Complex**  
*National Key Deer -- Key West -- Great White Heron -- Crocodile Lake*  
28950 Watson Boulevard  
Big Pine Key, FL 33043  
Phone: (305) 872-2239, Fax: (305) 872-3675



May 22, 2014

Dr. Tim Bargar  
Research Ecotoxicologist  
U.S. Geological Survey  
Southeast Ecological Science Center  
7920 NW 71st Street  
Gainesville, Florida 32653

Dear Dr. Bargar:

The U.S. Fish and Wildlife Service received your email commenting on the draft Mosquito Management Plan and Environmental Assessment (EA) on March 13, 2014. We appreciate your input and have the following responses.

Comment on page 92, 2nd paragraph: We agree that contamination of host plant could be viewed as an effect upon critical habitat and food quality, but the statement in the EA was addressing that the plant itself would not be lost from the application of pesticides. Given that the compounds used have a short half life, the long-term impact from the pesticide on the plant's food quality is not likely a primary driver in the toxicity to the species.

Comment on page 92, 3rd paragraph: The assumption was that if the habitat is exposed it would be subject to a potentially lethal exposure, and that the entire habitat is exposed to that lethal level. While we believe that assumption is very conservative and exposure may be incomplete or sub lethal, it was important to assess the concern using the most protective assumption given the status of the species.

Comment on page 94, 1st complete paragraph - typo in 3rd line: Comment noted.

Comment on page 94, 3rd paragraph: Comment noted.

Comment on page 94, 4th paragraph: Comment noted.

Comment on page 96, 1st line -- typo: Comment noted.

General Comment on Ding Darling NWR using a plan similar to Alternative C: We have assessed the practices of other refuges and incorporated that information in the derivation of the alternatives.

Thank you for your comments. We will be making a decision shortly and will ensure you receive a copy of that document.

Sincerely,

Nancy Finley  
Refuge Manager

April 7, 2014

**VIA ELECTRONIC SUBMISSION**

Refuge Manager  
Florida Keys National Wildlife Refuge  
28950 Watson Blvd.  
Big Pine Key, Florida 33043

RE: Draft Environmental Assessment for the Mosquito Management Plan of  
the Lower Florida Keys Wildlife Refuge Complex (the "Refuge")

Dear Refuge Manager:

Below are comments on the above-referenced draft Environmental Assessment (the "Draft EA"), which was announced on March 10, 2014. I submit these comments on behalf of myself and other Floridians who care about the protection of Florida's ecosystems and the perpetuation of biodiversity therein. I appreciate the opportunity to review the Draft EA and to provide comments to aid your analysis and final decision.

First, I would like to laud the Refuge and all of its workers for their commitment to protecting and promoting wildlife in the Florida Keys. I have followed the issue of mosquito control in the Keys for several years and understand how difficult it is for refuge managers to balance the competing interests in the Keys region. I also recognize that the Refuge has recently made pro-environmental strides by (1) meeting with the Florida Keys Mosquito Control District (the "District") to inform them that the ongoing issuance of Special Use Permits without National Environmental Policy Act ("NEPA") review was inappropriate, and (2) initiating the NEPA process through the compilation of this Draft EA. Still, I comment on this Draft EA below pursuant to my belief that refuge managers must do even more to protect the natural treasures extant to the Keys region.

**I. Requirements of NEPA**

NEPA requires an assessment of the likely impacts of a major federal action on the environment and human health as well as the disclosure of that evaluation to the public and the ultimate decision-maker. The goal of the assessment is informed and transparent decision-making so that all interested parties understand the trade-offs and consequences of the federal actor's proposed action.

As refuge managers have correctly recognized, the decision to permit the District to apply pesticides pursuant to a Mosquito Management Plan in the Refuge (the “Action”) is a major federal action and is subject to NEPA’s environmental review process. Per NEPA, an environmental assessment must include an evaluation of a range of reasonable alternatives to the proposed action, an evaluation of the direct, indirect, and cumulative impacts of the proposed action, and a review of measures to mitigate those impacts. To the extent possible, the United States Fish and Wildlife Services (“USFWS”) and National Marine Fisheries Service (“NMFS”) are encouraged to integrate the analyses required by the Endangered Species Act of 1973 (“ESA”) with those required by NEPA, thereby making the administrative process more efficient.

## **II. NEPA Deficiencies in Draft EA**

As noted above, environmental assessments must include evaluations of the direct, indirect, and cumulative impacts of the proposed action(s). This Draft EA does an inadequate job evaluating the indirect and cumulative impacts of the Action because it neglects to identify and describe the possible affects the Action could have on biodiversity, ecosystem services, food webs, and population genetics. Additionally, the Draft EA fails to properly evaluate the indirect effects of adulticides on the environment because it does not thoroughly evaluate the effects of their degradates. And finally, the Draft EA assumes, without justification, that adulticide use for mosquito control is beneficial for tourism and the surrounding community (the human environment) without even considering that the long term effects of adulticide use could be devastating to tourism and nearby populations that depend on it for their livelihood. Therefore, I urge the Refuge to evaluate (preferably in a full environmental impact statement) the following potential indirect and cumulative effects of the Action.

- 1) The effects (long and short term) of adulticide use on ecosystem services should be evaluated. For example, if Alternatives A or B are chosen, many non-target invertebrate pollinators will be killed every time “adulticides” are applied. Will this loss of pollinators lead to a loss of pollination? How will this loss of pollination, a valuable ecosystem service, affect plant populations and the animal populations that rely on those plants? This question is pivotal for the protection of species like butterflies, some of which may only be able to survive on a few species of host plant (*i.e.* the Miami blue butterfly lives almost exclusively on nickerbean, blackbead and balloon vine).
- 2) The effects of adulticide use on biodiversity should be considered. The refuge managers failed to evaluate how repeated applications of adulticides

could affect the populations of species relative to one another. Will adulticide applications affect certain populations inordinately thereby causing (1) niche overtake, (2) the alteration of complete ecosystems, or (3) a loss of species diversity? Without further evaluation, these impacts remain unknown.

3) The ecosystem effects of adulticides on carnivorous species, which rely on non-target invertebrates as a food source, should be further evaluated because these animals may experience food scarcity as a result of diminished populations of invertebrates. Still more, animals further up the food chain may be affected by ingestion of adulticide residues on (or in) prey doused with adulticides. Evaluation of these indirect effects is particularly important with regard to two listed species: (1) the lower keys marsh rabbit, and (2) the silver rice rat, which feed on plants and invertebrates that would be exposed to adulticides under Alternatives A and B.

4) The ecosystem effects of adding gambusia to local water retention ponds as a biological mosquito control, as considered in the Draft EA, are not evaluated. Will the addition of gambusia affect local floral or faunal populations or other ecosystem conditions?

4) The ecosystem effects of creating “No Spray Zones” are not considered. For example, will creating secluded safe areas for listed, non-target species as protection from adulticide applications lead to inbreeding depression or “island biogeography?”<sup>1</sup>

5) The ecosystem and financial effects of the loss of corals as a result of adulticide applications are not considered in the Draft EA. Surely, Table 5 (Page 69) of the Draft EA alludes to the possible financial effects of the Action, stating that Alternative C could lead to a “[p]ossible decrease of tourism [and the] ability to conduct business during peak season.” But, this conclusion is myopic—the long term effects of continued adulticide use above and around the Keys’ coral outcroppings could actually be extremely detrimental to tourism and Florida’s economy in the long term. As such, Alternative C may be even more tourism-friendly than Alternatives A and B because it would not harm corals. There is no evaluation, or even mention, of this counterpoint in the Draft EA.

