

**Action Plan to Reduce Exposure of Vulnerable  
Federally Listed Endangered and Threatened Species  
from the Use of Conventional Pesticides**



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**List of Other Documents Included in the docket to support this Vulnerable Species Action Plan<sup>1</sup>**

- Ecological Mitigation Support Document to Support Endangered Species Strategies, Version 1.0, dated July 2024

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<sup>1</sup> <https://www.regulations.gov/docket/EPA-HQ-OPP-2023-0327>

## 1. Executive Summary

EPA has completed the Vulnerable Species Pilot (VSP) that it initiated in June 2023, and has transitioned to the Vulnerable Species Action Plan (VSAP). The VSAP provides a framework for EPA to adopt early, meaningful protections to address potential population-level impacts for federally threatened and endangered (listed) species that EPA identifies as particularly “vulnerable” to pesticides. A primary goal of the action plan is to further the conservation and recovery of listed species by helping alleviate the stressor of pesticide exposure and potential resultant impacts to listed species. It applies to non-residential outdoor uses of conventional pesticides within the contiguous United States (CONUS)<sup>2,3</sup> and may include agricultural and non-agricultural uses. Similar to the Final Herbicide Strategy and the Draft Insecticide Strategy, the plan describes a three-step framework that EPA will use for vulnerable species when considering FIFRA actions for conventional pesticides (such as new chemical registrations and registration review). EPA plans to incorporate mitigation from the VSAP into applicable pesticide actions, even if effects determinations have not yet been made or any necessary consultation with the U.S. Fish and Wildlife Service (FWS)<sup>4</sup> has not been completed. The VSAP describes how EPA finalized the initial list of vulnerable species, the approach EPA plans to use to evaluate potential population-level impacts to these listed species and any associated mitigation, and how EPA plans to expand the approach to additional listed species in the future. Stakeholder input on the VSP and EPA’s efforts to develop strategies across groups of chemicals (*e.g.*, herbicides, insecticides) helped EPA refine and identify the approaches in this VSAP.

EPA identified 27 species (Table 1) listed by the FWS that are located within CONUS as “vulnerable species” and within the scope of the VSAP. The species include various types of vertebrates, invertebrates, and plants. EPA reconsidered the list of species included in the pilot in light of the vulnerable species description it is using for the VSAP and determined that seven did not meet the definition of a vulnerable species, but EPA is including seven new species in the VSAP that meet the vulnerability factors. Over time, EPA expects to add species to the VSAP during formal section 7(a)(2) pesticide consultations with FWS under the Endangered Species Act or as a result of EPA’s continued coordination with FWS.

Like the Herbicide and Insecticide Strategies, the VSAP provides a consistent and transparent approach to assess potential population-level impacts to the vulnerable species and to identify mitigations to reduce these impacts. This framework, which builds off the Herbicide Strategy (final released in August 2024) and the Insecticide Strategy (draft released in July 2024), is intended to provide similar and consistent mitigation for the vulnerable species for pesticides with similar characteristics (*e.g.*, exposure, toxicity, application method).

EPA identifies the potential for population-level impacts (Step 1), identifies the type and level of mitigation (Step 2), and identifies where mitigation applies (Step 3). The VSAP also explains that when EPA has developed a strategy that is applicable to the pesticide action, it will apply that strategy first. The

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<sup>2</sup> The VSAP does not apply to rodenticides since EPA is addressing them within their own strategy.

<sup>3</sup> EPA is currently developing a strategy for those FWS species that are located within Hawaii and plans to consider developing a strategy for those species located within the territories.

<sup>4</sup> The VSAP does not apply to species listed by the National Marine Fisheries Service (NMFS) as EPA is separately working with them to develop a programmatic consultation process to address potential impacts of pesticides to NMFS’ listed species and their critical habitat.

VSAP supplements that strategy such that EPA evaluates pesticide uses, exposure routes, and vulnerable species that are not covered by it.

The VSAP includes mitigation for common exposure routes, including spray drift and runoff/erosion, but also addresses other routes of pesticide exposure that could have population-level impacts to the vulnerable species. For example, this may include on field exposures of a vulnerable species that likely visits agricultural fields. This may also include other (less common) exposure routes, such as volatilization or bioaccumulation. For the vulnerable species, EPA will only require additional mitigation when necessary in geographically specific areas (referred to as Pesticide Use Limitation Areas or PULAs). EPA is currently developing a process to refine maps that EPA plans to use for PULAs. EPA does not plan to implement the VSAP in registration review for a particular vulnerable species prior to refining its map, which will likely be later in 2024.

The VSAP is not self-implementing. EPA will implement the VSAP through its FIFRA actions in registration and registration review. This document explains how EPA plans to consider and apply the VSAP to conventional new active ingredient registration actions and conventional registration review actions. As is current practice, EPA will seek public comment on these new chemical registration and registration review actions that would include, among other things, descriptions of how the VSAP was applied to the action.

## 2. Introduction

### 2.1. EPA's Workplan and Strategies to Protect Listed Species

When the Environmental Protection Agency (EPA or Agency) takes an action on a pesticide registration (*i.e.*, registers a pesticide or reevaluates it in registration review) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the Agency may also have a responsibility under the Endangered Species Act (ESA) to ensure that the pesticide is not likely to jeopardize the continued existence of federally threatened or endangered (hereafter referred to as "listed") species, or result in the destruction or adverse modification of their designated critical habitats. Meeting this ESA responsibility is a formidable task, considering the tens of thousands of pesticide products and registration amendments for which EPA is required to review potential effects for over 1,700 U.S. listed species.

Given these challenges, in April 2022, EPA released a workplan (USEPA, 2022a) and an update in November 2022 (USEPA, 2022b) on how it plans to meet its ESA obligations as part of pesticide registration processes conducted under FIFRA. The update also describes planned strategies for identifying early mitigation measures to address potential population-level impacts to listed species across groups of chemicals (*e.g.*, herbicides, rodenticides, insecticides) or in certain regions across the U.S. (*e.g.*, Hawaii). EPA expects that these strategies would lead to more efficient determinations of whether, how much, and where mitigations may be needed to reduce the potential for population-level impacts to listed species from many uses of conventional pesticides. This Vulnerable Species Action Plan (VSAP) is one of EPA's efforts to identify early mitigation measures for a subset of listed species. This VSAP complements other ESA strategies, including the Herbicide Strategy (final released in August 2024<sup>5</sup>)

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<sup>5</sup> Final Herbicide Strategy (EPA-HQ-OPP-2023-0365); [Regulations.gov](https://www.regulations.gov)

and the Insecticide Strategy (draft released in July 2024<sup>6</sup>). This Action Plan was informed by a Pilot effort and public comments that are discussed below.

## 2.2. Vulnerable Species Pilot

Consistent with the Agency's April 2022 Pesticide ESA Workplan, EPA released the draft VSP white paper on June 22, 2023. In the draft VSP white paper, EPA identified 27 listed species as highly vulnerable to pesticides, identified mitigation to protect the species by avoiding or minimizing pesticide exposure, and described an approach to implement the mitigation in certain future pesticide decisions. EPA provided a 45-day public comment period on the draft white paper and received more than 10,000 comments. Approximately 200 of these were unique comments across different stakeholders, with the remainder being a mail-in campaign in support of the VSP. Major public comments requested EPA to re-consider its approach to developing PULAs; provide more clarity on non-agricultural uses and proposed exemptions; include additional information on the proposed mitigations; clarify the approach for selecting vulnerable species; and consider the risk profile of a pesticide when identifying mitigations. On November 21, 2023, EPA released an update to the VSP to help the public better understand the status of this pilot. The update indicated that EPA intended to provide additional updates by fall 2024<sup>7</sup>.

As EPA concludes this pilot, EPA identified an approach that it will use for vulnerable species when considering FIFRA actions for conventional pesticides (such as new chemical registrations and registration review). EPA is referring to this approach as the Vulnerable Species Action Plan or VSAP. This action plan describes the approach EPA plans to use to evaluate the potential for population-level impacts to vulnerable species, any mitigations that may be needed to address those impacts, and how EPA plans to expand the list of vulnerable species beyond the initial species in the VSAP.

## 2.3. What is a "Vulnerable Species?"

EPA is including 27 species listed by FWS (**Table 1**) within the scope of the VSAP. For the VSAP, in response to public comments on the VSP draft white paper, EPA re-evaluated its description of a vulnerable species. EPA defines a vulnerable species as a listed species that is particularly vulnerable to pesticides due to a combination of factors including a declining population trend, small number of individuals or small number of populations (*e.g.*, groups of individuals or sub-populations), limited distribution (*e.g.*, endemic, constrained and/or isolated populations), and occurrence in areas that may be exposed to pesticides. Species are included in the VSAP when potential pesticide impacts to a small number or group of individuals may have population level impacts to the species.

EPA reviewed available information from FWS to evaluate the vulnerability of a species relative to other listed species, and information indicating that pesticides are a stressor. EPA included FWS's recent Biological Opinions for malathion, Enlist, and methomyl (draft) when evaluating whether pesticides may be considered a stressor. **Appendix A** includes information on the 27 vulnerable species in the VSAP with details on their vulnerability to potential pesticide exposures relative to other species and information on pesticides as a stressor to the vulnerable species.

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<sup>6</sup> Draft Insecticide Strategy (EPA-HQ-OPP-2024-0299); [Regulations.gov](https://www.epa.gov/regulations)

<sup>7</sup> Additional information on the vulnerable species pilot is available at: <https://www.epa.gov/angered-species/implementing-epas-workplan-protect-endangered-and-threatened-species-pesticides>

EPA reconsidered the list of species included in the pilot in light of the vulnerable species description it is using for the VSAP and determined that seven did not meet the definition of a vulnerable species (particularly vulnerable populations and potentially impacted by pesticides): the American burying beetle, Okeechobee gourd, Ouachita rock pocketbook, Rayed bean, Riverside fairy shrimp, San Diego fairy shrimp, and Taylor’s checkerspot butterfly (more information is provided in **Appendix B**). However, EPA is including seven new species in the VSAP that do meet the description of a vulnerable species: two new species that EPA identified during the Enlist consultation that were not in the pilot (the Spring Creek bladderpod and Whorled sunflower) and five additional species from Florida’s Lake Wales Ridge area (Carter’s mustard, Highlands scrub hypericum, Lewton’s polygala, Sandlace, and Snakeroot) to be inclusive of all of the vulnerable plants within this well-defined region since they meet our vulnerability factors of having confirmed pesticide exposure and a low number of populations that are in decline (**Table 1**). Going forward, EPA will consider expanding the list of vulnerable species when identified through ESA section 7(a)(2) consultations with FWS or as a result of EPA’s continued coordination with FWS (**Section 4.7** includes more discussion of this plan).

**Table 1. Species Currently Included in the VSAP**

Species	Taxon
Attwater's prairie chicken	Bird
Buena Vista Lake Ornate Shrew	Mammal
Avon Park harebells*	Plant
Carter's mustard*	Plant
Florida ziziphus*	Plant
Garrett’s mint*	Plant
Highlands scrub hypericum*	Plant
Lewton's polygala*	Plant
Sandlace*	Plant
Scrub blazingstar*	Plant
Scrub mint*	Plant
Short leaved rosemary*	Plant
Snakeroot*	Plant
Wireweed*	Plant
Leedy's roseroot	Plant
Madison cave isopod	Aquatic Invertebrate
Mead's milkweed	Plant
Ozark Cavefish	Fish
Palmate-bracted bird's beak	Plant
Poweshiek skipperling	Terrestrial Invertebrate
Rusty patched bumble bee	Terrestrial Invertebrate
Scaleshell mussel	Aquatic Invertebrate
Spring creek bladderpod	Plant
White Bluffs Bladderpod	Plant
Whorled Sunflower	Plant
Winged Mapleleaf	Aquatic Invertebrate
Wyoming toad	Amphibian

\*Located on the Lake Wales Ridge in Florida

## 2.4. Scope and Goals of Vulnerable Species Action Plan

In the VSAP, EPA worked with FWS to identify species that may be highly vulnerable to potential population-level impacts of pesticides. As a result, these species face a higher likelihood of a future jeopardy or adverse modification determination if exposed to pesticides. The VSAP focuses on proactively identifying mitigation measures that can be implemented during a pesticide registration or registration review action to protect these highly vulnerable listed species even before EPA completes an effects determination or completes a consultation with FWS.

