

APPENDIX L-B

PLANTS: Critical Habitat Determinations and Rationales

A.	Introduction.....	1
B.	Conclusion	3
C.	Critical Habitat Predominantly Overlapping Federal Lands	3
D.	Critical Habitats – Remaining Critical Habitat Categories and Rationales.....	4
E.	Ferns and Fern Allies	4
F.	Flowering Plants	5

A. Introduction

Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species (50 CFR 402.02). While there are general physical and biological features (PBFs)¹ that serve as the basis for all critical habitat designations, many critical habitat rules list specific PBFs related to the habitat needs of the species. In this assessment, when critical habitat rules did not list specific PBFs (primarily older critical habitat rules), we reviewed available information about the species' biology and habitat requirements to determine if features essential to the conservation value of the critical habitat for the species would be affected by the Action. We also reviewed other sections of the critical habitat rules, such as descriptions of special management considerations or protection and the application of the destruction or adverse modification standards for section 7(a)(2) consultations, to determine if these sections included information relevant to the effects of the Action on critical habitat.

Methodology

We used information related to the PBFs to categorize the critical habitats and frame our critical habitat effects analyses. We identified four general types of PBFs (for plants and animals) that would be susceptible to the effects of malathion, specifically, those that related to: (1) water quality and function, (2) arthropods as prey, (3) non-arthropods, including prey, pollinators/seed dispersers, or host fish, and (4) arthropod pollinators/seed dispersers. These types of PBFs are described in more detail in the "Critical Habitat Approach to the Assessment" section of the Opinion and are collectively referred to herein as the "relevant PBFs". We reviewed each critical habitat rule to determine if PBFs related to one or more of these factors is listed or discussed, and identified comparable habitat features where applicable for those critical habitats with rules that do not include specific PBFs. We then categorized proposed and designated critical habitats into three groups:

Category 1. Critical habitats that have no specific PBFs listed or otherwise identified.

Category 2. Critical habitats that have specified PBFs, but none related to the four relevant types of PBFs that we anticipate would be affected by pesticides (e.g., rocky stream bottom, sufficient space to move, etc.).

Category 3. Critical habitats that have one or more of the four relevant types of PBFs.

For critical habitats in Category 1, we reviewed information about the species biology and habitat requirements in the critical habitat rule to determine if any of the general types of PBFs shown above would likely pertain to the critical habitat. In cases where no relevant PBFs were identified, the critical habitat was treated the same as those in Category 2. Critical habitats in Category 2 have specific PBFs in the rules, but none relevant to the effects of the Action. In these cases (a subset of Category 1s and all Category 2s), no link could be made to consequences of the Action on the PBFs of the critical habitat, including elements of the habitat that require special management considerations or protection

¹ We are using this term as a standardized way to cover the various terms used in critical habitat designations that equate to PBFs, such as primary constituent elements (PCEs) or "essential features" in critical habitat rules prior to 2016.

and considerations when applying the adverse modification standard. Thus, based on the rationale that none of the essential features of the critical habitat would be affected by the Action, we determined that the Action was not likely to destroy or adversely modify critical habitats that fell into these Categories.

In cases where we identified habitat elements comparable to relevant PBFs for Category 1 critical habitats, the critical habitats were further analyzed using the same method as those in Category 3. In these cases (a subset of Category 1s and all Category 3s), we continued our assessment of the consequences of the Action by evaluating the extent to which the critical habitat overlaps with malathion use sites, the degree of anticipated usage within the critical habitat², the associated risk to the PBF(s), and anticipated effects on the critical habitat as a whole.

A dichotomous key was developed and used to facilitate our assessment of the effects of the Action on critical habitats with one or more of the relevant PBFs in categories 1 and 3 (see Appendix L-C for the dichotomous key). The key served two purposes. First, it was used to determine those critical habitats that fit into either of two groups where we anticipate the likelihood of exposure of critical habitat PBFs to malathion would be extremely low: (1) those critical habitats that have no overlap with use sites, and (2) those critical habitats that have 95% or higher overlap with Federal lands, where we anticipate only low levels of usage (see the Federal Lands section under *Approach to Usage Analysis* in the Opinion). No plant critical habitat fit the criteria for group 1. Our assessment of critical habitats that fit the criteria for group 2 are discussed below in the Conclusion section. Second, for critical habitats that did not fall into one of the two groups with low likelihood of exposure, the dichotomous key was used to frame our analysis by determining preliminary levels of concern (high or low) for the relevant PBFs in each critical habitat based on the anticipated risk to the PBF(s).

For all plant critical habitats with one exception, the only applicable PBF was related to pollinators and/or seed dispersers of the species. In determining our preliminary level of concern, we considered information that informed our considerations of risk, including the degree to which the pollinator/seed disperser PBF would be susceptible to adverse effects from malathion based on anticipated annual malathion usage in the critical habitat and overlapping malathion uses. For example, malathion generally poses high risks to pollinator/seed disperser PBFs involving insects and to a lesser extent, pollinator/seed disperser PBFs involving birds. There was one plant with a water quality PBF. As for animal water quality PBFs, plant PBFs involving low flow, low volume and moderate volume aquatic habitats (i.e., Bins 2, 5 and 6, as shown in Table 1 in the dichotomous key in Appendix L-C) may also be more at risk to degradation from pollutants such as malathion due to higher environmental concentrations that would occur from malathion entering water bodies with less capacity for dilution.

We assigned a preliminary high concern level to PBFs that fell into these high risk groups for critical habitats with over 5% usage anticipated annually (with some exceptions for usage only anticipated for mosquito control as indicated in the dichotomous key and explained in the individual critical habitat rationales). We assigned a preliminary low concern level to mammalian pollinators/seed disperser PBFs as these animals are less sensitive to malathion, and water quality PBFs involving moderate

² Associated usage data for critical habitats is not available as of the time of the final Biological Opinion. Information on usage within the species range is used as a surrogate for usage in critical habitat in this assessment of potential consequences of the Action.

flow, high flow, or high volume aquatic habitats (i.e., Bins 3, 4 and 7, as shown in Table 1 in the dichotomous key).

Once the preliminary level of concern was determined (regardless of whether it was high or low) for relevant PBFs in each proposed or designated critical habitat, we then considered any additional relevant information that would influence our conclusion as to whether the Action is likely to destroy or adversely modify critical habitat. For example, for most critical habitats, we considered label changes that include additional conservation measures intended to reduce impacts to listed species and their critical habitats (see *Description of the Action* section of Opinion). The following section presents our conclusion and supporting arguments for each proposed or designated critical habitat.