6) The cumulative effects that adulticides will have on nearby corals are not discussed. Corals around the World are already under tremendous stress as a

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<sup>1</sup> The isolation of species can affect extinction rates. Populations on islands (isolated suitable habitat surrounded by unsuitable habitat) are more likely to go extinct because individuals from other populations cannot emigrate to or “rescue” the isolated population from extinction.



result of ocean acidification. Corals in the Keys region are in many ways even more stressed because they are already damaged from wastewater leaking from local septic systems and hyper-eutrophic run-off flowing from the Kissimmee River Basin through the Everglades and out into Florida Bay. Additional evaluation is necessary to determine the cumulative effects of adulticides and these other stressors on coral populations.

7) Evaluation of the long term effects of adulticide resistance on mosquito populations and Keys ecosystems is also absent from the Draft EA. Adulticides target the nervous systems of adult mosquitoes. If any portion of a mosquito population survives contact with an adulticide then there is the possibility that the population could build resistance to adulticides.<sup>2</sup> If the refuge develops a dependency on adulticides for mosquito control and mosquitoes become resistant to the active ingredients in adulticides, then the Refuge's Mosquito Management Plan may become dysfunctional causing additional problems for the Refuge's ecosystems and residents of the surrounding communities. The possibility of mosquito resistance to chemical treatments and the controls the District plans to use to prevent that phenomenon should be evaluated.

8) The Draft EA does not consider that the degradates of adulticides (*i.e.* naled and permethrin) may actually be more lethal and have longer half-lives than the adulticides themselves. The effects of the degradates of adulticides on wildlife and the environment should have been evaluated by the Draft EA.

In addition to failing to perform a complete evaluation of the indirect and cumulative effects of the Action, the Draft EA is deficient in at least one other major area that begs discussion. In the Draft EA, the Refuge's preferred alternative, Alternative B (the Phased Approach to Mosquito Management), relies on "mosquito thresholds" as triggers for elevation from one phase of mosquito management to the next. While the Draft EA states that mosquito thresholds will be measured by a metric of "mosquitoes/minute," there is no mention about the tools that will be used to ensure the integrity and accuracy of those measurements or the agency that will be responsible for making them.

In the past, employees of the District used the "Arm Test" to determine mosquito landings. Leaving aside the fact that District employees may have incentives to spray adulticides, the use of the Arm Test to determine mosquito landings is problematic because the human eye cannot differentiate between multiple landings by

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<sup>2</sup> The possibility of mosquito resistance to larvicides seems more remote than resistance to adulticides because most larvicides contain active bacteria that feed on larval mosquitoes as opposed to chemicals that target mosquitoes' life processes, but it may be appropriate to evaluate mosquito resistance to larvicides in the Draft EA as well.

the same mosquito. Therefore, the Arm Test is inaccurate. The application of an inherently inaccurate measurement for the purpose of elevation from one treatment phase to the next jeopardizes the integrity of the entire Mosquito Management Plan. As such, additional description and evaluation of the protocols and controls for the measurement of mosquito thresholds should be added to a revised environmental assessment or environmental impact statement.

### Endangered Species Act Issues

Although the Refuge is likely aware of the ultimate goal of the Endangered Species Act, it is important that the environmental assessment make this clear to the public and the District. The ESA's goal is the recovery of listed species to biologically sustainable population levels. Put another way, the goal of the ESA is to repair populations so that species can be delisted. Conversely, the goal of the ESA is not to list species and then afford them protection only in their pre-listing geographic ranges, which in most cases are far reduced from historical population distributions.

The preferred alternative of the Refuge, Alternative B, does not provide listed butterfly and mollusk species with a chance to recover to sustainable population levels because it restricts the areas they will be able to survive in to No Spray Zones where they already occur. As such, Alternative B, and any other alternative that restricts the ability of populations to reach levels of sustainability and repopulate suitable habitat, are contrary to the purpose of the ESA and are potentially unlawful. Notably, any alternatives that could restrict populations of listed Lepidoptera (*i.e.* the Miami blue butterfly, Bartram's hairstreak, and Florida leafwing) from being restored are also contrary to Objective 11 of the Refuge's Comprehensive Conservation Plan.<sup>3</sup>

I am also concerned by the fact that (at least to my knowledge) the Refuge has never requested a consult from NMFS pursuant to Section 7 of the ESA. Adulticides and their degradates are known to be toxic to listed staghorn and elkhorn corals. The Refuge acknowledges this fact in the Draft EA. Per this, I urge the Refuge to follow the requirements of Section 7 of the ESA by consulting NMFS about the effects that adulticides applied in aquatic environments, or reaching coral beds via run-off or other hydrological processes, will have on listed aquatic species. Furthermore, when the Refuge oversees the District's efforts to obtain all permits required for state and federal endangered species compliance, I urge the Refuge to ensure that the District

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<sup>3</sup> Some argue that the Miami blue butterfly is no longer present in the Refuge and therefore the effects of adulticides on the Miami blue need not be evaluated. These arguments are grossly misinformed and out of sync with the purpose of the ESA. The Draft EA should consider whether or not perpetual application of adulticides over areas of pine rockland and coastal hammocks, which may otherwise be inhabited by the Miami blue butterfly or other listed species, has prevented the populations of listed species from expanding and multiplying.

consults with FWS and NMFS and acquires all necessary incidental take permits pursuant to Section 9 of the ESA.<sup>4</sup>

## Conclusions

While I believe that the Draft EA is a step in the right direction toward protection of Florida's natural resources, I also believe that additional evaluation is necessary to compensate for the Draft EA's deficiencies. And, because moderate to major environmental impacts were associated with each of the four (4) proposed alternatives, and therefore a finding of no significant impact ("FONSI") would not be appropriate under NEPA, I urge the Refuge to create an environmental impact statement ("EIS") to evaluate the full impacts (direct, indirect, and cumulative) of the alternatives on the environment.

Finally, I would like to express my personal opinion that Alternative C is the optimum alternative. Florida's wildlife, ecosystems, fisheries, and saltwater environments are already harrowed by anthropogenic stressors; including the extensive application of adulticides outside of protected areas. In addition to being beautiful and worth protecting for their own sake, Florida's wildlife and ecosystems provide tremendously valuable services to Floridians and are the lifeblood of Florida's tourist industry. I don't believe that the Refuge, tasked with the mission of protecting those very resources, should be contributing to their long term demise for comfort in the immediacy. I am hopeful that these comments will encourage the Refuge to continue to evaluate the effects of mosquito management on the environment in order to ensure that the goals of NEPA and the ESA are realized.

Sincerely,

Michael L. Elion, Esq.

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<sup>4</sup> The ESA broadly defines "take" to include "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect." Notably, the application of adulticides in and around the Refuge could harm or harass a multitude of protected species in direct and indirect ways. For example, naled is highly toxic to birds and butterflies. Several species of listed birds (i.e. piping plovers, roseate terns, and red knots) and several protected butterfly species are known to reside in the Keys region. If an aerial application of naled kills or even harasses or injures those species then an incidental take permit is required pursuant to Section 9 of the ESA. Additionally, other listed species (i.e. staghorn coral, elkhorn coral, silver rice rat, lower marsh rabbit, and stock island tree snail) may be indirectly harmed by adulticide applications resulting in the need for incidental take permits for those species before the application of adulticides. In order to help the District determine which incidental take permits they must apply for, I encourage the Refuge to perform additional evaluations on the indirect effects of adulticide application on listed species.



United States Department of the Interior  
**U.S. FISH AND WILDLIFE SERVICE**  
**Florida Keys National Wildlife Refuges Complex**  
*National Key Deer -- Key West -- Great White Heron -- Crocodile Lake*  
28950 Watson Boulevard  
Big Pine Key, FL 33043  
Phone: (305) 872-2239, Fax: (305) 872-3675



May 22, 2014

via email

Dear Mr. Elion:

The Florida Keys National Wildlife Refuge Complex (Refuge) received your comments on our draft environmental assessment (EA) for our mosquito management plan. We appreciate you taking the time to provide thoughtful input and we provide the following responses. We have done our best to have our response relate to your corresponding comment numbers.