The VSAP applies to non-residential outdoor uses of conventional pesticides in CONUS (agricultural and non-agricultural) that may have the potential for population-level impacts to the species included in the plan, except rodenticides, which are addressed within their own strategy. The VSAP covers common pesticide exposure routes, including spray drift and runoff/erosion, and other, less common routes of exposure that may be a concern for a species, such as on-field exposure (for species likely to visit agricultural fields), volatilization, and bioaccumulation.

The primary goals of the VSAP include:

1. Further the conservation and recovery of listed species by helping alleviate the stressor of pesticide exposure and potential resultant impacts to listed species;
2. Supplement strategies by evaluating potential impacts and identify associated mitigations specific to vulnerable species;
3. Evaluate the potential for population-level impacts and associated mitigations to the vulnerable species if a strategy does not apply;
4. Improve the efficiency of future ESA consultations on pesticides; and
5. Increase regulatory certainty for growers and other stakeholders.

**Table 2. Major Similarities and Differences of the Three-step Frameworks of the VSAP and Herbicide and Insecticide Strategies**

Step	VSAP	Final Herbicide Strategy	Draft Insecticide Strategy
1 – Identify potential for population-level impacts	<p>Direct impacts to listed vulnerable species, which includes vertebrates, invertebrates, and plants.</p> <p>Indirect impacts to species that the vulnerable species rely on for food, forage, and reproduction.</p>	<p>Direct impacts to listed plants.</p> <p>Indirect impacts to generalist animals, which include species that rely on plants for prey and habitat.</p>	<p>Direct impacts on listed invertebrates.</p> <p>Indirect impacts to generalists, which include species that rely on invertebrates for prey and pollination.</p>



Step	VSAP	Final Herbicide Strategy	Draft Insecticide Strategy
2 – Identify type and level of mitigation for exposure pathways	Spray drift, runoff/erosion, on field and other routes of exposure from agricultural and non-agricultural uses.	Spray drift, runoff/erosion, exposure from agricultural uses.	Spray drift, runoff/erosion, on field exposure from agricultural uses.
3- Identify where mitigation applies	Species specific locations (PULAs) and Bulletins.	Mitigation for generalists implemented broadly (general label). Direct impacts implemented using species-specific locations (PULAs) and Bulletins.	Mitigation for generalists implemented broadly (general label). Direct impacts implemented using species-specific locations (PULAs) and Bulletins.

2.5. Organization of this Document and Supporting Documents

**Section 3** explains the three-step framework that EPA expects to use to identify potential population-level impacts, identify mitigation measures to address these impacts, and determine the geographic extent of the mitigation measures. **Section 4** describes EPA’s plan for implementing the VSAP, including the identification of additional vulnerable species in the future. Where possible, the framework and implementation plan for VSAP is the same as or consistent with the Final Herbicide Strategy.

This document includes two supporting appendices. **Appendix A** provides more information on why each species meets the VSAP’s description of a vulnerable species. **Appendix B** provides additional information for the seven species included in the pilot but not the VSAP, with an explanation of why they do not meet the current description of a vulnerable species.

The VSAP is informed by Version 1.0 of the *Ecological Mitigation Support Document to Support Endangered Species Strategies*<sup>8</sup> (referred to throughout this document as the “**Ecological Mitigation Support Document**”). The **Ecological Mitigation Support Document** contains supporting information on mitigation measures EPA identified to date, and for which EPA has data on their efficacy in reducing exposure. The development of the support document includes consideration of stakeholder feedback and information collected during the development of the Herbicide Strategy. EPA took comment on the earlier version of the Ecological Mitigation Support Document, the Draft Herbicide Strategy, and the VSP draft white paper. EPA expects these mitigation measures to evolve as the Agency obtains additional information on potential mitigation and expects to provide updated versions of the **Ecological Mitigation Support Document** in the future.

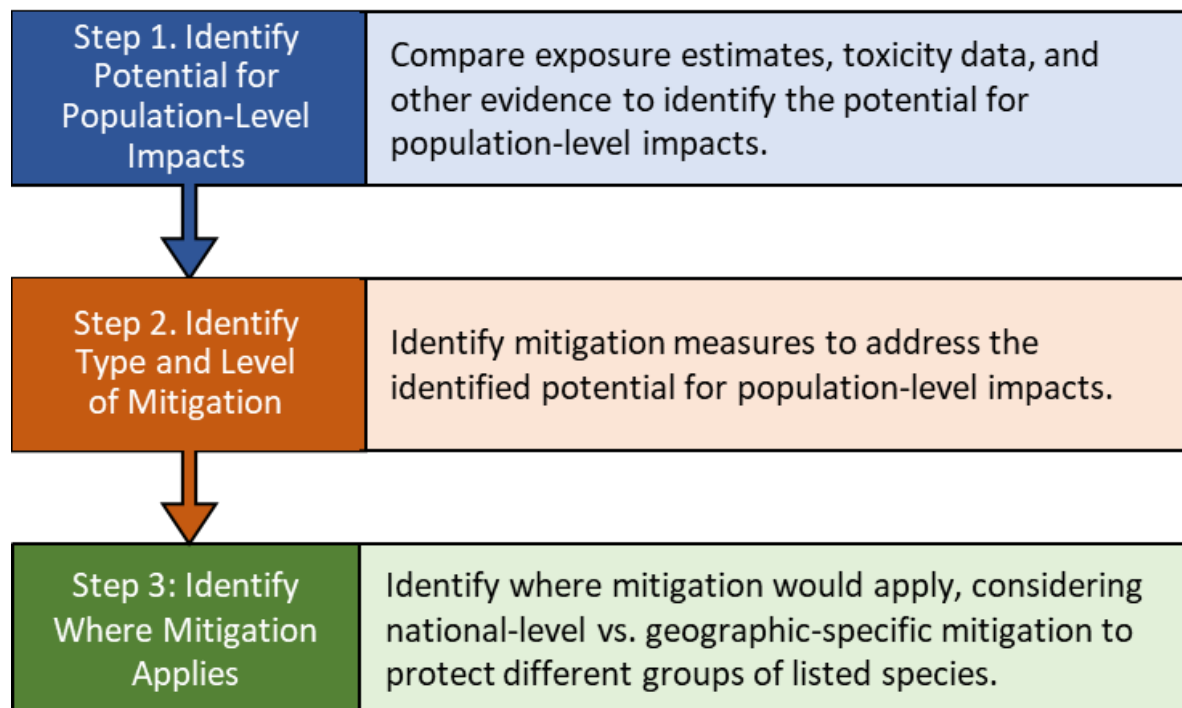
EPA is currently developing another document for this action plan that it expects to release in the coming months that will include a more detailed description of the VSAP’s three-step framework. The document will offer more specific information on the assessment process for evaluating potential

<sup>8</sup> Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2023-0365-1133>

population-level impacts for the vulnerable species. The framework described in this action plan is similar to the three-step framework described in the Herbicide Strategy (See Section 3 of that document<sup>9</sup>). Where possible, EPA used elements of the Herbicide Strategy for the VSAP. For example, Steps 1 and 2 of the Herbicide Strategy framework are used to identify potential population-level impacts to the listed plants in the VSAP and levels of spray drift and runoff/erosion mitigations for agricultural uses of herbicides.

### 3. Framework for Identifying Mitigation Measures for Vulnerable Species

The decision framework identifies the need for, level of, and extent of mitigation to reduce the potential for population-level impacts to the highly vulnerable listed species when considering conventional pesticide FIFRA actions for which this action plan would apply (**Figure 1**). This section provides an overview of the three-step framework. This framework was adopted from the Herbicide Strategy and the Insecticide Strategy to align with those processes and reduce complexity.



**Figure 1. Overview of the Vulnerable Species Action Plan 3-step framework.**

#### 3.1 Step 1

**Step 1** establishes the process for assessing the potential for population-level impacts to the vulnerable species. When EPA identifies that a pesticide demonstrates risk for a taxon that includes a vulnerable species (e.g., potential impacts to plants which include the vulnerable species, Mead’s milkweed), then the vulnerable species enters the Step 1 process. This step is based on long standing FIFRA risk

<sup>9</sup> Available at: <https://www.regulations.gov/document/EPA-HQ-OPP-2023-0365-1137>

assessment approaches EPA uses to identify potential ecological risk to non-target species, with additional considerations to refine the typical FIFRA risk assessment to account for evaluations of population-level impacts. In the VSAP, EPA considers the use pattern and environmental fate characteristics of conventional pesticides to estimate exposures in aquatic, wetland, and terrestrial environments. Exposures are estimated for agricultural and non-agricultural uses that are relevant to the vulnerable species and the action. Relevant exposure routes and uses vary by species, pesticide, and application method, so EPA will assess exposure routes based on each of these factors. For example, Attwater's prairie chicken may forage on corn fields, so if a pesticide's potential use sites include corn, EPA would assess on-field exposure.

EPA then compares these exposure estimates to toxicity data that represent direct impacts to the vulnerable species and the impacts to species that the vulnerable species rely on for food, shelter, and reproduction. This comparison of exposure to toxicity is considered by EPA for determining the potential for population-level impacts to occur to vulnerable species from a pesticide's registered or proposed use. In the population-level assessment, EPA supplements this analysis with other information including available incident and monitoring data in addition to how well exposure and toxicity estimates reflect important characteristics of the vulnerable species. This process results in the designation of not likely, low,<sup>10</sup> medium, or high potential for population-level impacts to vulnerable species and a commensurate level of mitigation (**Step 2**).

### 3.2 Step 2

**Step 2** involves identifying the level of mitigation to reduce exposure to address the potential for any population-level impacts from Step 1. EPA identifies a greater level of mitigation where the potential for those impacts is higher and less mitigation where the potential is lower. Where applicable, this VSAP relies on mitigation used by the Herbicide Strategy to reduce spray drift and runoff/erosion transport.

For reducing exposure from spray drift transport, EPA typically identifies a buffer. The buffer distance increases with the level of mitigation (low, medium, or high). If a buffer is identified, EPA plans to use the same approach described in the Herbicide Strategy to determine the buffer distance. Like the Final Herbicide and Draft Insecticide Strategies, EPA also identified other mitigation measures that a pesticide applicator could use to reduce a buffer distance such as application parameters (such as specific equipment, application rate, droplet size distribution), the use of a windbreak/hedgerow or forested/shrubland area as a physical barrier, or the relative humidity during application. See the **Ecological Mitigation Support Document** for additional details.

For reducing exposure from pesticide runoff/erosion, EPA would identify the level of mitigation points needed: 3 points of mitigation for low impacts, 6 points for medium impacts, and 9 points for high impacts. The point system is consistent across the VSAP, Final Herbicide Strategy, and Draft Insecticide Strategy. EPA developed a menu of runoff/erosion mitigation from practices that EPA has deemed effective at reducing pesticide runoff, and that are available to applicators in different parts of the country. The mitigation menu provides flexibility for pesticide applicators to use mitigation that is best for their situation. For example, pesticide applicators will get the same amount of runoff relief points as in the Final Herbicide Strategy and Draft Insecticide Strategy with the national map of runoff vulnerability by county. EPA groups the mitigation measures as application parameters, characteristics of the treated

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<sup>10</sup> A low potential for population-level impacts is a concern because there are still potential impacts. Low potential for impacts is associated with less mitigation.

field, runoff vulnerability, in-field mitigations, mitigation that are adjacent to the treated field, and retention systems that capture runoff and control discharge. The menu also includes points for applicators that work with a runoff/erosion specialist, participate in a conservation program, and/or track mitigation.