B. Conclusion

It is the FWS's biological opinion that the Action is not likely to result in the destruction or adverse modification (NDAM) of the proposed and designated critical habitats for plants analyzed in this Opinion, based on the rationales provided in the sections below. Tables at the beginning of each taxa section (ferns or flowering plants) include the critical habitats for that taxa group with their associated rationale categories and our conclusions. Rationales for conclusions that apply to critical habitats with no relevant PBFs (a subset of Category 1s and all Category 2s) are provided in the discussion about those categories (see *Introduction* above). Assessments of critical habitats with one or more relevant PBFs (a subset of Category 1s and all Category 3s) are provided in the applicable taxa sections following the taxa tables. The exception is those with high (95% or greater) overlap with Federal lands, where the rationale is described in section C. Each critical habitat analyzed in the taxa sections includes a description of the critical habitat PBFs, relevant excerpts from the critical habitat rule (if applicable), inputs and outputs from the dichotomous key (presented in table format), and the rationale and conclusion for the critical habitat. More details about the critical habitat designations and any associated PBFs are in the Status of the Species and Critical Habitat (SOS) documents in Appendix C.

C. Critical Habitat Predominantly Overlapping Federal Lands

The following critical habitats were given NDAM determinations based on their large degree of overlap with existing Federal lands (>95% overlap). Based on the available data, we anticipate that malathion usage is likely to occur on Federal lands over the duration of the Action, but only in very localized areas and on a limited basis, as it has in the past. We do not have any information suggesting that future usage on Federal lands is expected to increase over current levels. We assessed information in the critical habitat rules to determine if it would be likely for the small percentage (<5%) of critical habitat on non-federal lands to be disproportionately more important for the conservation and recovery of the species than areas on Federal lands, such that the usage on non-Federal lands would likely affect the value of the critical habitat as a whole for the conservation of the associated species. However, we did not find any situations where this would be likely to be the case. We expect any adverse effects to PBFs will likely be minimal, considering the small scale and low levels of past usage and in light of Federal agency programs that are designed to understand, avoid, and minimize the effects to listed species and their designated critical habitat, and the general conservation measures related to label changes for residential and agricultural uses that are expected to further reduce the likelihood of exposure and effects from these uses on non-target species and habitats (as described in Appendix A-2 and in the *Influence of Conservation Measures on Exposure on Effects* section in the Opinion). For these reasons, we made NDAM determinations for critical habitats primarily located on

Federal lands (i.e. >95% of the designated critical habitat acres are found on Federal lands) as summarized in **Error! Reference source not found.**

Table 1. Summary of species with critical habitats overlapping Federal lands by over 95%

Scientific Name	Common Name	Plant Assessment Group	Critical Habitat Overlap with Federal Lands (% area)
<i>Astragalus jaegerianus</i>	Lane Mountain milk-vetch	9	100
<i>Eriogonum codium</i>	Umtanum Desert buckwheat	9	100
<i>Physaria douglasii</i> ssp. <i>tuplashensis</i>	White Bluffs bladderpod	9	100
<i>Solanum conocarpum</i>	Marron bacora	11	100

D. Critical Habitats – Remaining Critical Habitat Categories and Rationales

The following sections describe our rationales for the remaining designated and proposed critical habitats organized by taxa group. Although some proposed and designated critical habitats have been addressed in the preceding sections, these have been included again in the taxa tables below to aid in crosswalking all of the proposed and designated critical habitats for each taxa group, with each entry indicating the location of the rationale. References to general conservation measures in the rationales below relate to label changes that will be implemented as described in the *Description of the Action* section and Appendix A-2 of this Opinion.

E. Ferns and Fern Allies

The categories and rationales for NDAM determinations for critical habitats of ferns and fern allies are summarized in Table 2. Further analysis was not necessary for the species in this taxa group as all were categorized as having no relevant PBFs, as discussed in the Introduction section of this appendix.

Table 2. Summary of Fern and Fern Ally Critical Habitat Categories and Rationales

Scientific Name	Common Name	Category	Rationale
<i>Adenophorus periens</i>	Pendant kihi fern	2	No relevant PBFs
<i>Asplenium dielirectum</i>	Asplenium-leaved diellia	2	No relevant PBFs
<i>Asplenium dielfalcatum</i>	No common name	2	No relevant PBFs
<i>Asplenium dielmannii</i>	No common name	2	No relevant PBFs
<i>Asplenium dielpallidum</i>	No common name	2	No relevant PBFs
<i>Asplenium peruvianum</i> var. <i>insulare</i>	No common name	2	No relevant PBFs
<i>Asplenium unisorum</i>	No common name	2	No relevant PBFs
<i>Ctenitis squamigera</i>	Pauoa	2	No relevant PBFs
<i>Diplazium molokaiense</i>	No common name	2	No relevant PBFs
<i>Doryopteris angelica</i>	No common name	2	No relevant PBFs
<i>Doryopteris takeuchii</i>	No common name	2	No relevant PBFs
<i>Dryopteris crinalis</i> var. <i>podosorus</i>	Palapalai aumakua	2	No relevant PBFs
<i>Huperzia mannii</i>	Wawae`iole	2	No relevant PBFs
<i>Huperzia nutans</i>	Wawae`iole	2	No relevant PBFs
<i>Marsilea villosa</i>	Ihi`ihi	2	No relevant PBFs
<i>Pteris lidgatei</i>	No common name	2	No relevant PBFs

F. Flowering Plants

The categories and rationales for NDAM determinations for critical habitats of flowering plant species are summarized in **Error! Reference source not found.** Analyses of critical habitats with relevant PBFs follow the table as indicated by the rationale notation “see below.” Further analysis was not necessary for those with no relevant PBFs (Category 2), as discussed in the *Introduction* section of this

appendix. See coinciding section of this appendix for discussions of those with over 95% Federal lands overlap with critical habitat.