#### **I. Requirements of NEPA**

We have as you described initiated this EA in order to provide a transparent process in compliance with the National Environmental Policy Act and evaluated a range of reasonable alternatives (three) to the proposed action, an evaluation of the direct, indirect, and cumulative impacts of the proposed action, and a review of measures to mitigate those impacts. We have concurrent to this process initiated a Section 7 consultation with the United States Fish and Wildlife Service (USFWS or Service). We have had informal discussions with the National Marine Fisheries Service (NMFS) as to the appropriate approach relative to marine species of concern and that is explained below.

#### **II. NEPA Deficiencies in Draft EA**

With regard to your comment on the adequacy of the evaluations of direct, indirect, and cumulative impacts of the proposed action(s), we understand your thoughts relative to having additional information on biodiversity, ecosystem services, food webs, and population genetics in evaluating these impacts. However, the National Environmental Policy Act (NEPA) and its guiding regulations do not require the agency to conduct unique studies to fill every data gap; it requires that the agency conduct a "hard look" at issues at hand. Within our analysis, the Refuge recognized the potential for loss of biodiversity, ecosystems and pollinators due to the use of broad spectrum insecticides. For this reason, multiple no spray zones have been created to afford additional protections to sensitive species. It should be emphasized that most adulticide use within the Refuge is prohibited under Alternative B within the Refuge and that non-spray zones and buffers are in place to ensure the Refuge is not subject to drift from these chemicals. The Refuge does not have the ability to impact decisions for use of these chemicals on private lands and thus the patchwork mosaic of public and private lands in itself makes management of biodiversity challenging beyond our borders.

1. We evaluated a suite of receptor species (ranging from invertebrate species to higher level vertebrates) in our evaluation and believe that they generally address a diverse range of resources at risk and potentially good surrogates for multiple trophic levels and the local ecosystem. Most of the species selected in our evaluation represent sensitive species, many sensitive to the specific

mosquito control issue at hand or the habitats that are at risk. It was believed that in using these rare species in our evaluation, we are also being protective of more common species that use the area (thus the overall biodiversity). So while the Refuge did not cover specifics of the question, it was cognizant of the issue of biodiversity, ecosystems and pollinators in its evaluation. Your comments did not provide any significant or new scientific information that indicate that the alternatives would cause additional or substantial loss to biodiversity or pollinators. Furthermore, it should be noted that the Refuge can only regulate the impacts on Federal land or others with which we have management authority. While loss of pollinators, ecosystem effects and biodiversity may occur on private lands, the Refuge contends that Alternative B provides adequate protections to biodiversity and pollinators within the jurisdictional boundaries where we can regulate actions through non-spray zones, buffer zones and mitigation actions.

2. See above for discussion on biodiversity. We contend that by evaluating the range of species, we are in fact evaluating biodiversity. Listed species also can represent very sensitive species so by focusing some on the listed species, we are protective of biodiversity as a whole.
3. Trophic level impacts to upper food chain species is not considered a major concern as the adulticide compounds biodegrade relatively quickly in the environment. For example, permethrin is bound to soil or aquatic sediments and degraded by bacteria. The degradation pathway of permethrin ultimately ends in the release of carbon dioxide. Naled degrades into dichlorvos and bromodichloroacetaldehyde. Dichlorvos rapidly degrades in water. Bromodichloroacetaldehyde has a half-life of 11 hours in water. In addition, adulticiding activity on Big Pine will be reduced under any of the action alternatives. Even with concerns associated with degradation products, the key element to consider is that there will be less adulticide applied under Alternative B (as well as C and D), and thus less of the degradation products or accumulation than under the current practice (Alternative A, no action). In addition, the Refuge placed restrictions on the number of applications in a finite period to allow for degradation so as to avoid accumulation in the environment. Impacts to silver rice rat and lower keys marsh rabbit (i.e., other trophic levels) were presented starting on Page 83 of the EA. These species effects are also considered in more detail within the Section 7 consultation, which will be completed shortly and was being prepared concurrently with the EA.
4. With regard to your question on ecosystem effects of Gambusia in retention basins, we looked at this condition as a status quo issue. The Refuge was itemizing elements of the District's integrated pest management procedures and included the fact that Gambusia was used within their ongoing procedures. Gambusia have been released in the ecosystem in these altered hydrologic areas for decades and persist without supplement in many cases. The Refuge will not permit direct release of Gambusia on its lands but has no ability to control this practice off Refuge.
4. (your second #4) Your question as to whether the creation of secluded safe areas (no spray zones) for listed, non-target species as protection from adulticide applications may lead to inbreeding is understood. As stated above, the Refuge is surrounded by privately owned parcels and many privately owned parcels are also nested within isolated Refuge lands. We cannot dictate actions on those private lands, but the Refuge does provide an island haven, as such for protecting rare species because of the land ownership mosaic. The low frequency of application of adulticides as a whole adjacent to the Refuge in recent years likely provides for some level of emigration from the Refuge lands and there are many landowners locally that prohibit spraying on their private parcels on Big Pine Key. The question of mosquito control as a whole is different than that being discussed for the protection of Refuge lands. It is not expected that the proposed Alternative will isolate these species beyond that which is currently in place due to land

ownership and that the proposed application rates, buffer zones, no spray zones, and expected frequency of treatments provide for an added level of protections to our lands to ensure those protections over time. Alternative B seeks to increase the number of individuals over the no action alternative, which is the desired both from a population perspective as well as from a genetic perspective. We view the buffers and no spray protections as important to the future success of the populations and demonstrate the importance of establishing protected areas in the Refuge given the threats outside those boundaries. Island biogeography is about sources and sinks and the Refuge is arguably a major source. Alternative B provides additional protections with the goal of producing a larger, stronger population and places effort in the high value areas for the species.

5. With regard to your question on ecosystem and financial effects of the loss of corals as a result of adulticide applications, some physiological impacts to coral species have been documented in the literature (see section 4.3 of the EA); however, insufficient information exists to evaluate the resulting effect to tourism that may be associated with the adulticide linked alternatives. Again, NEPA does not require new study for every concept out there. The Refuge is not permitting the application of adulticides to near shore waters, where it does not have ownership. The Refuge has discussed the concern associated with adulticide use with the District and has recommended they proceed with a formal consultation with NMFS (see below).
6. We understand your comment on the cumulative effects that adulticides may have on nearby corals. The Refuge is managed to the mean high water line. Waters are generally within the jurisdiction of the State of Florida, while some are also within the National Marine Sanctuary boundary. The Refuge will not permit adulticide applications to National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NOAA/NMFS) or State waters under the proposed alternative B, as we have no jurisdiction to permit such an activity. Instead, the Refuge has instructed the District to directly consult with NMFS, if applications are expected to occur over waters within those agency jurisdictions.
7. On your statement that our evaluation of the long term effects did not include a discussion of adulticide resistance on mosquito populations and Keys ecosystems, we do not believe that to be an effect that could be attributed to this action. Salt marsh mosquito populations on Big Pine Key are regularly augmented by migrants from nearby islands untreated by adulticides. The effect is that new introductions of susceptible mosquitoes maintain a high level of susceptibility in the salt marsh mosquitoes on Big Pine Key. Furthermore, resistance to pesticides is monitored by the District so corrective action can be taken. The potential drift of adulticide within the Refuge and other minor applications associated with the Refuge would likely not represent a causal factor for a population of mosquitos on Big Pine becoming resistant.
8. Each of the compounds are considered to have a very short half-life in the environment and are ultimately degraded to carbon dioxide. Permethrin is bound to soil or aquatic sediments and readily degraded by bacteria. Naled degrades into dichlorvos and bromodichloroacetaldehyde, which are problematic in the environment but again degrade further. For example, bromodichloroacetaldehyde has a half-life of only 11 hours in water. The key point is that overall, adulticiding will be reduced through the implementation of Alternative B. There will less adulticide applied and thus less of the degradation products. Further these compounds will not drift onto Refuge lands with the provisions of Alternative B and thus less likelihood these degradation products will occur on the Refuge.