EPA expects mitigation for the other routes of exposure will be limited to a subset of conventional pesticides and vulnerable species because potential impacts from spray drift and runoff are more common than from other exposure pathways. On-field mitigations may include application restrictions during times when crops are blooming, or no-application zones within specific habitats of the species. For volatilization, EPA expects to apply mitigation measures for volatile chemicals that have been identified previously for other pesticide registration actions, such as low volatilization formulations and watering in during application. EPA expects that runoff and erosion mitigations will help reduce exposure from bioaccumulation due to less overall exposure in aquatic habitats.

EPA identified several non-agricultural uses that may impact the vulnerable species, based on additional input from FWS species experts, non-agricultural user groups, and publicly available FWS species information (e.g., Status of Species Assessments) regarding the types of pesticides cited as impacting each of the proposed vulnerable species. These uses include mosquito adulticide, forestry, pasture, rangeland, and invasive species management. EPA will consider existing FWS biological opinions that include these uses to inform potential mitigations when EPA identifies a potential for population-level impact for a vulnerable species. For example, for mosquito adulticides, FWS has completed a biological opinion for malathion that directs applicators to avoid mosquito adulticide applications within certain geographic areas unless the applicators are coordinating with FWS<sup>11</sup>. FWS is working to better define the coordination process for expanding this mitigation to more mosquito adulticides. EPA also recognizes the importance of invasive species management, that invasive species are often a stressor for listed species, and that many users of pesticides for invasive species management are Federal or state agencies that are already coordinating with FWS. EPA is also aware of existing consultations between the FWS and other government agencies, particularly pesticide applications in forestry. EPA will consider these consultations to the extent it is aware of them, particularly if they are comprehensive for pesticide impacts. EPA will also continue to work with non-agricultural pesticide users to develop mitigation options specific for non-agricultural uses. For example, EPA is exploring a strategy for mosquito adulticides as described in EPA's November 2022 update to the ESA workplan (USEPA, 2022b).

The PULA development process (discussed in **Section 4.4**) will help EPA identify and refine non-agricultural uses that may need to be considered when evaluating impacts to vulnerable species. If there are population-level impacts from non-agricultural uses identified above in **Step 1**, then EPA will identify mitigation for those uses in **Step 2**. As EPA has done for agricultural uses, EPA plans to work with non-agricultural pesticide users to develop mitigation options specific for these uses. While EPA focused on agricultural uses in developing the mitigation in this plan and the Final Herbicide and Draft Insecticide strategies, EPA plans to use those mitigation measures when they apply to non-agricultural uses. For example, EPA would evaluate exposure from pasture and rangeland uses of a pesticide that could be

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<sup>11</sup> Malathion Mosquito Control Mitigation: *Where feasible, avoid application. If avoidance is not feasible or impairs the ability of the mosquito control district or agency to protect the public's health and welfare, coordinate with the local FWS ecological services field offices to determine appropriate measures to ensure the proposed application is likely to have no more than minor effects on the species (FWS points of contact are available through the information, planning, and consultation (IPaC) website <https://ecos.fws.gov/ipac/>). The applicator must retain documentation of the technical assistance in the agreed-upon species-specific measures that were implemented.*

used in proximity to the vulnerable species habitat. If there were population-level impacts from this pasture or rangeland use, then EPA would identify mitigation for the use. EPA expects that many of the mitigation measures developed for agriculture may be effective for pasture and rangeland pesticide applications.

### 3.3 Step 3

**Step 3** involves identifying where in CONUS to apply the different mitigation for direct impacts to vulnerable species and species they rely on. EPA plans to require any necessary mitigation only in geographically-specific areas (PULAs). Pesticide applicators would be responsible for reviewing these specific areas located on the EPA's Bulletins Live! Two (BLT) website to determine whether they are required to abide by any geographically-specific mitigation. Further, as described in **Section 4.4**, EPA is in the process of refining maps for these PULAs so that any resulting mitigation is targeted to protect listed species while minimizing impacts to users.

Taken together, the 3-step framework includes many refinements to EPA's standard FIFRA ecological assessments and for identifying mitigation to address those impacts for vulnerable species. The VSAP framework considers higher tier concepts such as variability in exposure across geography and differences in listed species impacts and habitats beyond the typical FIFRA ecological assessment for non-target species.

EPA incorporated elements of FWS's approach to developing biological opinions for pesticides and identifying mitigation to address population-level impacts (*e.g.*, USFWS, 2022a; USFWS, 2024a) into the 3-step framework. For example, FWS assesses potential population-level impacts by considering multiple factors such as pesticide exposures, impacts from direct toxicity, loss of diet or habitat, and overlap with potential use sites. FWS considers a combination of species-specific mitigation that could be included on pesticide product labeling, including directing applicators to EPA's BLT system. EPA incorporated elements from FWS's approaches to align the VSAP where there is a potential for population-level impacts and what early mitigation could be applied to address those impacts through registration or registration review actions.

When considering whether the potential impacts for a listed species to rise to the level of population-level impacts using the Final Herbicide and Draft Insecticide strategies, EPA evaluates the overlap between the species' locations and the potential use sites of a pesticide. If the overlap for a species is less than 5%, EPA does not consider that species to have a potential for population-level impacts. For those species with an overlap of 5% or more, EPA considers other factors including species-specific factors that would limit exposure such that there would not be a population-level impact. Due to the vulnerability of the VSAP species, a small amount of overlap could lead to population-level impacts. Therefore, EPA will use a lower overlap threshold of 1% for the VSAP species. This does not mean that EPA will automatically determine that VSAP species that exceed this threshold have a potential for population-level impacts. EPA will consider other factors from the risk assessment as it more closely considers the vulnerable species.

## 4. Implementing the Vulnerable Species Action Plan

The VSAP itself is not self-implementing. Rather, EPA will consider the applicability of this VSAP to inform conventional active ingredient registration and registration review actions. This section describes EPA's plan for implementing the VSAP through these actions. This section describes how VSAP interplays with other strategies and efforts (*e.g.*, Final Herbicide Strategy, Draft Insecticide Strategy, and offsets). EPA also plans to continue its discussions with FWS to streamline ESA consultations. The development of this VSAP and the future issuance of strategies is expected to inform these processes.

### 4.1. Consideration of Strategies

EPA is developing several strategies to group mitigations by pesticide type, use site, location, or other considerations. These strategies are intended to inform EPA's registration and registration review decisions when addressing population-level exposures and impacts relevant to listed species. The VSAP supplements the strategies such that EPA evaluates pesticide uses, exposure routes, and species taxa that are not covered by the existing strategies for the vulnerable species. For example, EPA grouped listed species in the strategies by taxa in determining what types of impacts may be expected from spray drift and runoff and the types of mitigation to address those impacts (*e.g.*, plants and invertebrates). In many cases, if a vulnerable species' taxon is included in a strategy (*e.g.*, plants covered under the Herbicide Strategy), the mitigation in the strategy likely addresses those concerns. In other cases, the taxon of a vulnerable species may not be considered by a strategy (*e.g.* fish, birds, mammals, reptiles, and amphibians) as is the case for the Final Herbicide Strategy because it is targeted to direct impacts to plants and impacts to species that rely on plants for food, shelter, or reproduction. Some herbicides may have direct impacts to species that are not plants (*e.g.*, birds). The VSAP ensures EPA evaluates these impacts to the vulnerable species by including them in the assessment even when they are not the target species of the strategy. EPA will also use the VSAP framework to evaluate the vulnerable species when there is not a current strategy (*e.g.*, a new fungicide active ingredient prior to a fungicide strategy). The VSAP is intended to be a comprehensive framework that accounts for the vulnerable species regardless of whether it is covered by a strategy.

The vulnerable species are diverse in their life history, locations, and potential for pesticide exposures. However, many species can be grouped in terms of what types of impacts may be expected from types of pesticides and the types of mitigation to address those impacts. Pesticide impacts to a given species may vary based on its life history (*e.g.*, diet, migration). Pesticide uses and potential impacts also vary across the U.S. based on crops grown, non-agricultural use sites (*e.g.*, forestry) and associated pest pressures. Often classes of chemicals have similar impacts, especially considering their target pests (*e.g.*, herbicides may impact non-target plants). The various strategies and this action plan are intended to account for the characteristics of the individual chemical and identify landscape scale mitigations, as appropriate, based on location, pesticide class, species, or use site (**Table 3**). Grouping species or pesticide uses based on their similarities will allow EPA to more efficiently and effectively identify and implement mitigations at a landscape scale through FIFRA registration and registration review actions. This will allow EPA to further its goals to reduce pesticide exposures and impacts to listed species, further the conservation of listed species, and streamline ESA section 7(a)(2) consultations on specific

actions. The final strategies and this action plan are expected to inform registration and registration review decisions. For more information on the strategies identified in **Table 3**, see EPA's ESA website<sup>12</sup>.

**Table 3. Summary of Mitigation Strategies that EPA is Developing or Has Committed to Develop**

Mitigation Strategy	Location <sup>1</sup>	Use Site	Conventional Pesticide Type
Herbicides	CONUS	Agriculture	Herbicides
Insecticides	CONUS	Agriculture	Insecticides
Rodenticides	U.S. and Territories	All	Rodenticides
Fungicides	CONUS	Agriculture	Fungicides
Vulnerable species action plan	CONUS	Agriculture Mosquito adulticide Rights of Way Forestry Rangeland	All (except rodenticides)
Hawaii	Hawaii	All	All (except rodenticides)

<sup>1</sup>CONUS = contiguous U.S.

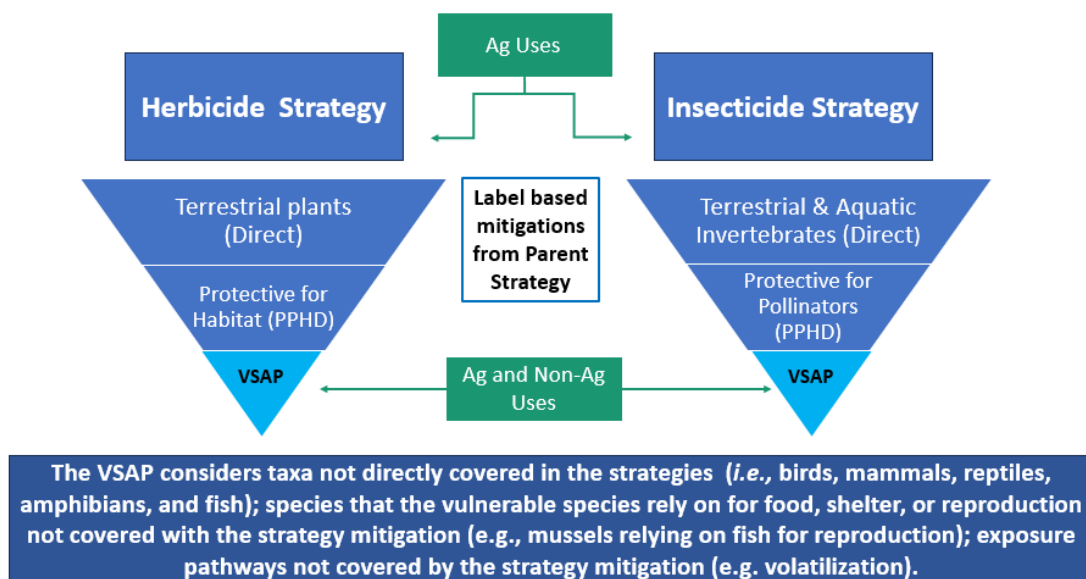
Some strategies are independent of each other. For example, the Rodenticides Strategy focuses on all uses of rodenticide products throughout the US, and therefore, rodenticides are not covered in the VSAP. Other strategies complement each other. EPA anticipates that multiple strategies located within CONUS (e.g., Herbicide and Insecticide Strategies) will complement the VSAP. For example, once the refined vulnerable listed species PULAs are finalized, EPA will be able to implement the VSAP and the Herbicide Strategy together, such that for an individual herbicide, EPA expects to consider both the Herbicide Strategy and VSAP.