Table 3. Summary of Flowering Plant Critical Habitat Categories and Rationales

Scientific Name	Common Name	Category	Rationale
<i>Abutilon eremitopetalum</i>	No common name	2	No relevant PBFs
<i>Abutilon sandwicense</i>	No common name	2	No relevant PBFs
<i>Acaena exigua</i>	Liliwai	2	No relevant PBFs
<i>Acanthomintha ilicifolia</i>	San Diego thornmint	2	No relevant PBFs
<i>Achyranthes mutica</i>	No common name	2	No relevant PBFs
<i>Achyranthes splendens</i> var. <i>rotundata</i>	Round-leaved chaff-flower	2	No relevant PBFs
<i>Agave eggersiana</i>	No common name	2	No relevant PBFs
<i>Alectryon macrococcus</i>	Mahoe	2	No relevant PBFs
<i>Allium munzii</i>	Munz's onion	2	No relevant PBFs
<i>Alsinidendron lychnoides</i>	Kuawawaenohu	2	No relevant PBFs
<i>Ambrosia pumila</i>	San Diego ambrosia	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Amsinckia grandiflora</i>	Large-flowered fiddleneck	2	No relevant PBFs
<i>Arabis georgiana</i>	Georgia rockcress	2	No relevant PBFs
<i>Arabis perstellata</i>	Braun's rock-cress	3	See below
<i>Arctostaphylos franciscana</i>	Franciscan manzanita	2	No relevant PBFs
<i>Arenaria ursina</i>	Bear Valley sandwort	2	No relevant PBFs
<i>Argyroxiphium kauense</i>	Mauna Loa (=Ka'u) silversword	2	No relevant PBFs
<i>Argyroxiphium sandwicense ssp. macrocephalum</i>	`Ahinahina	2	No relevant PBFs
<i>Asclepias welshii</i>	Welsh's milkweed	2	No relevant PBFs
<i>Astelia waialealae</i>	Pa`iniu	2	No relevant PBFs
<i>Astragalus albens</i>	Cushenbury milk-vetch	2	No relevant PBFs
<i>Astragalus ampullarioides</i>	Shivwits milk-vetch	3	See below
<i>Astragalus brauntonii</i>	Braunton's milk-vetch	2	No relevant PBFs
<i>Astragalus holmgreniorum</i>	Holmgren milk-vetch	3	See below

Scientific Name	Common Name	Category	Rationale
<i>Astragalus jaegerianus</i>	Lane Mountain milk-vetch	3	See below
<i>Astragalus lentiginosus</i> var. <i>coachellae</i>	Coachella Valley milk-vetch	2	No relevant PBFs
<i>Astragalus lentiginosus</i> var. <i>piscinensis</i>	Fish Slough milk-vetch	3	See below
<i>Astragalus magdalenae</i> var. <i>peirsonii</i>	Peirson's milk-vetch	2	No relevant PBFs
<i>Astragalus montii</i>	Heliotrope milk-vetch	2	No relevant PBFs
<i>Astragalus phoenix</i>	Ash meadows milk-vetch	2	No relevant PBFs
<i>Astragalus pycnostachyus</i> var. <i>lanosissimus</i>	Ventura Marsh Milk-vetch	3	See below
<i>Berberis nevini</i>	Nevin's barberry	2	No relevant PBFs
<i>Bidens amplexans</i>	Ko`oko`olau	2	No relevant PBFs
<i>Bidens campylotheca pentamera</i>	Ko`oko`olau	2	No relevant PBFs
<i>Bidens campylotheca waihoiensis</i>	Ko`oko`olau	2	No relevant PBFs
<i>Bidens conjuncta</i>	Ko`oko`olau	2	No relevant PBFs
<i>Bidens micrantha</i> ssp. <i>ctenophylla</i>	Ko`oko`olau	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Bidens micrantha ssp. kalealaha</i>	Ko`oko`olau	2	No relevant PBFs
<i>Bidens wiebkei</i>	Ko`oko`olau	2	No relevant PBFs
<i>Bonamia menziesii</i>	No common name	2	No relevant PBFs
<i>Brickellia mosieri</i>	Florida brickell-bush	3	See below
<i>Brighamia insignis</i>	Olulu	2	No relevant PBFs
<i>Brighamia rockii</i>	Pua `ala	2	No relevant PBFs
<i>Brodiaea filifolia</i>	Thread-leaved brodiaea	3	See below
<i>Calamagrostis hillebrandii</i>	Hillebrand's reedgrass	2	No relevant PBFs
<i>Canavalia molokaiensis</i>	`Awikiwiki	2	No relevant PBFs
<i>Canavalia napaliensis</i>	`Awikiwiki	2	No relevant PBFs
<i>Canavalia pubescens</i>	`Awikiwiki	2	No relevant PBFs
<i>Carex lutea</i>	Golden sedge	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Carex specuicola</i>	Navajo sedge	2	No relevant PBFs
<i>Castilleja campestris ssp. succulenta</i>	Fleshy owl's-clover	2	No relevant PBFs
<i>Castilleja cinerea</i>	Ash-grey paintbrush	2	No relevant PBFs
<i>Catesbaea melanocarpa</i>	No common name	2	No relevant PBFs
<i>Ceanothus ophiochilus</i>	Vail Lake ceanothus	2	No relevant PBFs
<i>Cenchrus agrimonioides</i>	Kamanomano	2	No relevant PBFs
<i>Centaurium namophilum</i>	Spring-loving centaury	2	No relevant PBFs
<i>Chamaesyce hooveri</i>	Hoover's spurge	2	No relevant PBFs
<i>Chamaesyce skottsbergii</i> var. <i>skottsbergii</i>	Ewa Plains `akoko	2	No relevant PBFs
<i>Charpentiera densiflora</i>	Papala	2	No relevant PBFs
<i>Chlorogalum purpureum</i>	Purple amole	3	See below
<i>Chorizanthe pungens</i> var. <i>pungens</i>	Monterey spineflower	3	See below
<i>Chorizanthe robusta</i> var. <i>hartwegii</i>	Scotts Valley spineflower	3	See below