With regard to your question on mosquito “thresholds” as triggers for elevation from one phase of mosquito management to the next, a landing rate count (LRC) is used by District personnel to gauge

mosquito numbers, and landing rates have been used as indices of mosquito numbers since 1917. They are an effective monitor of a demonstrable increase and are consistent with the requirements of state law. Host-seeking behavior of mosquitoes is such that upon alighting on a potential host they spend time evaluating the host for suitability and attempting to probe. Generally, mosquitoes do not take off and land again on the same host unless they are disturbed in some way thus staff are instructed in this methodology and it is an effective predictor. There are no incentives for District employees to apply more insecticides and these chemicals are costly. LRC is a useful index because it is monitoring the exact element that mosquito control treatments are meant to control.

We understand your interest in Alternative C as compared to Alternative B and grappled with many of the same points you raised. However, Alternative B provides a level of protection to Refuge resources that cannot be discounted, namely by specifically identifying buffer and no spray zones around very sensitive habitats. This raises awareness and sets forth protection measures that would not be in place without this dialog and plan in place. This approach is the only certain way to provide protections to these resources on boundaries of the Refuge. We do not have the ability to stop adulticide use beyond that which would affect the Refuge, and understanding that is key to understanding Alternative B's purpose.

Again, we appreciate your input and comments. We will ensure those issues are clarified in future documentation. We are considering this input with that received by others in developing our course of action. If we can provide any additional clarification please do not hesitate to contact me directly at 305-872-2239, ext. 209.

Sincerely,

Nancy Finley  
Refuge Manager



Finley, Nancy &lt;nancy\_finley@fws.gov&gt;

## comments on mosquito control poison

1 message

Paula Cannon <gettheleadout@bellsouth.net>  
To: nancy\_finley@fws.gov

Mon, Mar 31, 2014 at 3:13 PM

Dear Nancy,

I have been monitoring the butterflies on Big Pine for years and have seen several species completely vanish while the numbers of others continue to decline. The Bartrams will soon be extinct from Big Pine if it already isn't, I have not seen one since 8/23/13. It is hard for me to grasp the very idea of letting Mosquito Control start using poison again in any capacity.

Back in the early 80's I can remember the old war planes flying over so low it would shake your house and thick white fog everywhere as they passed over low, brushing the treetops. I remember seeing dozens of Florida Duskywings all down Key Deer Blvd rolling on the road dead as the wind from cars blew them along in tiny black spirals. I remember being in my Kayak and having a helicopter fly over me spraying so much that I felt the poison mist falling all over me, burning my skin. I had nowhere to go to take cover and it literally rained insects of every kind from dragonflies, bees, moths, wasps, everything all over me and all over the surface of the water. It's been over 30 years of onslaught, we finally made seemingly logical changes recently and have other means that do the job far more effectively and hopefully, at a much lower cost to the environment, so why even consider regression?

My personal experiences make this a very passionate subject. I held the very last adult Florida Leafwing in my hand as it died on 11/10/05 see photo one. I watched the Miami Blue fade away from Bahia Honda, shortly after I discovered the new offshore colonies. I planted an acre of butterfly garden 15 years ago and have had some of the rarest of the rare show up over the years like the first sighting of the Cuban race of Bahamian Swallowtails, Nickerbean Blues, the extremely rare Disguised scrub hairstreak, Bartrams scrub hairstreak as well as the now extinct from Big Pine, Florida Leafwings, the now extinct keys race of the Two Spotted skipper, Dingy Purplewing and sometimes 40 Zebra longwings at a time, only to watch them fall dead right in my garden where many roosted or disappear elsewhere, after an evening fog truck went by. See below, dead butterfly photo after one fog truck pass.

In recent years, I have far less flying in my garden then when I first planted it, even very common species like Cassius blue are scarcely present. That said, I am not implying MC is totally at fault for insect loss and decline, there are certainly other impacts such as hurricanes, deer, unsupervised prescribed burning, predation etc.. Still, the damage these chemicals are capable of is real and recognized and should be eliminated indefinitely.

On 5/28/2011 and 6/15/2011, there were two aerial sprayings. I placed one queen size white sheet in the middle of my garden right before MC sprayed, as you can see below in the last two photos the very dramatic number of insect species that dropped in photo 3 and what was left in photo 4 after the second spray a couple weeks later at the same location. Note the lack of mosquitoes.

My neighborhood petitioned to keep the fog truck off of our street and many are on the no spray list and put signs out when they called us, but this did not stop aerial poison or the drift from the fog trucks and the occasional new driver that did not shut off the fog even though we had signs up. Many times when they fogged or sprayed we had next to no mosquitoes on our street. It is my belief that many complaint calls to mosquito control are because of noseums rather than mosquitoes, nonpermanent residents really don't know the difference.

Since the use of BT we have had next to no issues with mosquitoes and if this has indeed been proven NOT harmful to other species, then this is all that should be used. Adulticide kills all insects and not only effects the entire insect population but also bird migrations as well as resident birds that eat insects. It must certainly have



3/31/14

DEPARTMENT OF THE INTERIOR Mail - comments on mosquito control poison

some impact on flora pollination and fruit and seed development. One can only imagine what it does to us.

For the record, I am strongly against the use of any poison and I base that opinion on 29 years of observing decline.

Sincerely, Paula Cannon



last adult leafwing butterfly on big pine 11/10/05 IMG\_3336



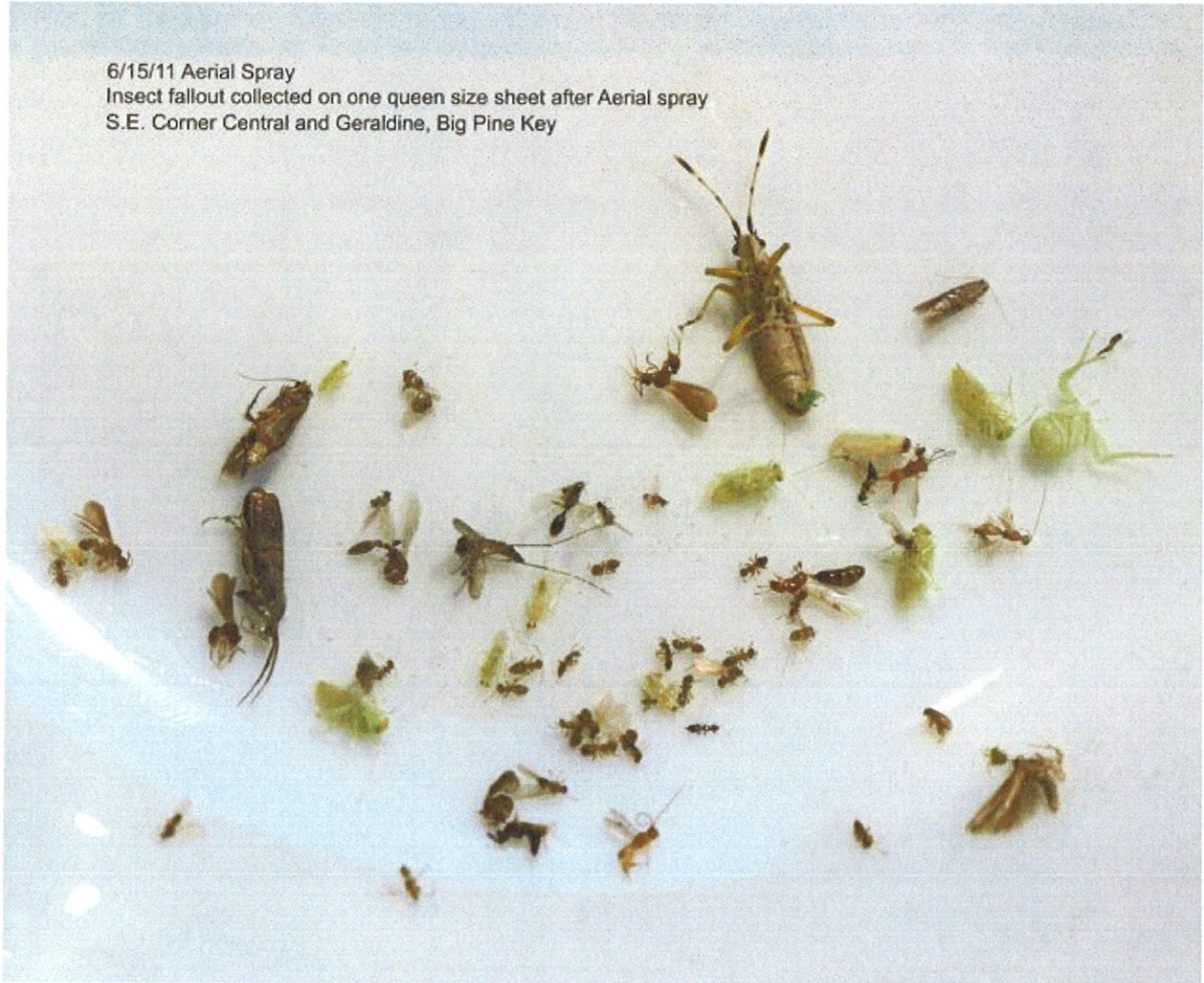
Feb 2008 fallout in my butterfly garden soon after a fog truck went by my house.