When the three step frameworks for the Herbicide Strategy and VSAP are applied, EPA will identify mitigation for listed animals that are generalists (to be applied on the general label) and any mitigation that may be applied for listed plants and their obligates using Herbicide Strategy PULAs. EPA will then identify whether there are potential population-level impacts from direct impacts to the vulnerable species themselves and/or to species that the vulnerable species rely on for food, shelter, or reproduction and any mitigation to address those impacts. The mitigation identified for the vulnerable species will be compared to the mitigation on the general label from the Herbicide Strategy (or Insecticide Strategy, or other future strategies, after they are finalized). For example, if the general label mitigation from the Herbicide Strategy is equal or exceed the levels of mitigation identified for the vulnerable species, the general label will provide the mitigation for these species. If more mitigation is needed for any of the vulnerable species, EPA will implement them using PULAs and geographic-specific Bulletins. The Herbicide Strategy is expected to address many of the plant-related impacts (from agricultural uses) on vulnerable species that are generalist animals (e.g., the rusty patched bumble bee).

Through the VSAP, for exposure routes or uses not included in the Herbicide Strategy, EPA intends to use PULAs to geographically specify where additional mitigation may be needed to address population-level impacts to the vulnerable species, such as when potential population-level impacts are identified for on-field exposures to the Spring creek bladderpod (which is known to occur on corn fields) and non-

<sup>12</sup> <https://www.epa.gov/endangered-species/implementing-epas-workplan-protect-endangered-and-threatened-species-pesticides>

agricultural uses that would appear in Bulletins. EPA would mitigate all relevant routes of exposure that contribute to population-level impacts. EPA expects that the VSAP and Insecticide Strategy will similarly complement each other for insecticides when the Insecticide Strategy is finalized. **Table 2** illustrates the major similarities and differences between the frameworks of the VSAP and the Herbicide and Insecticide Strategies. **Figure 2** depicts EPA’s thinking on how the VSAP and Herbicide or Insecticide Strategy complement each other.



**Figure 2. Illustration of How Vulnerable Species Action Plan Mitigation Compliments Herbicide and Insecticide Strategies**

#### 4.2. Consideration of Offsets

The VSAP includes mitigation that focuses on minimization of exposure and impacts. It may also include avoidance in some cases (e.g., for direct applications to known habitat of a vulnerable species identified within a PULA). At times, other federal agencies have used offsets to meet ESA obligations<sup>13</sup> (also known as compensatory mitigation) to address the impacts of their actions that cannot be avoided or minimized. Offsets are considered after feasible avoidance and minimization measures have been exhausted but more mitigation is needed to protect species. This could include actions such as habitat preservation or restoration, invasive species control, and species reintroductions. These actions can directly further species recovery (sometimes more than avoidance and minimization) and can increase flexibility by creating more options for EPA to meet its ESA obligations. EPA plans to identify opportunities for offsets to complement traditional avoidance and minimization measures in the future. Although a process still needs to be developed, EPA plans to do so through a multi-step process that would include working with FWS to develop general guidance on using offsets for pesticide consultations, working with registrants and/or other stakeholders to identify and adopt offsets for

<sup>13</sup> FWS defines offsets as measures to “compensate for, or offset, remaining unavoidable impacts after all appropriate and practicable avoidance and minimization measures have been applied by replacing or providing substitute resources or environments through the restoration, establishment, enhancement, or preservation of resources and their values, services, and functions....” (USFWS, 2023b).



specific pesticides and species, ensuring that adopted offsets are consistent with the legal authority under FIFRA and implemented through a pesticide registration. Additionally, EPA would continue working with the Services on implementation of offsets and how they might apply to vulnerable species.

There are several species within the VSAP that are known to use agricultural areas (*e.g.*, rusty patched bumble bee visits blueberry and fruit tree sites; Spring Creek bladderpod occurs on corn fields). If EPA were to determine that pesticide applications were occurring when these species are located on the field, then this situation could result in a potential for population-level impacts. Mitigation directly on fields can be challenging for growers as they may include application timing, or no spray restrictions based on the life cycle of the species. Agricultural areas do not represent ideal habitat for these species even though they may occur there. Consistent with the ESA, its implementing regulations, and FWS' guidance, EPA determines mitigation by first avoiding then minimizing the impact. In some rare cases, EPA may determine that avoidance areas are needed. An example of avoidance may include off-labeling use in a species PULA when there is overlap with pesticide use sites and/or usage. Ideally, avoidance can be limited in time to specific periods where exposure is a concern (*e.g.*, based on species life cycle, based on when the crop is blooming). When avoidance is not feasible, EPA considers minimization. Most mitigation considered in the VSAP involves minimization (*e.g.*, reduction of spray drift or runoff/erosion exposures). In coordination with FWS, EPA is also evaluating when species use pesticide use sites (*e.g.*, agricultural areas) to the point where potential population-level impacts and mitigation are identified. EPA and FWS are exploring offsets as a possible mitigation option to provide better habitat for the species and reduce impacts of mitigation (*e.g.*, off-labeling within a PULA) on growers. In general, offsets may involve compensating for or offsetting the remaining unavoidable impacts to individuals by restoring, establishing, enhancing, or preserving resources important to the species. For some vulnerable species, offsets are not a viable mitigation measure as individual and population numbers are so low. EPA plans to work with FWS and stakeholders to identify which species within the VSAP can benefit from offsets. If EPA and FWS determine that offsets are a viable option, EPA expects to seek public comment on how the Agency could include offsets as mitigation.

### 4.3. Registration Review and Registration Decisions

The conventional pesticide registration review workload includes hundreds of pesticide active ingredients, which represent thousands of individual products. EPA will consider the applicability of this VSAP to inform conventional active ingredient registration and registration review actions.

As part of the registration review process, EPA issues a Proposed Interim Registration Review Decision (PID) or Proposed Final Registration Review Decision (PFD) with proposed mitigation measures before issuing an Interim Registration Review Decision (ID) or Final Registration Review Decision (FD). Stakeholders can comment on proposed decisions that would include proposed mitigation measures, including those that will be informed by the VSAP. After considering comments received on the PID or PFD, EPA would determine whether any changes are needed to what was proposed before issuing any ID or FD.

As indicated in its April 2022 Workplan, EPA is prioritizing making effects determinations, and consulting as appropriate, for new conventional active ingredient actions. Typically, as part of the process for reviewing a new active ingredient, EPA takes comment on a proposed decision. The proposed decision would include a discussion of mitigation determined to be necessary, including measures to protect vulnerable species. The strategies and the VSAP would inform mitigation, where appropriate. EPA would then consider comments received before making the final registration decision. EPA expects to consider

the appropriateness of applying the VSAP for other actions on already registered active ingredients (*e.g.*, new uses).

When EPA identifies mitigation to address population-level impacts using the VSAP framework, a proposed decision associated with that action would include information on the mitigation. EPA may propose spray drift restrictions on one or more uses, such as spray drift buffers based on the application method, as well as runoff/erosion mitigation. EPA may also propose mitigation to reduce direct exposure on use site to vulnerable species or mitigation to reduce exposures from other exposure routes (*e.g.*, volatilization or bioaccumulation). EPA plans to propose mitigation in geographically specific areas (*i.e.*, using PULAs), unless the mitigation measures on the general label are sufficient. In some cases, EPA expects that mitigation proposed across the full spatial extent of a use pattern within CONUS (*e.g.*, as part of mitigation applied from the Herbicide Strategy), may also apply for species in the VSAP. In those cases, EPA will specify the mitigation requirements on the general pesticide product label.

When EPA identifies the need for runoff/erosion mitigation for a particular conventional pesticide new active ingredient registration or registration review action, the proposed decision would discuss product label statements related to these mitigation measures. The statements may include directions for use that require mitigation measures to achieve the minimum number of mitigation points for that pesticide. There could also be a statement on the pesticide product labeling directing the user to the mitigation menu website and/or BLT. The mitigation points on product labeling would be specific to the approved agricultural uses for that product. Mitigation points may also be applied to non-agricultural uses if EPA determines that the runoff/erosion mitigation measures derived for agricultural uses apply for the specific non-agricultural use being considered. Different mitigation may be appropriate for some non-agricultural use sites than those that EPA has identified for agricultural use sites.

If a label requires a minimum number of mitigation points to be achieved, it may direct users to access EPA's mitigation menu website for detailed information on what mitigation measures a pesticide user could choose from (and the points associated with each measure) to meet the minimum number of points. The mitigation menu website would also contain options that provide mitigation relief and their corresponding points. Currently, the website has a helpful section describing many of the mitigation measures being considered in the strategies and VSAP<sup>14</sup>. The current version of the mitigation menu website does not have the associated points for each mitigation measure (EPA plans to upload this information in the fall of 2024).

When a pesticide product label directs a user to the mitigation menu website for measures to meet the associated points to minimize off-site transport of pesticides via runoff/erosion, the measure(s) would need to be employed consistent with the description on the website. EPA worked with USDA on the descriptions of the mitigation measures. Posted with the Final Herbicide Strategy, EPA provided information on the Agency's descriptions and the cross-references to NRCS conservation practices<sup>15</sup>. Providing a mitigation measure menu on a website allows EPA to update and expand the menu as the Agency receives more information on the efficacy of additional potential mitigation measures and to incorporate emerging and future technologies. EPA can therefore provide up-to-date available mitigation in a timely manner, providing for more flexibility for applicators and growers. As a result, applicators and

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<sup>14</sup> Available at this pinpoint site <https://www.epa.gov/pesticides/mitigation-menu#measures>

<sup>15</sup> Crosswalk of EPA's Ecological Mitigation Measures with USDA NRCS Conservation Practices in Support of EPA's Endangered Species Strategies, Version 1.0, dated August 2024, available at <https://www.regulations.gov/document/EPA-HQ-OPP-2023-0365-1136>

growers would likely have multiple options when deciding what mitigation measures to apply to achieve the total number of points required by a product's labeling. EPA recognizes the importance of communicating with applicators, farm managers, and landowners in the agricultural community. Likewise, communication among applicators, farm managers, and landowners on necessary mitigation measures is essential when planning an application.

EPA understands that many pesticide applicators use multiple pesticides on the same field at the same time. In this case, if a pesticide user applies more than one pesticide at the same time to a field, then the user would need to comply with the most restrictive set of mitigation among the pesticides that they plan to apply. This principle applies to listed species mitigation and all other use restrictions on the label, as these other use restrictions may be associated with ecological and/or human health risks identified by the Agency.

To help growers and applicators consider their options, EPA is also developing calculators that growers and applicators could use to help determine what mitigation relief measures apply to them and their associated points for runoff/erosion, spray drift buffer, number of points associated with mitigations they may already have in place, and what further actions they may need to take to meet the total required points or buffers. EPA plans to develop other resources that could further help applicators, farm managers, and landowners work through the label complexity.