Scientific Name	Common Name	Category	Rationale
<i>Chorizanthe robusta</i> var. <i>robusta</i>	Robust spineflower	3	See below
<i>Chromolaena frustrata</i>	Cape Sable Thoroughwort	2	No relevant PBFs
<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	Suisun thistle	3	See below
<i>Cirsium loncholepis</i>	La Graciosa thistle	3	See below
<i>Cirsium wrightii</i>	Wright's marsh thistle	3	See below
<i>Clermontia drepanomorpha</i>	`Oha wai	2	No relevant PBFs
<i>Clermontia lindseyana</i>	`Oha wai	2	No relevant PBFs
<i>Clermontia oblongifolia</i> ssp. <i>brevipes</i>	`Oha wai	2	No relevant PBFs
<i>Clermontia oblongifolia</i> ssp. <i>mauiensis</i>	`Oha wai	2	No relevant PBFs
<i>Clermontia peleana</i>	`Oha wai	2	No relevant PBFs
<i>Clermontia pyrularia</i>	`Oha wai	2	No relevant PBFs
<i>Clermontia samuelii</i>	`Oha wai	2	No relevant PBFs
<i>Colubrina oppositifolia</i>	Kauila	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Consolea corallicola</i>	Florida semaphore Cactus	3	See below
<i>Cordylanthus mollis ssp. mollis</i>	Soft bird's-beak	3	See below
<i>Cyanea acuminata</i>	Haha	2	No relevant PBFs
<i>Cyanea asarifolia</i>	Haha	2	No relevant PBFs
<i>Cyanea asplenifolia</i>	Haha	2	No relevant PBFs
<i>Cyanea calycina</i>	Haha	2	No relevant PBFs
<i>Cyanea copelandii ssp. haleakalaensis</i>	Haha	2	No relevant PBFs
<i>Cyanea crispa</i>	Haha	2	No relevant PBFs
<i>Cyanea dolichopoda</i>	Haha	2	No relevant PBFs
<i>Cyanea dunbarii</i>	Haha	2	No relevant PBFs
<i>Cyanea duvalliorum</i>	Haha	2	No relevant PBFs
<i>Cyanea eleeleensis</i>	Haha	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Cyanea glabra</i>	Haha	2	No relevant PBFs
<i>Cyanea grimesiana ssp. grimesiana</i>	Haha	2	No relevant PBFs
<i>Cyanea grimesiana ssp. obatae</i>	Haha	2	No relevant PBFs
<i>Cyanea hamatiflora ssp. carlsonii</i>	Haha	2	No relevant PBFs
<i>Cyanea hamatiflora ssp. hamatiflora</i>	Haha	2	No relevant PBFs
<i>Cyanea horrida</i>	Haha nui	2	No relevant PBFs
<i>Cyanea humboldtiana</i>	Haha	2	No relevant PBFs
<i>Cyanea kolekoleensis</i>	Haha	2	No relevant PBFs
<i>Cyanea koolauensis</i>	Haha	2	No relevant PBFs
<i>Cyanea kuhihewa</i>	Haha	2	No relevant PBFs
<i>Cyanea kunthiana</i>	Haha	2	No relevant PBFs
<i>Cyanea lanceolata</i>	Haha	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Cyanea lobata</i>	Haha	2	No relevant PBFs
<i>Cyanea longiflora</i>	Haha	2	No relevant PBFs
<i>Cyanea magnicalyx</i>	Haha	2	No relevant PBFs
<i>Cyanea mannii</i>	Haha	2	No relevant PBFs
<i>Cyanea maritae</i>	Haha	2	No relevant PBFs
<i>Cyanea mceldowneyi</i>	Haha	2	No relevant PBFs
<i>Cyanea munroi</i>	Haha	2	No relevant PBFs
<i>Cyanea obtusa</i>	Haha	2	No relevant PBFs
<i>Cyanea pinnatifida</i>	Haha	2	No relevant PBFs
<i>Cyanea platyphylla</i>	Haha	2	No relevant PBFs
<i>Cyanea procera</i>	Haha	2	No relevant PBFs
<i>Cyanea profuga</i>	Haha	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Cyanea purpurellifolia</i>	No common name	2	No relevant PBFs
<i>Cyanea recta</i>	Haha	2	No relevant PBFs
<i>Cyanea remyi</i>	Haha	2	No relevant PBFs
<i>Cyanea rivularis</i>	Haha	2	No relevant PBFs
<i>Cyanea shipmanii</i>	Haha	2	No relevant PBFs
<i>Cyanea solanacea</i>	Popolo	2	No relevant PBFs
<i>Cyanea st.-johnii</i>	Haha	2	No relevant PBFs
<i>Cyanea stictophylla</i>	Haha	2	No relevant PBFs
<i>Cyanea superba</i>	Haha	2	No relevant PBFs
<i>Cyanea truncata</i>	Haha	2	No relevant PBFs
<i>Cyanea undulata</i>	Haha	2	No relevant PBFs
<i>Cyperus fauriei</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Cyperus pennatiformis</i>	No common name	2	No relevant PBFs
<i>Cyperus trachysanthos</i>	Pu`uka`a	2	No relevant PBFs
<i>Cyrtandra cyaneoides</i>	Mapele	2	No relevant PBFs
<i>Cyrtandra dentata</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra ferripilosa</i>	Haiwale	2	No relevant PBFs
<i>Cyrtandra filipes</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra giffardii</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra gracilis</i>	No common name	2	No relevant PBFs
<i>Cyrtandra kaulantha</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra limahuliensis</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra munroi</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra oenobarba</i>	Ha`iwale	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Cyrtandra oxybapha</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra paliku</i>	Haiwale	2	No relevant PBFs
<i>Cyrtandra polyantha</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra sessilis</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra subumbellata</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra tintinnabula</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra viridiflora</i>	Ha`iwale	2	No relevant PBFs
<i>Cyrtandra waiolani</i>	No common name	2	No relevant PBFs
<i>Deinandra (=Hemizonia) conjugens</i>	Otay tarplant	3	See below
<i>Deinandra increscens ssp. villosa</i>	Gaviota Tarplant	2	No relevant PBFs
<i>Delissea rhytidosperma</i>	No common name	2	No relevant PBFs
<i>Delissea subcordata</i>	Oha	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Delissea undulata</i>	No common name	2	No relevant PBFs
<i>Delphinium bakeri</i>	Baker's larkspur	3	See below
<i>Delphinium luteum</i>	Yellow larkspur	3	See below
<i>Dubautia herbstobatae</i>	Na`ena`e	2	No relevant PBFs
<i>Dubautia imbricata imbricata</i>	Na`ena`e	2	No relevant PBFs
<i>Dubautia kalalauensis</i>	Naenae	2	No relevant PBFs
<i>Dubautia kenwoodii</i>	Naenae	2	No relevant PBFs
<i>Dubautia latifolia</i>	Koholapehu	2	No relevant PBFs
<i>Dubautia pauciflora</i>	Na`ena`e	2	No relevant PBFs
<i>Dubautia plantaginea magnifolia</i>	Na`ena`e	2	No relevant PBFs
<i>Dubautia plantaginea ssp. humilis</i>	Na`ena`e	2	No relevant PBFs
<i>Dubautia waialealae</i>	Na`ena`e	2	No relevant PBFs
<i>Echinomastus erectocentrus var. acunensis</i>	Acuña Cactus	3	See below