5/28/11 Aerial Spray  
fallout on one queen size sheet  
after aerial spray.  
S.E. Corner Central & Geraldine, BPK

52811bugfallout aerial. mosquitoes?

6/15/11 Aerial Spray  
Insect fallout collected on one queen size sheet after Aerial spray  
S.E. Corner Central and Geraldine, Big Pine Key



61511 insect fallout aerial spray



United States Department of the Interior  
**U.S. FISH AND WILDLIFE SERVICE**  
**Florida Keys National Wildlife Refuges Complex**  
*National Key Deer -- Key West -- Great White Heron -- Crocodile Lake*  
28950 Watson Boulevard  
Big Pine Key, FL 33043  
Phone: (305) 872-2239, Fax: (305) 872-3675



May 22, 2014

via email  
Ms. Paula Cannon

Dear Ms. Cannon:

The Florida Keys National Wildlife Refuge Complex (Refuge) received your March 31, 2014 email with comments on our draft Environmental Assessment and Mosquito Management Plan. We appreciate you taking the time to provide thoughtful input and we will do our best to respond to the points you bring up.

In your email, you suggest the concept of letting the Florida Keys Mosquito Control District (District) initiate using pesticides again and a regression towards using chemical methods of control similar to earlier approaches used in the 1980s. The proposed Alternative B utilizes methods and applications of adulticide that are less invasive/aggressive than that used in past years (which was represented by the no action Alternative A). Alternative B increases the area around the Refuge where adulticide use would be prohibited and provides restriction on frequency of application through the use of triggers that were based on lesser use models and thresholds than those that had been used in the past. We have worked closely with the District to enhance the use of larvicide to minimize adulticide application and methods of application have certainly improved over the years to minimize both volume used and concentration. Alternative B likely represents the least use of adulticide chemicals in the recent history of mosquito control on Big Pine Key. While it is true that larvicide activities can control 80-85% of mosquitos, the community has expressed concern associated with how to address disease and impacts to tourism if there was not an alternative that provided some additional flexibility beyond just larvicide use.

The Refuge also understands your point on the concept that past District control may have been conducted to address nuisance "no see ums" vs. mosquitos and that is why Alternative B has a presumptive requirement for a landing rate assessment prior to any adulticide application. We believe that this added requirement will avoid unnecessary use of adulticides in the environment.

We echo your concern associated with non-target mortality associated with the use of adulticide compounds. The development of additional buffers and no-spray zones around butterfly critical habitat within Alternative B is a key component for the protection of these at risk species and other pollinators. It should be noted that adulticide use is prohibited under Alternative B within the Refuge non-spray zones and buffers and these buffers are in place to ensure the Refuge is not subject to drift from these chemicals; thereby specifically protecting critical and occupied habitat for the listed species. Alternative B specifically was designed to avoid migration of the adulticide from adjacent non-federal lands.

Thank you again for your comments. We are considering your input with that received by others in developing our course of action. If I can provide any additional clarification please do not hesitate to contact me directly at 305-872-2239, ext. 209.

Sincerely,

Nancy Finley  
Refuge Manager



Finley, Nancy &lt;nancy\_finley@fws.gov&gt;

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## Official FKMCD EA response

1 message

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**Michael Doyle** <mdoyle@keysmosquito.org>

Thu, Apr 10, 2014 at 11:43 PM

To: "Nancy Finley (nancy\_finley@fws.gov)" <nancy\_finley@fws.gov>

Nancy,

Here is our response to the EA.

We will follow with a hard copy tomorrow.

Thanks,

Michael

April 9, 2014

Refuge Manager  
Florida Keys National Wildlife Refuge Complex  
28950 Watson Blvd  
Big Pine Key, Florida 33043

Dear Ms. Finley,

This letter is in response to The U.S. Fish and Wildlife Service's Lower Keys National Wildlife Refuge Complex draft Environmental Assessment (EA) for the Mosquito Management Plan.

The Florida Keys Mosquito Control District (FKMCD) is the primary governmental entity responsible for mosquito control in the Florida Keys portion of Monroe County, Florida. Our mission is to protect the citizens of the Florida Keys from mosquito-borne diseases, and to improve their quality of life by reducing the impact of nuisance mosquitoes. I wish to make several comments on behalf of the FKMCD.

First, I wish to thank the USFWS staff at the Lower Keys National Wildlife Refuge Complex for allowing us to contribute sizable amounts of mosquito population and treatment data to their analysis. As a District, we strive to make sensible and economical mosquito control decisions based on reliable and verifiable data, such as daily mosquito landing rate counts, species information, and treatment records. We are pleased that at least 11 years of detailed records contributed to this document.

Second, we wish to state that Alternative B is the favored alternative of FKMCD. Whilst this alternative restricts some of our previous ability to control adult mosquitoes on Big Pine and No Name Keys, it allows larviciding for preventing the bulk of larval mosquitoes from becoming biting adult mosquitoes. Alternative B also allows for some threshold-based methods for adulticide treatments during unusually high periods of mosquito density. This Alternative both reduces adulticiding and encourages larviciding.

Since approximately 2003, FKMCD has shifted our control strategy heavily towards larviciding in the Big Pine Key and No Name Key areas. Since 2003, the need for adulticiding on these Keys has been reduced approximately 80%. We primarily use the bacterium Bti (*Bacillus thuringiensis israelensis*) for large-scale larviciding (i.e., an average of 46,000 acres treated by helicopter each year). This significant reduction in adult mosquito populations, through large-scale larviciding, allows us the opportunity to accept reductions in adulticiding proposed in the subject EA. Without this ability to larvicide, such reductions in adulticides would be unacceptable to the FKMCD and the local populace.