#### 4.4 Plan for Developing PULAs for the VSAP

As EPA noted in its update on the Vulnerable Species Pilot<sup>16</sup>, EPA is developing an approach to refine maps that EPA plans to use for PULAs. EPA received comments on the draft VSP white paper<sup>17</sup> and the Draft Herbicide Strategy that asked EPA to reconsider the maps that EPA plans to use when identifying geographically specific locations for mitigations to address population-level impacts to a given listed species. Commenters from various groups (e.g., pesticide registrants, environmental groups, grower groups, academic institutions) stated that using entire species' ranges as the basis for a PULA captures many areas that are not needed to protect listed species at a population-level. Commenters requested that EPA refine PULAs that are overly broad, such that they focus mitigations on areas where species are more likely to be located and minimize unnecessary impacts on agriculture and other pesticide users. In response, EPA is developing an approach to refine maps used for PULAs so that when the Agency applies the strategy to a FIFRA action, those areas where mitigation would apply are to conserve a listed species and its critical habitat (if designated) and reduce the potential for including extraneous areas. This approach is being developed with input from FWS, USDA and other technical experts. EPA expects that for many species, the refined PULAs would represent parts of the range, not the entire range. Therefore, refining the PULAs would limit mitigation to areas necessary for species conservation and lessen their impact for growers and applicators. This approach focuses on identifying those areas most critical to conserve a vulnerable species and then adding buffers to account for potential offsite transport from a treated field, as applicable. If EPA were to identify mitigation to address offsite exposure from a treated field, then those identified mitigation only pertain to those fields or portions of fields located within the extent of the buffered PULA.

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<sup>16</sup> <https://www.epa.gov/system/files/documents/2023-11/vsp-update-nov2023.pdf>

<sup>17</sup> Additional information on the vulnerable species pilot is available at: <https://www.epa.gov/endangered-species/implementing-epas-workplan-protect-endangered-and-threatened-species-pesticides>

EPA is currently prioritizing PULA development for the vulnerable species and expects to begin completing them in 2024. EPA does not plan to implement the VSAP in registration review for a particular vulnerable species prior to refining its map.

#### 4.5. Education and Outreach

EPA acknowledges the critical need for additional education and outreach as this plan and the strategies are finalized and implemented in pesticide decisions. This section describes EPA's education and outreach efforts over the past two years and describes EPA's next steps.

Various educational webinars were held in 2022 and 2023 that pertain to early listed species mitigation efforts under FIFRA and help users navigate Bulletins Live! Two. In November 2022, EPA organized a webinar to present the ESA Workplan Update. The webinar covered the FIFRA Interim Ecological Mitigation measures, draft section 3 label language that directs users to the BLT system for implementing geographically specific mitigation measures, and current and future initiatives to prioritize mitigation for listed species. The Workplan Update webinar can be accessed online at: <https://www.youtube.com/watch?v=ENMUQdPvvyY>.

In July 2023, EPA and USDA OPMP held a webinar to introduce the draft VSP white paper. The webinar covered the pilot species, the draft mitigation measures, the draft implementation plan, and a StoryMap demonstration (where a vulnerable species range is overlapped with crop data and draft pesticide use limitation areas). The VSP webinar recording can be accessed online at: <https://www.youtube.com/watch?v=H8FmuN7AEY4>.

In August 2023, another similar webinar was held by EPA and USDA OPMP to introduce the Draft Herbicide Strategy, including draft mitigation measures, implementation plan, example crop scenarios, and topics for public comment. The Draft Herbicide Strategy webinar recording can be accessed online at: [https://www.youtube.com/watch?v=vmm\\_oTmxdlU](https://www.youtube.com/watch?v=vmm_oTmxdlU).

In November 2023, EPA organized a webinar to provide an overview of the BLT system. The webinar described how Bulletins relate to the general label, explained how to use BLT, demonstrated how to look for geographically specific mitigation, and addressed frequently asked questions. Materials from the webinar can be accessed online at: <https://www.epa.gov/endangered-species/materials-november-2023-bulletins-live-two-webinar>.

In 2023 and 2024, EPA also met with affected stakeholders, including various crop/commodity groups, to understand the grower perspective and potential land/crop management challenges associated with implementation of the strategy.

In spring 2024, EPA and USDA hosted a workshop on ecological risk mitigation. EPA also hosted stakeholder workshops to discuss PULA refinements and offsets.

On June 18, 2024, EPA held another public webinar to introduce the first version of the mitigation menu website (currently being used for FIFRA IEM) and seek stakeholder feedback.<sup>18,19</sup>

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<sup>18</sup> June 18<sup>th</sup>, 2024 public webinar recording, transcript, and slides on the mitigation menu webpage: <https://www.epa.gov/pesticides/mitigation-menu>.

<sup>19</sup> June 18<sup>th</sup>, 2024 public webinar YouTube recording link: <https://www.youtube.com/watch?v=kVkiWlX03go>

On September 5, 2024, EPA held another public webinar to present the Draft Insecticide Strategy.

Additional educational webinars are being considered as other strategies are finalized and as the strategies are implemented in pesticide decisions.

EPA continues to work with external stakeholders, such as the states through the State FIFRA Issues Research and Evaluation Group (SFIREG) and the Association of American Pesticide Control Officials (AAPCO), to discuss, among other things, potential implementation challenges.

EPA plans to compile existing and develop new communication and education materials. These materials are intended to support awareness of new label requirements resulting from implementation of the Herbicide Strategy and VSAP and of the new types of mitigations included in the strategies and efforts. Because pesticide users may have been using these products for several years or decades, awareness of any changes in how these pesticides may be used is key to their ability to apply these products according to new directions for use.

EPA has developed and is planning to create various educational materials, including handouts, presentations, webpages, and informational webinars. EPA also recognizes that the main sources of information for many growers/applicators are the states, crop consultants, extension agents, and pesticide distributors and that it needs to partner with them to improve grower/pesticide user awareness. EPA believes that providing the appropriate support materials to the professionals that advise pesticide applicators will help educate users on new directions for use, including bulletins, and thus help decrease pesticide exposures to listed species. EPA is planning to create a webpage that will serve as a repository of education materials.

When EPA makes changes to the VSAP (*e.g.*, by adding a new species, see **Section 4.7**), EPA plans to communicate the changes through the proposed decision process for registration or registration review actions as well as a broader public communication processes. For example, EPA would post species expansion updates to the vulnerable species website<sup>20</sup>.

#### 4.6. Consultation with FWS

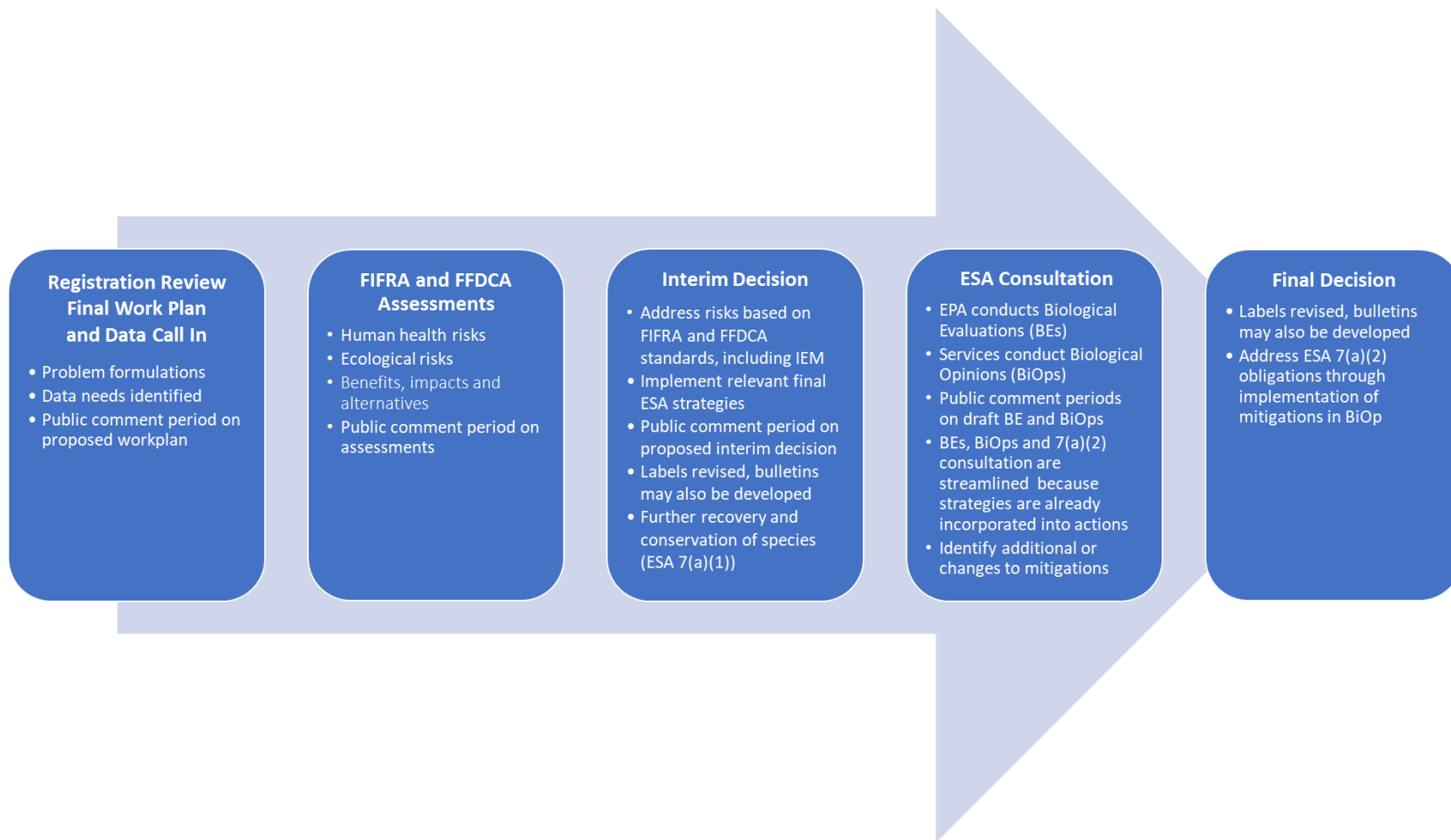
One of the goals of the VSAP is to help increase the efficiency of the pesticide section 7(a)(2) consultation process. In coordination with FWS, EPA also plans to use this, other strategies, and other activities, as outlined in the ESA Workplan (and Update), to further the conservation and recovery of listed species consistent with ESA section 7(a)(1). This will be accomplished, in part, by working with FWS to proactively protect listed species from pesticides, resulting in a streamlined section 7(a)(2) consultation process on individual pesticide actions.

EPA expects that its work with FWS will result in more efficient processes and that could include mitigation for specific species that are informed by this action plan and the strategies. EPA has been working with FWS on broad landscape scale approaches to reduce pesticide exposure in ways that can further benefit the recovery of many species and designated critical habitat within the U.S. Identification and implementation of these approaches earlier in the FIFRA and ESA process could serve as a filter

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<sup>20</sup> <https://www.epa.gov/endangered-species/implementing-epas-workplan-protect-endangered-and-threatened-species-pesticides>

where impacts to many species can be reduced, leaving a limited number of remaining impacts to focus upon in a streamlined section 7(a)(2) consultation. This approach would also be a more effective and efficient use of agency resources to maximize protections of listed species in a timely manner. **Figure 3** depicts how EPA envisions incorporating this action plan and the strategies into registration review decisions and how this could help streamline section 7(a)(2) consultations because mitigations could be incorporated into the action prior to initiating or completing any necessary consultation. Throughout this process, there are multiple opportunities for input from the public during comment periods. This will allow EPA and FWS to consider important feedback from stakeholders on assessments and mitigation.



**Figure 3. Tiered approach where VSAP and mitigation strategies are incorporated into registration review of specific pesticides (individual or groups). The application of pesticide exposure reduction strategies early in the process allows EPA to further the recovery and conservation of species.**

## 4.7. Expansion of VSAP to Include Other Species

Moving forward, there are two ways that EPA plans to consider expanding the number of vulnerable species within the scope of the VSAP. The first situation is through section 7(a)(2) formal pesticide consultation with FWS<sup>21</sup>. EPA anticipates that the factors described in this action plan will inform those consultations and eventual identification of vulnerable species that may need additional mitigation. For example, during the Enlist consultation, EPA identified two additional species that needed mitigation implemented using PULAs, *i.e.*, the spring creek bladderpod and whorled sunflower. The second way species may be brought into the VSAP would be if in EPA's continued coordination with FWS, but outside of a formal consultation, a species is identified as being particularly vulnerable to pesticides, EPA would evaluate it against the factors as described in this action plan and may consider adding it to VSAP.