Scientific Name	Common Name	Category	Rationale
<i>Enceliopsis nudicaulis</i> var. <i>corrugata</i>	Ash Meadows sunray	2	No relevant PBFs
<i>Eragrostis fosbergii</i>	Fosberg's love grass	2	No relevant PBFs
<i>Erigeron decumbens</i> var. <i>decumbens</i>	Willamette daisy	2	No relevant PBFs
<i>Erigeron parishii</i>	Parish's daisy	2	No relevant PBFs
<i>Eriodictyon capitatum</i>	Lompoc yerba santa	2	No relevant PBFs
<i>Eriogonum codium</i>	Umtanum Desert buckwheat	3	See below
<i>Eriogonum gypsophilum</i>	Gypsum wild-buckwheat	1	No relevant PBFs
<i>Eriogonum kennedyi</i> var. <i>austromontanum</i>	Southern mountain wild-buckwheat	2	No relevant PBFs
<i>Eriogonum ovalifolium</i> var. <i>vineum</i>	Cushenbury buckwheat	2	No relevant PBFs
<i>Eriogonum pelinophilum</i>	Clay-Loving wild buckwheat	2	No relevant PBFs
<i>Eryngium sparganophyllum</i>	Arizona eryngo	2	No relevant PBFs
<i>Erysimum capitatum</i> var. <i>angustatum</i>	Contra Costa wallflower	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Eugenia koolauensis</i>	Nioi	2	No relevant PBFs
<i>Euphorbia celastroides</i> var. <i>kaenana</i>	`Akoko	2	No relevant PBFs
<i>Euphorbia deppeana</i>	`Akoko	2	No relevant PBFs
<i>Euphorbia eleanoriae</i>	`Akoko	2	No relevant PBFs
<i>Euphorbia haeleeleana</i>	`Akoko	2	No relevant PBFs
<i>Euphorbia halemanui</i>	Akoko	2	No relevant PBFs
<i>Euphorbia herbstii</i>	`Akoko	2	No relevant PBFs
<i>Euphorbia kuwaleana</i>	`Akoko	2	No relevant PBFs
<i>Euphorbia remyi</i> var. <i>kauaiensis</i>	`Akoko	2	No relevant PBFs
<i>Euphorbia remyi</i> var. <i>remyi</i>	`Akoko	2	No relevant PBFs
<i>Euphorbia rockii</i>	`Akoko	2	No relevant PBFs
<i>Exocarpos luteolus</i>	Heau	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Festuca ligulata</i>	Guadalupe fescue	2	No relevant PBFs
<i>Festuca molokaiensis</i>	No common name	2	No relevant PBFs
<i>Flueggea neowawraea</i>	Mehamehame	2	No relevant PBFs
<i>Fremontodendron mexicanum</i>	Mexican flannelbush	2	No relevant PBFs
<i>Gardenia mannii</i>	Nanu	2	No relevant PBFs
<i>Geranium arboreum</i>	Nohoanu	2	No relevant PBFs
<i>Geranium hanaense</i>	Nohoanu	2	No relevant PBFs
<i>Geranium hillebrandii</i>	Nohoanu	2	No relevant PBFs
<i>Geranium kauaiense</i>	Nohoanu	2	No relevant PBFs
<i>Geranium multiflorum</i>	Nohoanu	2	No relevant PBFs
<i>Gonocalyx concolor</i>	No common name	2	No relevant PBFs
<i>Gouania hillebrandii</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Gouania meyenii</i>	No common name	2	No relevant PBFs
<i>Gouania vitifolia</i>	No common name	2	No relevant PBFs
<i>Grindelia fraxinipratensis</i>	Ash Meadows gumplant	2	No relevant PBFs
<i>Harrisia</i> (= <i>Cereus</i>) <i>aboriginum</i> (= <i>gracilis</i>)	Aboriginal Prickly-apple	3	See below
<i>Hedeoma todsenii</i>	Todsens's pennyroyal	1	No relevant PBFs
<i>Helianthus paradoxus</i>	Pecos sunflower	2	No relevant PBFs
<i>Helianthus verticillatus</i>	Whorled Sunflower	2	No relevant PBFs
<i>Hesperomannia arborescens</i>	No common name	2	No relevant PBFs
<i>Hesperomannia arbuscula</i>	No common name	2	No relevant PBFs
<i>Hesperomannia lydgatei</i>	No common name	2	No relevant PBFs
<i>Hibiscadelphus giffardianus</i>	Hau kuahiwi	2	No relevant PBFs
<i>Hibiscadelphus hualalaiensis</i>	Hau kuahiwi	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Hibiscadelphus woodii</i>	Hau kuahiwi	2	No relevant PBFs
<i>Hibiscus arnottianus ssp. immaculatus</i>	Koki`o ke`oke`o	2	No relevant PBFs
<i>Hibiscus brackenridgei</i>	Ma`o hau hele (=Native yellow hibiscus)	2	No relevant PBFs
<i>Hibiscus clayi</i>	Clay's hibiscus	2	No relevant PBFs
<i>Hibiscus dasycalyx</i>	Neches River rose-mallow	2	No relevant PBFs
<i>Hibiscus waimeae ssp. hanneriae</i>	Koki`o ke`oke`o	2	No relevant PBFs
<i>Holocarpha macradenia</i>	Santa Cruz tarplant	3	See below
<i>Hudsonia montana</i>	Mountain golden heather	1	No relevant PBFs
<i>Ipomopsis polyantha</i>	Pagosa skyrocket	3	See below
<i>Ischaemum byrone</i>	Hilo ischaemum	2	No relevant PBFs
<i>Isodendrion hosakae</i>	Aupaka	2	No relevant PBFs
<i>Isodendrion laurifolium</i>	Aupaka	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Isodendron longifolium</i>	Aupaka	2	No relevant PBFs
<i>Isodendron pyriformis</i>	Kula wahine noho	2	No relevant PBFs
<i>Ivesia kingii</i> var. <i>eremica</i>	Ash Meadows ivesia	2	No relevant PBFs
<i>Ivesia webberi</i>	Webber's Ivesia	3	See below
<i>Kadua cookiana</i>	Awiwi	2	No relevant PBFs
<i>Kadua coriacea</i>	Kio`ele	2	No relevant PBFs
<i>Kadua degeneri</i>	No common name	2	No relevant PBFs
<i>Kadua laxiflora</i>	Pilo	2	No relevant PBFs
<i>Kadua parvula</i>	No common name	2	No relevant PBFs
<i>Kadua st.-johnii</i>	No common name	2	No relevant PBFs
<i>Kanaloa kahoolawensis</i>	Kohe malama malama o kanaloa	2	No relevant PBFs
<i>Keysseria</i> (=Lagenifera) <i>erici</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Keysseria (=Lagenifera) helenae</i>	No common name	2	No relevant PBFs
<i>Kokia cookei</i>	Cooke's koki`o	2	No relevant PBFs
<i>Kokia drynarioides</i>	Koki`o	2	No relevant PBFs
<i>Kokia kauaiensis</i>	Koki`o	2	No relevant PBFs
<i>Korthalsella degeneri</i>	Hulumoa	2	No relevant PBFs
<i>Labordia cyrtandrae</i>	Kamakahala	2	No relevant PBFs
<i>Labordia helleri</i>	Kamakahala	2	No relevant PBFs
<i>Labordia lydgatei</i>	Kamakahala	2	No relevant PBFs
<i>Labordia pumila</i>	Kamakahala	2	No relevant PBFs
<i>Labordia tinifolia</i> var. <i>wahiawaensis</i>	Kamakahala	2	No relevant PBFs
<i>Labordia triflora</i>	Kamakahala	2	No relevant PBFs
<i>Lasthenia conjugens</i>	Contra Costa goldfields	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Leavenworthia crassa</i>	Fleshy-fruit glade cress	2	No relevant PBFs
<i>Leavenworthia exigua laciniata</i>	Kentucky glade cress	3	See below
<i>Leavenworthia texana</i>	Texas golden Glade cress	2	No relevant PBFs
<i>Lepidium arbuscula</i>	`Anaunau	2	No relevant PBFs
<i>Lepidium papilliferum</i>	Slickspot peppergrass	3	See below
<i>Lesquerella kingii ssp. bernardina</i>	San Bernardino Mountains bladderpod	2	No relevant PBFs
<i>Lesquerella thamnophila</i>	Zapata bladderpod	2	No relevant PBFs
<i>Lilaeopsis schaffneriana var. recurva</i>	Huachuca water-umbel	2	No relevant PBFs
<i>Limnanthes floccosa ssp. californica</i>	Butte County meadowfoam	2	No relevant PBFs
<i>Limnanthes floccosa ssp. grandiflora</i>	Large-flowered woolly Meadowfoam	2	No relevant PBFs
<i>Linum carteri carteri</i>	Carter's small-flowered flax	3	See below
<i>Lipochaeta fauriei</i>	Nehe	2	No relevant PBFs
<i>Lipochaeta lobata var. leptophylla</i>	Nehe	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Lipochaeta micrantha</i>	Nehe	2	No relevant PBFs
<i>Lipochaeta waimeaensis</i>	Nehe	2	No relevant PBFs
<i>Lobelia gaudichaudii</i> ssp. <i>koolauensis</i>	No common name	2	No relevant PBFs
<i>Lobelia monostachya</i>	No common name	2	No relevant PBFs
<i>Lobelia niihauensis</i>	No common name	2	No relevant PBFs
<i>Lobelia oahuensis</i>	No common name	2	No relevant PBFs
<i>Lomatium cookii</i>	Cook's lomatium	2	No relevant PBFs
<i>Lupinus sulphureus</i> ssp. <i>kincaidii</i>	Kincaid's Lupine	3	See below
<i>Lysimachia daphnoides</i>	lehua makanoe	2	No relevant PBFs
<i>Lysimachia filifolia</i>	No common name	2	No relevant PBFs
<i>Lysimachia iniki</i>	No common name	2	No relevant PBFs
<i>Lysimachia lydgatei</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Lysimachia maxima</i>	No common name	2	No relevant PBFs
<i>Lysimachia pendens</i>	No common name	2	No relevant PBFs
<i>Lysimachia scopulensis</i>	No common name	2	No relevant PBFs
<i>Lysimachia venosa</i>	No common name	2	No relevant PBFs
<i>Melanthera kamolensis</i>	Nehe	2	No relevant PBFs
<i>Melanthera tenuifolia</i>	Nehe	2	No relevant PBFs
<i>Melicope adscendens</i>	Alani	2	No relevant PBFs
<i>Melicope balloui</i>	Alani	2	No relevant PBFs
<i>Melicope christophersenii</i>	Alani	2	No relevant PBFs
<i>Melicope degeneri</i>	Alani	2	No relevant PBFs
<i>Melicope haupuensis</i>	Alani	2	No relevant PBFs
<i>Melicope hiiakae</i>	Alani	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Melicope knudsenii</i>	Alani	2	No relevant PBFs
<i>Melicope lydgatei</i>	Alani	2	No relevant PBFs
<i>Melicope makahae</i>	Alani	2	No relevant PBFs
<i>Melicope mucronulata</i>	Alani	2	No relevant PBFs