Even with an exceptionally effective larviciding program, the need to maintain adulticiding at some level is recognized even by companies which do not produce adulticides. For example, Valent Biosciences, our primary supplier of Bti larvicides, has recently offered this statement:

*"Valent Biosciences Corporation (VBC) supports Integrated Vector Management (IVM) for mosquito control. IVM follows a systematic, science-based approach to the control of vectors in a manner that optimizes control of mosquito populations while protecting public health and the environment.*

*VBC firmly believes that Larval Source Management (LSM) forms the basis for IVM programs. LSM, by definition, is the use of methods to modify aquatic habitats (i.e. the source of mosquitoes) using flood control/sanitation techniques (source reduction) and/or application of mosquito larvicides to reduce mosquito populations. VBC provides solutions for LSM based on target-specific biorational mosquito larvicide products and technical support to mosquito control professionals. This is our core focus.*

*VBC also recognizes that the use of mosquito adulticides may be a necessary component of IVM. Circumstances such as vector borne disease or very high adult nuisance mosquito populations may result in the need for insecticidal applications directed toward adult mosquitoes. We understand that conditions such as lack of access, insufficient capacity, or bad weather can interfere with LSM operations, resulting in adult mosquito outbreaks. In addition, when a determination is made that adult mosquito populations are actively transmitting disease, killing the adult vectors becomes a necessary public health intervention.*

Finally, the wording of one section regarding wind direction is of concern to us, regarding wind direction in relation to adulticiding on Big Pine Key. As written, these sentences could conceivably be construed to disallow all adulticiding on Big Pine Key. Pages 27 and 35 mention wind direction and prohibition of mosquito adulticiding activity when wind is blowing toward Refuge land. No distance is specified. Although it might seem a stretch, as written those sentences do preclude adulticide activity anywhere on Big Pine Key if wind is blowing toward Refuge lands. We propose the sentences be reworded in order that FKMCD can conduct adulticide activities up to the buffer zone. The areas bordering the buffer zone are not under prohibition for adulticiding and the purpose of the buffer is to protect the habitat from adulticide application.

Again, thank you for the opportunity to participate in the Environmental Assessment process.

Sincerely,



Michael Doyle  
Executive Director  
Florida Keys Mosquito Control District  
Key West, Florida

*Michael S. Doyle*

Executive Director  
Florida Keys Mosquito Control District  
5224 College Road  
Key West, FL 33040  
p: (305) 292-7190  
f: (305) 292-7199  
c: (305)906-1792  
[mdoyle@keysmosquito.org](mailto:mdoyle@keysmosquito.org)





United States Department of the Interior  
**U.S. FISH AND WILDLIFE SERVICE**  
Florida Keys National Wildlife Refuges Complex  
*National Key Deer – Key West – Great White Heron – Crocodile Lake*  
28950 Watson Boulevard  
Big Pine Key, FL 33043  
Phone: (305) 872-2239, Fax: (305) 872-3675



May 22, 2014

Michael S. Doyle  
Executive Director  
Florida Keys Mosquito Control District  
5224 College Road  
Key West, FL 33040

Dear Mr. Doyle:

The Florida Keys National Wildlife Refuge Complex (Refuge) received your comments on our draft environmental assessment (EA) for our mosquito management plan. We appreciate you taking the time to provide thoughtful input and we provide the following responses.

We gratefully acknowledge the contributions the Florida Keys Mosquito Control District (District) made in assisting in the development of the EA and plan. Given the Refuge is managing an issue that is so integrally linked to your program, we saw no better way to produce this document than through the collaborative process that ensued. We also appreciate your interest in reducing adulticide use in the community and in working with us to develop Alternative B to try to optimize tactics. Larvicide methods are clearly an important control tool, but we understand that most effective vector control program may utilize multiple approaches and thus our willingness to consider multiple options within the plan.

With regard to your question on wind direction and application of adulticides, we recognize that language could benefit from clarification. The areas bordering the buffer zone are not under prohibition for adulticiding and the purpose of the buffer is to protect the habitat from adulticide application. However, in discussions with our Ecological Services Office, there was a discussion of a wind speed limit for treatment so as to preclude applications from blowing through that buffer area. The wind speed determinant may still be in play and result from the concurrent Section 7 consultation and conference opinion that is underway in response to this EA.

We appreciate your input and comments. We will ensure those issues are clarified in future documentation. We are considering this input with that received by others in developing our course of action. If we can provide any additional clarification please do not hesitate to contact me directly at 305-872-2239, ext. 209.

Sincerely,

Nancy Finley  
Refuge Manager



Florida Fish and Wildlife Conservation Commission

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April 10, 2014

Ms. Nancy Finley, Refuge Manager  
Florida Keys National Wildlife Refuge Complex  
28950 Watson Boulevard  
Big Pine Key, Florida 33043  
Email: [keydeer@fws.gov](mailto:keydeer@fws.gov)

Re: Draft Environmental Assessment for the Mosquito Management Plan for the Lower Florida Keys National Wildlife Refuge Complex

Dear Ms. Finley:

Florida Fish and Wildlife Conservation Commission (FWC) staff has reviewed the U.S. Fish and Wildlife Service's (Service) draft environmental assessment (EA) for the mosquito management plan for the Lower Florida Keys National Wildlife Refuge Complex, and provides the following comments in accordance with the Fish and Wildlife Coordination Act for your consideration.

**Comments**

- Staff feels that the draft EA provides good background on Lower Keys habitats, flora and fauna, and history. Staff also appreciates the comprehensive analysis of the 4 mosquito control alternatives provided and the comparisons made of their respective scenarios to potentially impact refuge lands.
- Staff feels that the proposed designation of buffer zones limiting adulticide use near occupied and proposed critical habitat for the Bartram's scrub-hairstreak as given in Alternative B represents an improvement over the current (Alternative A) mosquito control practices. However, the proposed landing rate thresholds for Alternative B adulticiding (3 mosquitoes/minute for ground and barrier applications; 10/minute for aerial) seems low; these rates would be easy to reach in many areas depending on how and where specific surveys are performed. It seems that these thresholds and spray areas could be easily manipulated and that determining compliance would be very difficult. If a landing rate threshold-based alternative (Alternative B) is to be implemented, staff feels the thresholds should be raised. Ideally, given their broad spectrum effects, adulticides would be used only to address human health issues, and not nuisance mosquitoes, on conservation lands.
- It was not clear whether the application of barrier treatments to vegetation, using the adulticides bifenthrin and deltamethrin, was necessarily a part of Alternative B; the draft EA says, "...if imposed under alternative B" (p. 94). Staff has concerns about the use of barrier treatments since they have not previously been widely used in the Keys and may deliver higher pesticide concentrations than the ULV methods.
- It should be especially emphasized that we have relatively little information regarding the cumulative wildlife and environmental impacts from the adulticides used in Alternative B, particularly on the specific listed, imperiled, rare, and declining species mentioned or alluded to in the draft EA.

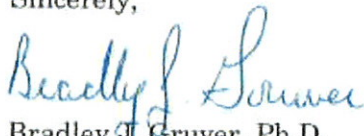
- Staff concurs with the Service's designation of Alternative C, which uses only larvicides on refuge lands, as the "environmentally preferred alternative." This alternative seems to be a good compromise in that it allows effective control of larval mosquitoes (for example, Fig. 8, p. 99) and thus increased enjoyment, health, and safety of refuge visitors, while not imposing on refuge lands the potential adverse environmental impacts associated with chemical pesticides.

**Additional Editorial Comments**

- Providing a table listing acronyms used would be helpful to the reader.
- Within the description of pine rockland (pp. 47-48), it would be appropriate to mention this is where one finds pineland croton, the host plant for the imperiled Bartram's scrub-hairstreak and Florida leafwing butterflies.
- Including the scientific names for those animal and plant species described on pp. 55-62 would resolve any potential confusion in identification.
- "Bartram's hairstreak" is mentioned often in the draft EA. To be consistent with the Service's recent documents proposing this species to be listed as endangered, it should be referred to as "Bartram's scrub-hairstreak."
- The federally endangered Miami blue butterfly is incorrectly referred to as a candidate species on p. 55. Also, within the description of the Miami blue butterfly (p. 58), it could be mentioned that the species has not been seen at Bahia Honda SP since 2010 and may be extirpated. Also, it would be appropriate to mention the Miami blue's host plant (blackbead in Key West NWR; nickerbean at Bahia Honda).