As mentioned above, when EPA makes changes to the VSAP, like the addition of a new species, EPA plans to communicate the changes through the proposed decision process for registration or registration review actions as well as a broader public communication processes. For example, EPA would post species expansion updates to the vulnerable species website<sup>22</sup>.

## 5. Conclusions and Next Steps

EPA developed the VSAP to identify and implement early protections for identified vulnerable species by reducing the potential for population-level impacts to these species. The VSAP currently includes 27 species listed by FWS that are located within CONUS. The VSAP decision framework provides a process for identifying when the uses of a conventional pesticide have a potential for population-level impacts to vulnerable species and identifying mitigations to address these impacts. The VSAP is designed to reduce exposure to each of the vulnerable species from spray drift, runoff/erosion, and other routes of exposure that may be applicable for specific chemicals (*e.g.*, volatilization, bioaccumulation). The VSAP considers conventional, non-residential outdoor insecticide, herbicide, and fungicide applications to agricultural and non-agricultural use sites (*e.g.*, mosquito adulticide). EPA is currently developing another document for this action plan that it expects to release in the coming months that will include a more detailed description of the VSAP's three-step framework. VSAP can be applied to FIFRA registration and registration review actions by providing mitigation on the general pesticide product label, a mitigation menu website, and BLT.

EPA plans to expand the VSAP over time to include additional species as it identifies them through consultation and coordination with FWS. EPA is working to develop refined PULAs for the species currently included in the VSAP. EPA plans on communicating and educating stakeholders and applicators so that they understand applicable mitigations for their intended pesticide applications. EPA will continue to develop additional mitigation measures and consider the use of offsets that may increase the flexibility available to growers and applicators to protect listed species.

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<sup>21</sup> FWS identified two species of listed plants that needed more mitigation to avoid jeopardy than other species of listed plants in the 2,4-D Enlist Biological Opinion: the spring creek bladder pod (*lesquerella perforata*), and the whorled sunflower (*Helianthus verticillatus*) (USFWS, 2023b). EPA is responding to that vulnerability assessment and identification of more protective mitigation by adding the species to the Vulnerable Species Action Plan.

<sup>22</sup> <https://www.epa.gov/endangered-species/implementing-epas-workplan-protect-endangered-and-threatened-species-pesticides>



## Appendix A. Information on Species Included in VSAP

This appendix includes information on the 27 species included in the VSAP to explain why they meet EPA's definition of a vulnerable species as described in this action plan.

### Attwater's greater prairie-chicken

The Attwater's greater prairie chicken currently has two populations that have a total of less than 200 individuals. The trend of the populations is declining (USFWS 2022a). Due to the low numbers of individuals, impacts to a limited number of individuals could impact the populations of this species. In FWS's recent biological opinions for malathion and Enlist, additional mitigations were needed for this species to avoid jeopardy. In the draft methomyl biological opinion, FWS determined that jeopardy is likely without mitigations (USFWS 2022a, 2023b, and 2024a).

### Buena Vista Lake ornate shrew

The Buena Vista Lake shrew occupies a reduced range in the southern San Joaquin Valley, where there are only a few extant occurrences known. It is estimated that the species may have lost more than 95 percent of its historical habitat (USFWS, 2024a). Population size and health cannot be estimated with the available data but based on the low number of specimens collected in areas with high-quality habitat, the species is expected to be extremely rare (USFWS, 2024a). The Buena Vista Lake ornate shrew is described by FWS as having a low resiliency, a low redundancy, and a low representation indicating that the species has low population numbers that are in decline (USFWS, 2024a). In the 2020 Species Status Assessment the FWS describes the species as being found in habitat patches where the landscape is dominated by agriculture indicating that species is on or on the margin of potential use sites and can be directly exposed to pesticides sprayed on nearby crops, or to herbicides sprayed on roadsides and canal banks. Pesticides could also affect the shrew indirectly by lowering their prey base (USFWS, 2011a and 2020). In the draft methomyl biological opinion, FWS determined that jeopardy and adverse modification of critical habitat are likely without mitigations (USFWS, 2024a).

### Lake Wales Ridge Plants

The Lake Wales Ridge (LWR) area in central Florida is an ancient sandy scrub habitat that hosts a variety of unique plant and animal species, some found nowhere else in the world. Millions of years ago, when sea levels were higher and covered the majority of land in Florida, the ridge was a long thin island. There are a total of twelve endangered plant species in this region; the Vulnerable Species Pilot included 7 of the species but the current VSAP includes all 12 (each discussed below) as the mitigations would cover the entire group. These species will be handled as a group because they are all encompassed in this unique region of the Lake Wales Ridge. **Table A-1** below identifies the five additional Lake Wales Ridge plants that are included in the VSAP.

**Table A-1. Additional Species within the Lake Wales Ridge Region Added to the VSAP**

Entity ID	Common Name	Scientific Name
740	Highlands scrub hypericum	<i>Hypericum cumulicola</i>
803	Lewton's polygala	<i>Polygala lewtonii</i>
805	Sandlace	<i>Polygonella myriophylla</i>
932	Snakeroot	<i>Eryngium cuneifolium</i>

Entity ID	Common Name	Scientific Name
1015	Carter's mustard	<i>Warea carteri</i>

For eight of the Lake Wales Ridge plants that are included in this action plan, FWS's recent biological opinion for malathion noted additional mitigations were needed for these species to avoid jeopardy (USFWS, 2022a). The mitigations applied in a PULA related to the Lake Wales Ridge region including State Forest and Wildlife and Environmental Areas, Bombing Range Ridge, Winter Haven Ridge, and Mount Dora Ridge within the combined ranges of the Central Florida dicots. The mitigations focused on minimization related to agricultural applications (*e.g.*, timing restrictions, wind directional restrictions, or use of buffers).

All of the 12 Lake Wales Ridge plants are endemic, often have very small populations (some are known from only three to five sites), and their populations are fragmented by both geography and human modification of the landscape. For example, the recovery plan for the Avon Park harebells states, much of the native uplands on the Lake Wales Ridge and surrounding counties have been converted to agriculture or residential development. The remaining habitat is fragmented into small parcels and in many cases, isolated (USFWS, 2019a).

#### Avon Park harebells

Historically and currently, the species is known from just two populations (USFWS, 2019a). In addition to habitat loss from conversion to agriculture or residential development, the FWS recovery plan states that development is also often associated with an increase in the use of various types of pesticides. The components of these pesticides can have a range of effects on insect pollinators. The 5-year status review states, the loss of pollinators could be potentially devastating for Avon Park harebells, as they are dependent on pollination for successful reproduction (USFWS, 2023a). FWS's recent biological opinion for malathion noted additional mitigations were needed to avoid jeopardy (USFWS, 2022a).

#### Carter's mustard

Carter's mustard is found almost exclusively in upland areas primarily in sandhills and scrubby flatwoods, and often at the ecotone between these two vegetation types. In the northern part of its range, most sites are on sandhill. Near the south end of its range (*e.g.*, ABS), Carter's mustard is found primarily in scrubby flatwoods but also grows along sandy trails and roadsides. Carter's mustard populations fluctuate widely from year to year and fires usually initiate cycles, with the largest population sizes occurring the year following. The most recent FWS counts had 50 known occurrences for Carter's mustard, of which 41 were found on 12 managed areas (USFWS, 2019a). Historical populations in Brevard and Miami-Dade Counties are believed extirpated.

#### Florida ziziphus

Florida ziziphus is known only from a few sites on the Lake Wales Ridge in southern Polk and northern Highlands counties. Only four of the 14 known populations occur in publicly protected sites. Most populations are self-sterile due to limited genetic diversity and the isolation of population. The most recent count reported 10 known occurrences for Florida ziziphus, of which five are protected at four different managed areas. In addition, four new populations have been established since 2008. Florida ziziphus has been reintroduced using transplants and seeds to four sites, including The Nature Conservancy's Tiger Creek Preserve, the Lake Wales Ridge State Forest, and the Lake Wales Ridge NWR

(USFWS, 2019a). FWS's recent biological opinion for malathion noted additional mitigations were needed to avoid jeopardy (USFWS, 2022a).

### Garrett's mint

The loss of scrub on the Lake Wales Ridge habitat was the primary reason for listing Garrett's mint as endangered. Garrett's mint is known from four sites, all occurring in a 6-km (north to south) by 3-km (east to west) area of Highlands County, Florida. Three of four occurrences are located on private land. The area in the vicinity of these occurrences has been largely converted to citrus groves and scattered single family residences (USFWS, 2016). The population size is 3,891 individuals (USFWS, 2016). FWS's recent biological opinion for malathion noted additional mitigations were needed to avoid jeopardy (USFWS, 2022a).

### Highlands scrub hypericum

Highlands scrub hypericum is restricted to scrub on the Lake Wales Ridge in Polk and Highlands counties. Population sizes of highlands scrub hypericum vary considerably over time and are largest in the first decade after fire. Previous FWS counts reported 60 occurrences for Highlands scrub hypericum, 28 of which were within managed areas which is a nine percent decrease from previous counts in 2008 (USFWS, 2019a). FWS's recent biological opinion for malathion noted additional mitigations were needed to avoid jeopardy (USFWS, 2022a).

### Lewton's polygala

Lewton's polygala is known from Marion, Lake, Orange, Osceola, Polk, and Highlands counties on the Lake Wales and Mount Dora ridges and is found in sandhill and yellow sand scrub and the transitional habitats between (USFWS, 2019a). The land is dominated by longleaf pine, turkey oak, and other oaks. It can also be found in recently cleared areas such as the dry, open clearings around power lines. Lewton's polygala is an amphicarpic species, which means it produces flowers and fruits above and below the ground. FWS notes there are only about a dozen amphicarpic species worldwide (USFWS, 2019a). While self-fertilization occurs, it appears to be a less-reliable mechanism for seed production than insect pollination. Prominent pollinators include bee-flies (Bombyliidae), flower flies (Syrphidae) and leaf-cutter bees (Megachilidae). The most recent counts 44 known occurrences for Lewton's polygala, of which 28 were on 12 managed areas (USFWS, 2019a).

### Sandlace

Sandlace is distributed in Orange, Osceola, Polk, and Highlands counties. Most extant occurrences are located in Highlands and southern Polk counties. It occurs in dry white-sand scrub dominated by Florida rosemary, as well as oak scrub, flatwoods, roadsides, and occasionally sandhills. Sandlace reproduces sexually and vegetatively through the rooting. According to the FWS (USFWS, 2019a), counts had 72 extant occurrences with 39 on managed land. Thirty-three of 72 extant Sandlace occurrences were located on private property where they had no protection from development. This was a 36 percent decrease from the previous 5-year status review, which reported 113 extant occurrences.

### Scrub blazingstar

Scrub blazing star is extant on the Lake Wales Ridge (roughly 90 to 100 occurrences) and Winter Haven Ridge (one occurrence) in Highlands and Polk Counties. The recovery plan (USFWS, 2019a) reports a significant decrease (approximately 23 percent) from the last 5-year status review. FWS's recent

biological opinion for malathion noted additional mitigations were needed to avoid jeopardy (USFWS, 2022a).

### Scrub mint

Scrub mint is endemic to a very limited portion of the Lake Wales Ridge in Highlands County, Florida, and is found at four localities. All four of these areas are native vegetation which are surrounded by agricultural and residential areas (USFWS, 2019a). In the most recent counts, scrub mint was known from 14 occurrences, seven of which were on managed areas. The other seven occurrences were located on private land and their status was unknown. Based on 2008 aerial images, it appeared that four occurrences were likely extirpated or heavily disturbed and another five were possibly still extant based on remaining habitat in the area where they were previously recorded (USFWS, 2019a). This species has 14 populations and approximately 5,000 individuals. FWS's recent biological opinion for malathion noted additional mitigations were needed to avoid jeopardy (USFWS, 2022a).