<i>Melicope munroi</i>	Alani	2	No relevant PBFs
<i>Melicope ovalis</i>	Alani	2	No relevant PBFs
<i>Melicope pallida</i>	Alani	2	No relevant PBFs
<i>Melicope paniculata</i>	Alani	2	No relevant PBFs
<i>Melicope puberula</i>	Alani	2	No relevant PBFs
<i>Melicope reflexa</i>	Alani	2	No relevant PBFs
<i>Melicope saint-johnii</i>	Alani	2	No relevant PBFs
<i>Melicope zahlbruckneri</i>	Alani	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Mentzelia leucophylla</i>	Ash Meadows blazingstar	2	No relevant PBFs
<i>Mezoneuron kawaiense</i>	Uhiuhi	2	No relevant PBFs
<i>Mimulus fremontii</i> var. <i>vandenbergensis</i>	Vandenberg monkeyflower	3	See below
<i>Monardella viminea</i>	Willowy monardella	3	See below
<i>Mucuna sloanei</i> var. <i>persericea</i>	Sea bean	2	No relevant PBFs
<i>Myrsine juddii</i>	Kolea	2	No relevant PBFs
<i>Myrsine knudsenii</i>	Kolea	2	No relevant PBFs
<i>Myrsine linearifolia</i>	Kolea	2	No relevant PBFs
<i>Myrsine mezii</i>	Kolea	2	No relevant PBFs
<i>Myrsine vaccinioides</i>	Kolea	2	No relevant PBFs
<i>Navarretia fossalis</i>	Spreading navarretia	2	No relevant PBFs
<i>Neostapfia colusana</i>	Colusa grass	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Neraudia angulata</i>	No common name	2	No relevant PBFs
<i>Neraudia ovata</i>	No common name	2	No relevant PBFs
<i>Neraudia sericea</i>	No common name	2	No relevant PBFs
<i>Nitrophila mohavensis</i>	Amargosa niterwort	2	No relevant PBFs
<i>Nothoctrum breviflorum</i>	`Aiea	2	No relevant PBFs
<i>Nothoctrum peltatum</i>	`Aiea	2	No relevant PBFs
<i>Nototrichium humile</i>	Kulu`i	2	No relevant PBFs
<i>Oenothera deltoides ssp. howellii</i>	Antioch Dunes evening-primrose	2	No relevant PBFs
<i>Orcuttia inaequalis</i>	San Joaquin Orcutt grass	2	No relevant PBFs
<i>Orcuttia pilosa</i>	Hairy Orcutt grass	2	No relevant PBFs
<i>Orcuttia tenuis</i>	Slender Orcutt grass	2	No relevant PBFs
<i>Orcuttia viscida</i>	Sacramento Orcutt grass	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Oxytheca parishii</i> var. <i>goodmaniana</i>	Cushenbury oxytheca	2	No relevant PBFs
<i>Packera franciscana</i>	San Francisco Peaks ragwort	2	No relevant PBFs
<i>Panicum fauriei</i> var. <i>carteri</i>	Carter's panicgrass	1	No relevant PBFs
<i>Panicum niihauense</i>	Lau `ehu	2	No relevant PBFs
<i>Pectis imberbis</i>	Beardless chinch weed	3	See below
<i>Pediocactus peeblesianus</i> var. <i>fickeiseniae</i>	Fickeisen plains cactus	3	See below
<i>Penstemon debilis</i>	Parachute beardtongue	3	See below
<i>Pentachaeta lyonii</i>	Lyon's pentachaeta	2	No relevant PBFs
<i>Peperomia subpetiolata</i>	`Ala `ala wai nui	2	No relevant PBFs
<i>Peucedanum sandwicense</i>	Makou	2	No relevant PBFs
<i>Phacelia submutica</i>	DeBeque phacelia	2	No relevant PBFs
<i>Phyllostegia bracteata</i>	No common name	2	No relevant PBFs
<i>Phyllostegia haliakalae</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Phyllostegia hirsuta</i>	No common name	2	No relevant PBFs
<i>Phyllostegia hispida</i>	No common name	2	No relevant PBFs
<i>Phyllostegia kaalaensis</i>	No common name	2	No relevant PBFs
<i>Phyllostegia knudsenii</i>	No common name	2	No relevant PBFs
<i>Phyllostegia mannii</i>	No common name	2	No relevant PBFs
<i>Phyllostegia mollis</i>	No common name	2	No relevant PBFs
<i>Phyllostegia parviflora</i>	No common name	2	No relevant PBFs
<i>Phyllostegia pilosa</i>	No common name	2	No relevant PBFs
<i>Phyllostegia racemosa</i>	Kiponapona	2	No relevant PBFs
<i>Phyllostegia renovans</i>	No common name	2	No relevant PBFs
<i>Phyllostegia velutina</i>	No common name	2	No relevant PBFs
<i>Phyllostegia waimeae</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Phyllostegia warshaueri</i>	No common name	2	No relevant PBFs
<i>Phyllostegia wawrana</i>	No common name	2	No relevant PBFs
<i>Physaria douglasii</i> ssp. <i>tuplashensis</i>	White Bluffs bladderpod	3	See below
<i>Physaria globosa</i>	Short's bladderpod	2	No relevant PBFs
<i>Piperia yadonii</i>	Yadon's piperia	3	See below
<i>Pittosporum halophilum</i>	No common name	2	No relevant PBFs
<i>Pittosporum napaliense</i>	Ho`awa	2	No relevant PBFs
<i>Plantago hawaiiensis</i>	Kuahiwi laukahi	2	No relevant PBFs
<i>Plantago princeps</i>	Kuahiwi laukahi	2	No relevant PBFs
<i>Platanthera holochila</i>	No common name	2	No relevant PBFs
<i>Platydesma cornuta</i> var. <i>cornuta</i>	No common name	2	No relevant PBFs
<i>Platydesma cornuta</i> var. <i>decurrens</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Platydesma rostrata</i>	Pilo kea lau li`i	2	No relevant PBFs
<i>Pleomele forbesii</i>	Hala pepe	2	No relevant PBFs
<i>Pleomele hawaiiensis</i>	Hala pepe	2	No relevant PBFs
<i>Poa atropurpurea</i>	San Bernardino bluegrass	2	No relevant PBFs
<i>Poa mannii</i>	Mann's bluegrass	2	No relevant PBFs
<i>Poa sandwicensis</i>	Hawaiian bluegrass	2	No relevant PBFs
<i>Poa siphonoglossa</i>	No common name	2	No relevant PBFs
<i>Polygonum hickmanii</i>	Scotts Valley Polygonum	3	See below
<i>Polyscias bisattenuata</i>	No common name	2	No relevant PBFs
<i>Polyscias flynnii</i>	No common name	2	No relevant PBFs
<i>Polyscias gymnocarpa</i>	`Ohe`ohe	2	No relevant PBFs
<i>Polyscias lydgatei</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Polyscias racemosa</i>	No common name	2	No relevant PBFs
<i>Portulaca sclerocarpa</i>	Po`e	2	No relevant PBFs
<i>Pritchardia munroi</i>	Lo`ulu	2	No relevant PBFs
<i>Psychotria grandiflora</i>	Kopiko	2	No relevant PBFs
<i>Psychotria hexandra ssp. oahuensis</i>	Oahu wild coffee (=kopiko)	2	No relevant PBFs
<i>Psychotria hobdyi</i>	Kopiko	2	No relevant PBFs
<i>Pteralyxia kauaiensis</i>	Kaulu	2	No relevant PBFs
<i>Pteralyxia macrocarpa</i>	Kaulu	2	No relevant PBFs
<i>Remya kauaiensis</i>	No common name	2	No relevant PBFs
<i>Remya mauiensis</i>	Maui remya	2	No relevant PBFs
<i>Remya montgomeryi</i>	No common name	2	No relevant PBFs
<i>Sanicula mariversa</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Sanicula purpurea</i>	No common name	2	No relevant PBFs
<i>Santalum haleakalae</i> var. <i>lanaiense</i>	Lanai sandalwood (=`iliahi)	2	No relevant PBFs
<i>Schenkia sebaeoides</i>	Awiwi	2	No relevant PBFs
<i>Schiedea apokremnos</i>	Ma`oli`oli	2	No relevant PBFs
<i>Schiedea attenuata</i>	No common name	2	No relevant PBFs
<i>Schiedea haleakalensis</i>	No common name	2	No relevant PBFs
<i>Schiedea helleri</i>	No common name	2	No relevant PBFs
<i>Schiedea hookeri</i>	No common name	2	No relevant PBFs
<i>Schiedea jacobii</i>	No common name	2	No relevant PBFs
<i>Schiedea kaalae</i>	No common name	2	No relevant PBFs
<i>Schiedea kauaiensis</i>	No common name	2	No relevant PBFs
<i>Schiedea kealiae</i>	Ma`oli`oli	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Schiedea laui</i>	No common name	2	No relevant PBFs
<i>Schiedea lydgatei</i>	No common name	2	No relevant PBFs
<i>Schiedea membranacea</i>	No common name	2	No relevant PBFs
<i>Schiedea nuttallii</i>	No common name	2	No relevant PBFs
<i>Schiedea obovata</i>	No common name	2	No relevant PBFs
<i>Schiedea salicaria</i>	No common name	2	No relevant PBFs
<i>Schiedea sarmentosa</i>	No common name	2	No relevant PBFs
<i>Schiedea spergulina</i> var. <i>leiopoda</i>	No common name	2	No relevant PBFs
<i>Schiedea spergulina</i> var. <i>spergulina</i>	No common name	2	No relevant PBFs
<i>Schiedea stellarioides</i>	Laulihilihi	2	No relevant PBFs
<i>Schiedea trinervis</i>	No common name	2	No relevant PBFs
<i>Schiedea viscosa</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Sesbania tomentosa</i>	Ohai	2	No relevant PBFs
<i>Sicyos alba</i>	`Anunu	2	No relevant PBFs
<i>Sidalcea keckii</i>	Keck's Checker-mallow	3	See below
<i>Sidalcea oregana</i> var. <i>calva</i>	Wenatchee Mountains checkermallow	2	No relevant PBFs
<i>Silene alexandri</i>	No common name	2	No relevant PBFs
<i>Silene hawaiiensis</i>	No common name	2	No relevant PBFs
<i>Silene lanceolata</i>	No common name	2	No relevant PBFs
<i>Silene perlmanii</i>	No common name	2	No relevant PBFs
<i>Solanum incompletum</i>	Popolo ku mai	2	No relevant PBFs
<i>Solanum sandwicense</i>	`Aiakeakua, popolo	2	No relevant PBFs
<i>Spermolepis hawaiiensis</i>	No common name	2	No relevant PBFs
<i>Sphaeralcea gierischii</i>	Gierisch mallow	3	See below