Thank you for the opportunity to comment on this document. If you have specific technical questions regarding the content of this letter, please contact David Cook at 850-921-1021 or by email at [david.cook@myfwc.com](mailto:david.cook@myfwc.com).

Sincerely,



Bradley J. Gruver, Ph.D.  
Section Leader  
Species Conservation Planning Section  
Division of Habitat and Species Conservation



United States Department of the Interior  
**U.S. FISH AND WILDLIFE SERVICE**  
**Florida Keys National Wildlife Refuges Complex**  
*National Key Deer – Key West – Great White Heron – Crocodile Lake*  
28950 Watson Boulevard  
Big Pine Key, FL 33043  
Phone: (305) 872-2239, Fax: (305) 872-3675



May 22, 2014

Dr. Bradley Gruver  
Section Leader  
Species Conservation Planning Section  
Florida Fish and Wildlife Conservation Commission  
620 South Meridian Street  
Tallahassee, FL 32339

Dear Dr. Gruver:

The Florida Keys National Wildlife Refuge Complex (Refuge) received your comments on our draft environmental assessment (EA) for our mosquito management plan. We appreciate you taking the time to provide thoughtful input and we will do our best to respond to the points you bring up.

Your concerns associated with the landing rate triggers for initiating mosquito adulticide activities initially concerned the Refuge as well and we had extensive discussion with the Florida Keys Mosquito Control District (District) concerning this topic. Mosquito “thresholds” as triggers for elevation from one phase of mosquito management to the next were based on historic data collected from the District over more than a decade that indicated frequency of application of adulticide in response to landing rate counts (LRC). LRCs have been used by District personnel to gauge mosquito numbers, and landing rates have been used as indices of mosquito numbers since 1917. When performed by the same individual at the same time in the same place each day, they are an effective monitor of a demonstrable increase and are consistent with the requirements of state law. Host-seeking behavior of mosquitoes is such that upon alighting on a potential host they spend time evaluating the host for suitability and attempting to probe. Generally, mosquitoes do not take off and land again on the same host unless they are disturbed in some way thus staff are instructed in this methodology and it is an effective predictor. The District proposed a model based on the LRC data that was an elevation of the triggers used in past practice and was a better representation of need vs. the current practice of applying adulticide in response to nuisance calls. Under this scenario the District would respond to the call but have an additional responsibility to ensure the threshold had also been met prior to application, thereby providing some consistency and addressing individual tolerance differences in the community.

Your concern associated with the use of barrier treatments to vegetation using the adulticides bifenthrin and deltamethrin is understood. To clarify, the District proposed using this method as a means to reduce the broadcast of adulticides across a larger area using fogging trucks when it may

not be the most effective method to address a localized control need. The District expressed that this approach would be used in isolated circumstances on private lands. The idea was to protect the isolated area from the persistent source without having to repeat truck fogging missions repetitively until the source could be controlled with larvicide or other methods. The concept of using a barrier treatment was viewed as potentially reducing adulticide exposure by reducing these repeated applications in favor of a longer persisting compound. It is recognized that toxicity would potentially be higher in the very limited use area but that was weighed against the less targeted use of fogging missions. The Refuge; however, would not permit the use of barrier treatments on its lands and thus it would not impact critical or occupied butterfly habitat contained on those lands. The concept of barrier treatment was identified in the document to identify the range of tools potentially available as an alternative to spraying in the Refuge.

We concur with your finding that there is limited cumulative impact information in the literature relative to wildlife impacts. It should be understood that under the National Environmental Policy Act (NEPA), cumulative impacts are evaluated in association with the impacts linked with other actions (e.g. construction impacts, ongoing activities) that might be occurring concurrently with the proposed alternatives, not only cumulative or reoccurring use of pesticides in the environment. Since the adulticides used are short lived in the environment, persistence is not an issue but we do recognize that repetitive use of a short persisting pesticide could result in long-term impacts to wildlife, but that would be very difficult to quantify or link directly to any one causal factor. The repetitive treatment impacts were evaluated in the long-term impacts section rather than in the cumulative impacts section of the document.

We appreciate your editorial comments. We will ensure those issues are clarified in future documentation. We are considering your input with that received by others in developing our course of action. If I can provide any additional clarification please do not hesitate to contact me directly at 305-872-2239, ext. 209.

Sincerely,

Nancy Finley  
Refuge Manager

Dennis J. Olle  
934 Andres Ave.  
Coral Gables, FL 33134

April 10, 2014

SENT VIA EMAIL & REGULAR U.S. MAIL

Refuge Manager  
Florida Keys National Wildlife Refuge Complex  
28950 Watson Road  
Big Pine Key, Florida 33043

Re: U.S. Fish and Wildlife Service (the "Service") Environmental Assessment for the  
Mosquito Management Plan dated March 10, 2014 (the "Draft")

Dear Manager Finlay:

I welcome the opportunity to comment on the Draft. I have several concerns, which are set forth briefly below.

1. The so-called Preferred Alternative (Alternative B) improperly places unwarranted emphasis on controlling nuisance mosquitoes. Specifically, there is no documented evidence that the amount of mosquitoes present in Florida Keys National Wildlife Refuge Complex (the "Refuge") has any material impact on either the health or the economy of Big Pine Key, much less the Florida Keys in general. Further, the nebulous health concerns (at 90-91 and 96) have not been sufficiently documented to justify the spraying of (or allowing the drift of) any poisons on the Refuge's land.
2. With respect to the chart which appears at 69, to the extent it reflects the important bases for the Service's selection of Alternative B, such reasoning is both rudimentary and flawed for the following reasons:
  - No consideration (column) with respect to the Florida Leafwing.
  - With respect to Alternative B and its impact on the Bartram's Hairstreak variety, there is no factual basis to conclude that the species would persist (even at its current historically low levels) much less increase.
  - Also with respect to Alternative B, there is no reason to believe it would "benefit other wildlife", especially when compared to Alternatives C or D.
  - There is no factual basis set forth in the Draft to conclude that there is any economic advantage supplied by Alternative B. Further, there is no evidence supporting a conclusion that there is a reasonable likelihood of decreased economic activity resulting from Alternatives C or D.
  - While Alternative D is likely to result in the largest number of mosquitoes being present, for certain limited periods of time, in Florida Keys National Wildlife Refuge Complex, there is no evidence that the sheer number of mosquitoes represents an increased health risk, as opposed to a nuisance. The entire health concerns set forth throughout the Draft are, at best, attenuated and are not sufficient to support a finding that the number of mosquitoes represents an increase in such risk.

- Under the column "Surrounding Community", the community's "satisfaction with mosquito control" criterion is not an appropriate factor to consider for making your decision, and if so, it certainly does not deserve to be treated with the same tenor as the protection of wildlife on a federal wildlife refuge.
3. I am non-plussed as to why the so-called Preferred Environmental Alternative (Alternative C) is not the selected alternative. Your decision to identify Alternative C as such belies your decision to select the more environmentally destructive Alternative B. The protection of wildlife for future generations is, as it should be, your principle goal.