### Short-leaved rosemary

The FWS recovery plan (USFWS, 2019a) reports a roughly 20 percent decline from the last 5-year status review, which reported 35 known occurrences. The current count identifies 28 occurrences, 15 of which are on seven different managed areas that are presumed or known to be extant. The other 13 occurrences were located on private lands. The current status of occurrences and trends of short-leaved rosemary on private lands is unknown (USFWS, 2019a). According to the Nature Serve data (USFWS, 2022a), there are six to 80 populations, and the population size is 1,000 - 2,500 individuals. FWS's recent biological opinion for malathion noted additional mitigations were needed to avoid jeopardy (USFWS, 2022a).

### Snakeroot

Snakeroot is found in open sand gaps in rosemary habitats within the Lake Wales Ridge in Highlands County. In the last FWS counts, there were 13 known occurrences, 10 of which were on 5 managed areas. This was a 32 percent decline from the 19 reported occurrences in the previous 5-year status review in 2010 (USFWS, 2019a). Nearly every aspect of snakeroot's demography is affected by time-since-fire.

### Wireweed

This species is located in Lake Wales, Winter Haven, and Bombing Range ridges in central peninsular Florida. It ranges from Lake Pierce in Polk County southward to Venus near the southern tip of the Lake Wales Ridge in Highlands County (USFWS, 2019a). The FWS recovery plan (USFWS, 2019a), reports a significant decrease (approximately 40 percent) in individuals from the last 5-year status review. The last counts as 71 extant occurrences, 47 of which were on managed lands and down from the 119 reported occurrences. FWS's recent biological opinion for malathion noted additional mitigations were needed to avoid jeopardy (USFWS, 2022a).

### Leedy's roseroot

Leedy's roseroot is found today in only six locations in two widely separated states. Four populations of several thousand plants each are found in Minnesota. The other two are in upstate New York, a large population on the shores of Seneca Lake and a single plant at Watkins Glen. The Leedy's roseroot is described by FWS as having a moderate resiliency, a low redundancy, and a low representation indicating that the species has low population numbers that are in decline. According to the FWS, site-specific

threats include dumping and the filling of sinkholes causing groundwater contamination and the use of pesticides at Whitewater WMA (noting this issue at WMA is resolved; USFWS, 2015a). In the draft methomyl biological opinion, FWS determined that jeopardy is likely without mitigations (USFWS, 2024a).

### Madison cave isopod

The Madison Cave isopod is found in 52 - 57°F flooded limestone caves beneath the Great Valley of Virginia and West Virginia, where it swims freely through freshwater aquifers. Very little is known about the biology of this species. This species is protected under the ESA because the species' reproduction and genetic diversity are very low, and it exists in only seven sites that are isolated from each other. Because of the low population growth of this species even in ideal conditions, it is crucial to protect the quality of their remaining limited freshwater cave habitat. The Madison cave isopod is described as having a very low resiliency and a low redundancy indicating that the species has low population numbers (approximately two to six) that are in decline (USFWS, 1996).

### Mead's milkweed

The Mead's milkweed is described as having a low resiliency, a low redundancy, and a low representation which support that the species has low population numbers that are in decline. There are 212 estimated populations of Meads milkweed, but only 3 are described by FWS as having high viability to the point where the population has the ability to survive or live successfully. The recovery criteria for the species requires 21 of these populations to have high viability to be delisted. Many of the other populations (approximately 130) are described as having low population numbers that are regularly mowed and unable to reproduce. The species is described as being found on hay meadows, indicating that it is on or on the margin of potential use sites and can be directly exposed to pesticides. The FWS 5-year Review (USFWS, 2012) includes herbicide or pesticide application as current threats including reference to herbicide damage to Mead's milkweed plants in occurrence records for three populations. Indirect effects of increased pesticide use can result in the direct decline of the Mead's milkweed primary pollinators, which include miner bees (*Anthophora abrupta*), western honeybees (*Apis mellifera*) and small bumblebees (*Bombus* spp) (USFWS, 2022a). Research has reported constant herbicide application as a contributing factor in the decline of Mead's milkweed in railroad prairies. In the draft methomyl biological opinion, FWS determined that jeopardy is likely without mitigations (USFWS, 2024a).

### Ozark cavefish

This species is found in nutrient-rich cave streams and springs throughout the Springfield Plateau of the Ozark Highlands in Arkansas, Missouri, and Oklahoma. A total of 15 caves in the Ozark Highlands have populations of the cavefish. The Ozark cavefish is described as having a low number of populations that are in decline, and the number of individuals in 2011 was estimated as 213 (USFWS, 2011b). Overall, threats to the species are stable or increasing at the majority of active sites. The 2024 FWS 5-year review describes the threats to the species as human entry, agriculture, and urbanization/development (USFWS, 2024b). The Ozark cavefish is struggling to reproduce even when cave water habitat is untouched by outside chemicals, so pesticides that contaminate the groundwater or reach the cave may cause additional stress. Because of the low population growth of this species even in ideal conditions, it is crucial to protect the quality of their remaining limited freshwater habitat.

### Palmate-bracted bird's beak

Historically, the bird's beak is known to occur in scattered locations of the Sacramento and San Joaquin Valleys of California. There is intensive agricultural and urban development within the species' range. Much of the suitable soils for supporting this habitat been converted to agriculture and urban development. Use of insecticides for mosquito control is specifically mentioned as a challenge (FWS, 5-year review, 2009) via loss of the Western bumble bee as a pollinator. The Palmate-bracted bird's beak is described as having a low resiliency, a low redundancy, and a low representation indicating that the species has low population numbers (approximately eight) that are in decline.

### Poweshiek skipperling

The Poweshiek skipperling was once found in native prairies of many midwestern states and Manitoba, Canada. This species is now on the brink of extinction and is only found at a few sites in a single Michigan county, in very limited numbers at one site in Wisconsin, and in one prairie complex in Manitoba. The Poweshiek skipperling is described as having a very low resiliency, and a low redundancy indicating that the species has low population numbers that are in decline. In the 2022 Recovery Plan, the FWS links pesticide exposure to possible direct and indirect adverse effects to the species and asserts that pesticides may exacerbate habitat destruction (USFWS, 2022b). In the draft methomyl biological opinion, FWS determined that jeopardy and adverse modification are likely without mitigations (USFWS, 2024a).

### Rusty patch bumblebee

The Rusty patch bumblebee is described as having low population numbers that are in decline. Populations started a precipitous decline around 2007 likely due to several interacting stressors, including pesticides, pathogens, climate change, habitat loss (and resulting loss of nectar sources and nesting spaces), and small population biology (USFWS, 2021a). As described in the FWS biological opinion, there are 69 populations and many of the current populations are documented by only a few individuals. For example, 95 percent of the known populations are documented by five or fewer individuals and the maximum number found at any site was 30. Another factor discussed by FWS is with the rusty patched bumble bee the effective population sizes are inherently small due to their eusocial structure, haplodiploidy reproduction, and the associated "diploid male vortex." This reproductive strategy makes the rusty patched bumble bee particularly vulnerable to the effects of a small population size. Along with the loss of populations, a marked decrease in the range and distribution has occurred in recent times. Since 2000, the species' distribution has declined across its range (representing an 87% loss of spatial extent expressed as a loss of counties with the species). As of August 2018, the species to be extant in 94 counties and one Canadian District (USFWS, 2023b). There is evidence of the species visiting pollinator attractive use sites and can be directly exposed to pesticides. The rusty patched bumble bee has also been observed and collected in a variety of habitats, including prairies, woodlands, marshes, agricultural landscapes, and urban use sites such as parks and gardens. In the draft methomyl biological opinion, FWS determined that jeopardy is likely without mitigations (USFWS, 2024a).

### Scaleshell mussel

According to the FWS, assessing abundance and population trends of the scaleshell is difficult because of its rarity. When the species was listed in 2001, it was known from 14 rivers in three states (USFWS 2021b). As noted in the 2021 5-year review, since 2001, living specimens have only been found in the Meramec, Bourbeuse, and Gasconade rivers in Missouri (USFWS, 2021b). Fragmentation and the loss of scaleshell sites has contributed to the decline of this species. This species has an obligate relationship with the Freshwater drum. There is also a captive propagation effort to support this species. The

Scaleshell mussel is described as having a low resiliency, a low redundancy, and a low representation indicating that the species has low population numbers (approximately one to three) that are in decline. FWS discusses sand and gravel dredging, destruction of stream banks, disturbance of mussel beds, deposition of wastes from livestock movement, siltation, and surface run-off of pesticide and fertilizer as potential contributing factors to the species decline.

### Spring creek bladderpod

The Spring Creek bladderpod is an annual plant endemic to Tennessee. The species currently occurs in only three watersheds in Wilson County, TN: Spring Creek, Barton's Creek, and Cedar Creek. The Spring creek bladderpod is described as having one to five populations, indicating susceptibility to threats. In the 2006 Recovery plan, the FWS describe that the species is found on agricultural fields which indicates that the species can be directly exposed to pesticides (USFWS, 2006). In FWS's recent biological opinion for Enlist, additional mitigations were needed for this species to avoid jeopardy.

### White Bluffs bladderpod

White Bluffs bladderpod is still known only from the single population that is limited to the dry, sparsely vegetated upper and top exposures of the White Bluffs along the Columbia River in the state of Washington. The estimated number of flowering plants has fluctuated greatly, but FWS reports a relatively stable mean of approximately 24,300 individuals (USFWS, 2022c). According to FWS, the White Bluffs bladderpod does not grow directly on agricultural fields but is nearby agriculture that may support pollinators. More recent reports express the importance for pollinators to the White Bluff's bladderpod and that protection of these pollinators (*e.g.*, butterflies, flies, wasps, bumblebees, moths, beetles, and ants) are crucial to the conservation of the species. The White Bluffs bladderpod is described as having a low to moderate resiliency and low redundancy and representation indicating that the species has a single population that is in decline (USFWS, 2022c).

### Whorled sunflower

FWS describes the Whorled sunflower as having a low resiliency, a low redundancy, and a low representation indicating that the species has low population numbers that are in decline (USFWS, 2023c). As described in the 2023 FWS status of the species assessment, the range is reduced to only eight natural populations, and extant populations vary in size, but tend to be relatively small and isolated, making it more difficult for the species to withstand and recover from stochastic or catastrophic events. Further, the species is likely suffering genetic isolation and reduced adaptive capacity. These conditions result in low viability for the species. In FWS's recent biological opinion for Enlist, additional mitigations were needed for this species to avoid adverse modification of its critical habitat. In the draft methomyl biological opinion, FWS determined that jeopardy and adverse modification are likely without mitigations (USFWS 2023b and 2024a). The 2023 Status of the species assessment describes that the species is found on roadsides, railroads, and agricultural fields which indicates the species and its pollinators are on or near multiple pesticide use sites and could be directly exposed to pesticides.

### Winged mapleleaf

As described by FWS, the winged mapleleaf (WML) is an extremely endangered freshwater mussel. The WML is found within the mainstem of the St. Croix River, Mississippi River, Chippewa River, Bourbeuse River, Duck River, Little River, Saline River, Ouachita River, and Cassatot River. This species requires captive propagation to sustain its populations. Based on the FWS 5-year review, there are four stable, two unknown, and two newly established populations. Although several populations considered stable

or increasing, the range and abundance of remnant populations continue to remain small and vulnerable to stochastic disturbance (USFWS, 2015b). This species also has an obligate relationship with the channel catfish.