Scientific Name	Common Name	Category	Rationale
<i>Stenogyne bifida</i>	No common name	2	No relevant PBFs
<i>Stenogyne campanulata</i>	No common name	2	No relevant PBFs
<i>Stenogyne kanehoana</i>	No common name	2	No relevant PBFs
<i>Stenogyne kauaulaensis</i>	No common name	2	No relevant PBFs
<i>Stenogyne kealiae</i>	No common name	2	No relevant PBFs
<i>Stephanomeria malheurensis</i>	Malheur wire-lettuce	1	No relevant PBFs
<i>Streptanthus bracteatus</i>	Bracted twistflower	3	See below
<i>Taraxacum californicum</i>	California taraxacum	2	No relevant PBFs
<i>Tetramolopium capillare</i>	Pamakani	2	No relevant PBFs
<i>Tetramolopium filiforme</i>	No common name	2	No relevant PBFs
<i>Tetramolopium lepidotum ssp. lepidotum</i>	No common name	2	No relevant PBFs
<i>Tetramolopium remyi</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Tetramolopium rockii</i>	No common name	2	No relevant PBFs
<i>Thlaspi californicum</i>	Kneeland Prairie penny-cress	3	See below
<i>Trematolobelia singularis</i>	No common name	2	No relevant PBFs
<i>Tuctoria greenei</i>	Greene's tuctoria	2	No relevant PBFs
<i>Tuctoria mucronata</i>	Solano grass	2	No relevant PBFs
<i>Urera kaalae</i>	Opuhe	2	No relevant PBFs
<i>Varronia rupicola</i>	No common name	2	No relevant PBFs
<i>Vigna o-wahuensis</i>	No common name	2	No relevant PBFs
<i>Viola chamissoniana ssp. chamissoniana</i>	Pamakani	2	No relevant PBFs
<i>Viola helenae</i>	No common name	2	No relevant PBFs
<i>Viola kauaiensis var. wahiawaensis</i>	Nani wai`ale`ale	2	No relevant PBFs
<i>Viola oahuensis</i>	No common name	2	No relevant PBFs