Respectfully,

Dennis J. Oile

DJO/mbd





United States Department of the Interior  
**U.S. FISH AND WILDLIFE SERVICE**  
**Florida Keys National Wildlife Refuges Complex**  
*National Key Deer – Key West – Great White Heron – Crocodile Lake*  
28950 Watson Boulevard  
Big Pine Key, FL 33043  
Phone: (305) 872-2239, Fax: (305) 872-3675



May 22, 2014

Dennis J. Olle  
934 Andres Ave.  
Coral Gables, FL 33134

Dear Mr. Olle:

The Florida Keys National Wildlife Refuge Complex (Refuge) received your comments on our draft environmental assessment (EA) for our mosquito management plan. We appreciate you taking the time to provide thoughtful input and we provide the following responses. We have done our best to have our response relate to your corresponding comment numbers.

1. The Preferred Alternative (Alternative B) improperly places unwarranted emphasis on controlling nuisance mosquitoes – Response: The EA evaluated a series of impact topics but each impact topic stands alone in its assessment. While we evaluated impacts to the community and to refuge functions, there was no attempt to indicate that the nuisance mosquito impacts associated with those assessments trump the concerns pertaining to ecological resources. In that document, we recognize that mosquitoes are a natural component of the environment and the EA discusses the policy and objectives related to protecting the natural resources in substantial detail. The county health department has indicated that mosquito control is an integral component in their efforts to control disease but has not provided thresholds and has stated that issues have to be assessed on an individual basis. Appendix H in the EA provides for consultation and integration of public health concerns in the decision making process.
2. The chart which appears at Page 69 –
  - a. You are correct that the table on Page 69 does not address the Florida leafwing. Bartram's hairstreak is present in the Refuge and the mitigations and safeguards are the same for both species. Florida leafwing was discussed throughout the document in concert with the Bartram's hairstreak, thus in the table, we used Bartram's as an indicator of effects on leafwings in the table.
  - b. The basis for our belief that the Bartram's would persist is founded on the concept that the species currently persists and that lesser use of adulticide in the environment and Bartram's specific habitat buffers and no spray zones provide

for protection beyond that which currently exists. Given monitoring is an important element of this plan, we will be able to document that they will persist and hopefully improve. Should this not be the case, the plan also allows for annual reviews of procedures, which would allow the Refuge to change elements of the plan to allow for additional safeguards.

- c. The concept that other species would benefit was discussed in additional detail within each alternative but in general the concept was that by creating these buffer areas and no spray zones, other species such as pollinators and other invertebrates would receive less exposure leaving a larger area unimpacted by adulticide. This in turn would benefit higher trophic levels. Given we cannot dictate actions for mosquito control on private lands, the concern would be that Alternatives C and D may result in the use of private localized adulticide spray units (which does currently exist on any scale known to us yet are practiced locally and are readily commercially available) in response to the lack of controlled/agreed upon efforts by the Mosquito Control District. Otherwise, the impacts associated with Alternatives C and D would be similar to that of B. This concept was discussed in the narrative sections under Environmental Consequences for each alternative.
  - d. The National Environmental Policy Act does not require that we do a unique study to assess the economic impacts but asks that we conduct a hard look at the issue. It is logical to propose that nuisance mosquitos could impact the community's tourism and attractions including the Refuge by making the environment less hospitable. We did not intend to define its importance quantitatively other than to state that it could exist and that less control of mosquitos as related to the various alternatives would equate to more mosquito/human conflicts.
  - e. We recognize your assertion that the number of mosquito does not equate to disease as being correct. However, the Florida Department of Health has stated that mosquito control is an important component of disease control within the Keys. So it is difficult to rectify how to develop appropriate thresholds for adulticide use; this is also a problem throughout the nation. Appendix C and H provides an overview of how we will work with the Health Department and the District to ensure use is appropriate to address disease concerns, and Appendix D describes the basis for adulticide use thresholds.
  - f. The human environment is defined as the natural and physical environment and the relationship of people with that environment (definition from CEQ - Regulations for Implementing NEPA, Sec. 1508.14). NEPA requires an EA to address the human environment and thus it is appropriate to include an analysis of the surrounding community in the EA to address the "relationship with people" element. The fact the assessment includes this component does not necessarily give it added weight in the decision, but it was an important consideration to include in the evaluation.
3. We identified Alternative C in the EA as the environmentally preferred alternative based on the concept of reduction of adulticide use balanced with some protections to the human environment regarding potential disease and nuisance factors. However, Alternative C is not the agency preferred because the action does not provide for buffers

(as does Alternative B) and thus the District could spray adulticide adjacent to the Refuge boundary on non-Refuge lands and have drift of that material on the Refuge causing losses to sensitive species (in addition formulation, treatment frequency and other components of application could be changed on private lands adjacent to the Refuge in the absence of a permitted plan). As you are aware, the Refuge cannot dictate control efforts off our property and thus Alternative B includes a key provision for protecting butterfly species in the long run through buffers that would not be afforded to us through the other alternatives. In addition, the use of private fogging units might increase under Alternative C allowing for more adulticide to be distributed without our knowledge or understanding as to the source. Enforcement issues would be difficult given the potential number of users, the difficulty in finding impacted species (i.e., butterflies) and the fact that the pesticides involved are ephemeral in nature. Alternative B is therefore the agency preferred alternative.

Again, we appreciate your input and comments. We will ensure those issues are clarified in future documentation. We are considering this input with that received by others in developing our course of action. If we can provide any additional clarification please do not hesitate to contact me directly at 305-872-2239, ext. 209.

Sincerely,

Nancy Finley  
Refuge Manager

# U.S. Fish and Wildlife Service

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## ATTACHMENT B ERRATA

An errata section provides clarifications, modifications or additional information to the EA. The modifications here do not significantly change the analysis of the EA and, therefore a new or revised EA is not needed and will not be produced.

- 1. Modification to Page 27 and 35:** Clarify that the areas bordering the buffer zone are not under prohibition for aduaticiding and the purpose of the buffer is to protect the habitat from aduaticide application. However, in discussions with our Ecological Services Office, there was a discussion of a wind speed limit for treatment so as to preclude applications from blowing through that buffer area. See page 10 under mitigation of this document for wind speeds.
- 2. Modification to page 47:** Within the description of pine rockland (pp. 47-48), it would have been appropriate to mention that this habitat is where one finds pineland croton, the host plant for the imperiled Bartram's scrub-hairstreak and Florida leafwing butterflies.
- 3. Modification to Page 55:** The federally endangered Miami blue butterfly was incorrectly referred to as a candidate species on p. 55.
- 4. Modification to Page 58:** Within the description of the Miami blue butterfly (p. 58), it could have been mentioned that the species has not been seen at Bahia Honda SP since 2010 and may be extirpated. Also, it would be appropriate to mention the Miami blue's host plant is blackbead in Key West NWR and nickerbean at Bahia Honda.
- 5. Modification to Page 107:** Reference for Anderson 2012 was omitted and should list: Anderson C.T., K.A. Bradley, and S. Saha. 2012. Evaluation of Management Techniques in Pine Rockland Forests of the National Key Deer Refuge. Proceedings of the Annual Wildlife Society Conference 2012.
- 6. Modification to Page 109:** Reference for Carlson et al. 1993 was omitted and should list: Carlson, P.C., G.W. Tanner, J.M. Wood, and S.R. Humphrey. 1993. Fires in Key deer habitat improves browse, prevents succession, and preserves endemic herbs. Journal of Wildlife Management 57: 914-928.
- 7. Modification to Page 122:** Reference for USFWS 1998, USFWS 1999 was omitted and should list: U.S. Fish and Wildlife Service (1998). Draft Multi-Species Recovery Plan for the Threatened and Endangered Species of south Florida, Volume I and U.S. Fish and Wildlife Service. 1999. South Florida multi-species recovery plan. U.S. Fish and Wildlife Service, Atlanta, Georgia.
- 8. General Comment:** "Bartram's hairstreak" is mentioned often in the draft EA. To be consistent with the Service's recent documents proposing this species to be listed as endangered, it should be referred to as "Bartram's scrub-hairstreak."