### Wyoming Toad

FWS stated that “The Wyoming toad (*Bufo hemiophrys baxteri*, now known as *Anaxyrus baxteri*) is considered one of the most endangered amphibian species in North America.” (USFWS, 2024a). There are two known populations with a total of <50 individuals. This species has historically occurred with a limited area of approximately 12,000 acres. This species is declining, with low resiliency, representation, and redundancy. In the 1980’s and 1990’s FWS identified pesticides (used on agriculture and mosquito adulticide spray) to be a threat to this species. In the early 2000’s monitoring data for pesticide concentrations in the habitat of this species led FWS to conclude that pesticides were not a direct threat to the species; however, FWS continues to monitor pesticide exposures to ensure that this does not change. In the recent FWS biological opinion for malathion, additional mitigations of the mosquito adulticide use were needed to avoid likely jeopardy to this species.



## Appendix B. Information on Species from Pilot That Are Not Included in VSAP

This appendix includes detailed information on the seven species that were included in the Vulnerable Species Pilot but are not included in the VSAP. After receiving public comments on the Vulnerable Species Pilot, EPA revisited and revised its definition of a Vulnerable Species. The species included in this appendix do not meet the revised definition that is used for the VSAP. Specifically, this information is related to the vulnerability of these species relative to others and information on pesticides as a stressor. This information represents the basis for why these species are not included in the VSAP.

### American burying beetle

The American burying beetle (*Nicrophorus americanus*) was included in the Vulnerable Species Pilot. EPA reviewed the available information from FWS on that species and decided not to include it in the VSAP because the species does not meet the vulnerability factors used for the VSAP. In the most recent Status of the Species Assessment (2019)<sup>23</sup>, FWS rated the American burying beetle as moderate to high for resiliency, and moderate for representation, and shows a “stable to increasing” population trend (FWS, 2019b). In 2020, the FWS downlisted the American burying beetle from endangered to threatened, suggesting that the species vulnerability is decreasing<sup>24</sup>. In FWS’s recent biological opinions for malathion and Enlist, additional mitigations beyond those that were adopted on the general label were not needed for this species to avoid jeopardy. FWS does not currently identify pesticides as a major threat to this species. However, since this species is an invertebrate, it is a species that would be evaluated the draft Insecticide Strategy.

### Okeechobee gourd

During the public comment period on the VSP, and in follow up discussions with stakeholders and other federal agencies, EPA received important information on how this species is managed<sup>25</sup>. FWS works with pesticide applicators to develop management plans that include no spray zones near the Okeechobee gourd habitat. EPA has concluded that the management of this species results in low pesticide exposure potential, and the species is not defined as vulnerable under the VSAP. Since pesticide exposure is comprehensively managed, at present, in the entirety of the species habitat and range, EPA has concluded the species does not currently need the additional protections afforded by inclusion in the VSAP.

### Ouachita rock pocketbook

The Ouachita rock pocketbook (ORP) population estimate was  $420 \pm 730$ . The FWS 5-Year Review (USFWS, 2018a) included pesticides via water quality degradation from point sources and nonpoint sources of pollution as a potential threat to the species. Because the majority of the remaining ORP populations are generally small and geographically isolated, the patchy distributional pattern of populations in short river reaches makes them more susceptible to extirpation from single catastrophic events, such as toxic chemical spills (USFWS, 2018a). The sources of pollution within the watersheds occupied by the ORP include silvicultural activities, agricultural activities, livestock production, clearing

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<sup>23</sup> <https://ecos.fws.gov/ServCat/Reference/Profile/110983>

<sup>24</sup> <https://www.govinfo.gov/content/pkg/FR-2020-10-15/pdf/2020-19810.pdf#page=1>

<sup>25</sup> <https://www.regulations.gov/comment/EPA-HQ-OPP-2023-0327-0122> - Comment submitted by USACE - Jacksonville District - Invasive Species Management Branch

of riparian vegetation, road construction, urbanization, and other practices that allow erodible soils to enter streams (USFWS, 2004). EPA has determined that the level of mitigation identified for population-level impacts would be achieved by the Draft Insecticide Strategy. The ORP, although susceptible to extirpation, has a level of estimated populations to the point where impact to a few individuals may not result in population-level impacts. Therefore, the species does not meet the vulnerability factors. Since the scope of the Draft Insecticide Strategy does not extend to species for which some mussels have obligate relationships, EPA also considered if this mussel has an obligate relationship and found that it does not. Since the ORP does not meet the vulnerability factor and because potential population level impacts would be addressed by the Draft Insecticide Strategy, EPA is not including it as a vulnerable species. EPA anticipates that the Draft Insecticide Strategy will provide some protections for host fish through generalist mitigations and that full indirect effects will be considered later in the process [*i.e.* 7(a)(2) consultation].

### Rayed bean

The Rayed bean is described as having a low resiliency, a low redundancy, and a low representation. There are 21 - 80 populations and there are greater than 1,000,000 individuals. Based on historical and current data, the rayed bean has declined significantly range-wide and is now known from only 31 streams and one lake (down from 115), a 73 percent decline (USFWS, 2018b). The 2022 FWS Status of the Species assessment describes water contamination is a primary threat, and contamination could come from agriculture or urban runoff. Aquatic herbicides, algaecides, adjuvants, and lampricides are used to treat aquatic nuisance or invasive species within aquatic ecosystems. In the draft methomyl biological opinion, FWS determined that jeopardy is likely without additional mitigation measures beyond those that already adopted on the general label (USFWS, 2024a). EPA has determined that this level of mitigation identified for population-level impacts would be achieved by the Draft Insecticide Strategy. The rayed bean, although in a significant decline, has a level of estimated individuals and populations such that impact to a few individuals may not result in population-level impacts. Therefore, the species does not meet the vulnerability factors. Since the scope of the Draft Insecticide Strategy does not extend to species for which some mussels have obligate relationships, EPA also considered if this mussel has an obligate relationship and found that it does not. Since the Rayed bean does not meet the vulnerability factor and because potential population level impacts would be addressed by the Draft Insecticide Strategy, EPA is not including it as a vulnerable species. EPA anticipates that the Draft Insecticide Strategy will provide some protections for host fish through generalist mitigations and that full indirect effects will be considered later in the process [*i.e.* 7(a)(2) consultation].

### Riverside fairy shrimp

The Riverside fairy shrimp live in vernal pools, which are wetlands that range in size from small puddles to shallow pools. The species is estimated to occupy 35 vernal pool complexes. These pools are mostly rain fed and covered by shallow water for variable periods from winter to spring but may be completely dry for most of the summer and fall. California's vernal pools begin to fill with the winter rains. Runoff from irrigation can affect vernal pools. Riverside fairy shrimp may be exposed to pesticides used to control weeds and insects from drift and runoff. Herbicides are commonly used to control weeds outside (e.g., for roads, farms and residential landscaping) and even within (*i.e.*, for enhancement/restoration projects) Riverside fairy shrimp habitat (USFWS, 2008a). Vernal pool plant and animal species have declined as a result of water contamination and the toxicity of pesticides may injure or be fatal to the fairy shrimp. The Riverside fairy shrimp is described as having a low resiliency, a low redundancy, and a low representation indicating that the species has low population numbers that are in decline. Although the Riverside fairy shrimp meets the vulnerability factor of the vulnerable species definition, EPA has

determined that the species does not meet the pesticide exposure factor. There is potential impact from pesticide exposure, and this exposure could result in detrimental effects to the species, but the level of exposure is not high enough to warrant inclusion in the Vulnerable Species Action Plan. The level of exposure and exposure pathways (i.e. runoff and drift) that may impact the species would be addressed in a final Insecticide Strategy. This is supported by the FWS Biological Opinion on malathion and methomyl (draft) where they concluded this species is highly vulnerable, individuals are likely to die if exposed, and pesticides are noted as a threat the species, but that the FWS anticipates, at most, a very small number of individuals are likely to be exposed to malathion and methomyl when considering the labeled mitigation for these pesticides (USFWS, 2022a and 2024a). Additional species-specific mitigation measures were not needed for this species. For parts of the range in close proximity to agricultural pesticide uses, the species will be receiving appropriate levels of mitigation from the Insecticide Strategy if impacts are identified. There are some pesticide uses that the Riverside Fairy shrimp may be exposed to that are not within the scope of the Draft Insecticide Strategy. These include mosquito adulticides that may be used within residential areas near occupied vernal pool complexes. The FWS Biological Opinion on malathion determined that mosquito adulticide usage of malathion is anticipated to occur in <1% of the non-Federal portion of the species range annually based on standard past usage data (USFWS, 2022a).

### San Diego fairy shrimp

Similar to the Riverside fairy shrimp, the San Diego fairy shrimp live in vernal pools, which are wetlands that range in size from small puddles to shallow. The species is estimated to occupy 137 vernal pool complexes. These pools are mostly rain fed and covered by shallow water for variable periods from winter to spring but may be completely dry for most of the summer and fall. California's vernal pools begin to fill with the winter rains. Runoff from irrigation can affect vernal pools. Vernal pool plant and animal species have declined as a result of water contamination and the toxicity of pesticides may injure or be fatal to the fairy shrimp. In the FWS 2021 5-year review, predation, drought, climate change, fire, pesticides, and other pollutants are listed as potential threats to SDFS (USFWS, 2021c). The San Diego fairy shrimp is described as having a moderate resiliency, a moderate redundancy, and a moderate representation indicating that the species has a stable population. The moderate resiliency, redundancy, representation, and stable population trend indicates that the species does not meet the vulnerable species definition of being more vulnerable to pesticides relative to other listed species. For parts of the range in close proximity to agricultural pesticide uses, the species will be receiving appropriate levels of mitigation from the Draft Insecticide Strategy if impacts are identified. This is supported by the FWS Biological Opinion on malathion and methomyl (draft) where they concluded this species are highly vulnerable, individuals are likely to die if exposed, and pesticides are noted as a threat the species, but that the FWS anticipates, at most, a very small number of individuals are likely to be exposed to malathion and methomyl when considering the labeled mitigation measures for these pesticides (USFWS, 2022a and 2024a). Additional species-specific mitigations were not needed for this species.

### Taylor's checkerspot

When this species was listed in 2013, FWS identified pesticides as a threat to the species. Specifically, in the 2013 Determination of Endangered Status for the Taylor's Checkerspot<sup>26</sup>, FWS stated "Because the species exists within a matrix of rural agricultural lands and low-density development, herbicide and insecticide use may have direct effects on the species and its host plants." Since then, FWS has collaborated and consulted with pesticide applicators in occupied areas to avoid and minimize the

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<sup>26</sup> [https://www.fws.gov/sites/default/files/federal\\_register\\_document/2013-23567.pdf](https://www.fws.gov/sites/default/files/federal_register_document/2013-23567.pdf)

impacts of pesticides. Correspondence from FWS provided to EPA in 2023 indicated that pesticide use within occupied areas is almost entirely done to manage and restore habitat, and is done in ways designed to minimize impact to Taylor's checkerspot individuals. In addition, FWS concluded that extant populations and planned translocations occur either on sites managed for conservation and/or federal lands where the use of pesticides that may affect Taylor's checkerspot requires consultation. They also noted that individuals are currently unlikely to occur within an agricultural matrix. (Information provided by FWS to EPA in 2023). In the recent draft recovery plan for this species, FWS no longer identifies pesticides as a threat (USFWS, 2022d<sup>27</sup>). In FWS's biological opinions for malathion and Enlist, FWS did not identify additional mitigations to avoid jeopardy or adverse modification for this species and its critical habitat in addition to those already on the label (USFWS, 2022a and 2023b). Also, in the 2024 draft biological opinion for methomyl, the species is not listed as being potentially jeopardized by the use of methomyl nor is the designated critical habitat concluded to be adversely modified from the use of this insecticide (USFWS, 2024a). Since pesticide exposure is comprehensively managed, at present, in the entirety of the species habitat and range, EPA has concluded the species does not currently need the additional protections afforded by inclusion in the VSAP.

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<sup>27</sup> [https://ecos.fws.gov/docs/recovery\\_plan/SIGNED%20-%20TCB%20dRP%20\(20221109\).pdf](https://ecos.fws.gov/docs/recovery_plan/SIGNED%20-%20TCB%20dRP%20(20221109).pdf)

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