Scientific Name	Common Name	Category	Rationale
<i>Wikstroemia villosa</i>	No common name	2	No relevant PBFs
<i>Wilkesia hobbii</i>	Dwarf iliau	2	No relevant PBFs
<i>Xylosma crenatum</i>	No common name	2	No relevant PBFs
<i>Yermo xanthocephalus</i>	Desert yellowhead	2	No relevant PBFs
<i>Zanthoxylum dipetalum</i> var. <i>tomentosum</i>	A`e	2	No relevant PBFs
<i>Zanthoxylum hawaiiense</i>	A`e	2	No relevant PBFs
<i>Zanthoxylum oahuense</i>	A`e	2	No relevant PBFs
<i>Zizania texana</i>	Texas wild-rice	1	See below

***Arabis perstellata* (Braun's Rock-Cress)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Relatively undisturbed, closed canopy mesophytic and sub-xeric forest with large, mature trees, including sugar maple (*Acer saccharum*), chinquapin oak (*Quercus muhlenbergii*), hackberry (*Celtis occidentalis*), or Ohio buckeye (*Aesculus glabra*)
- Open forest floors with little herbaceous cover and leaf litter accumulation with natural disturbance
- Areas with few introduced weed species

- Rock outcrops on moderate to steep calcareous slopes

In the Final Rule (*see* Effects of Critical Habitat Designation), “[a]ctivities that significantly degrade or destroy *Arabis perstellata* pollinator populations (e.g, pesticide application)” may directly or indirectly destroy or adversely modify critical habitat.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	No Mention	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
23.63	4.83	0	0.32	0
Total % Use Overlap = 28.46 ²		Total % Usage overlap = 0.32 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of preliminary low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Braun’s rock-cress.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. However, usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.32%). Furthermore, conservation measures will be implemented that reduce exposure of pollinators to malathion applications on corn and pasture, the two main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is

complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton, orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Both conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of Braun's rock cress, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not appreciably alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures are will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be appreciably impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Braun's rock-cress.

Citation:

U.S. Fish and Wildlife Service. 2004. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Arabis perstellata* (Braun's Rock-cress). Final Rule. Federal Register 69:31460-31496.

***Astragalus ampullarioides* (Shivwits Milk-Vetch)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Outcroppings of soft clay soil, often purple-hued
- Topographic features/relief, including alluvial fans and fan terraces
- Insect visitors or pollinators

Pollen dispersal for this species is provided mainly by insect pollinators (e.g., *Anthophora captognatha*, *A. damnersi*, *A. porterae*, *Eucera quadricincta*, *Bombus morrissonis*, *Hoplitis grinnelli*, *Osmia clarescens*, *O. marginata*, *O. titus*, *O. clarescens*, and two types of *Dialictus* spp), which are listed as a PBF in the Final Rule.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	5.35	0	0.63	61.2
Total % Use Overlap = 100 ²		Total % Usage overlap = 0.63 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Shivwits milk-vetch.

A fairly large portion of the species' critical habitat (61.2%) is on Federal lands, where malathion usage is expected to be extremely low and carried out with avoidance and minimization measures for listed species and critical habitats (as described in the Effects of the action section of the Opinion). Thus, while usage may occur anywhere within the overlapping use sites, we are primarily concerned about effect of malathion on the non-Federal portion of the critical habitat, as we anticipate no more than low level effects on the Federal portion. While expected use and usage may be high outside of the Federal portion of critical habitat, and while this usage may change in amount over time, the large portion of critical habitat contained in Federal lands are assured to remain high quality with low impacts from malathion use.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.63%). Furthermore, conservation measures will be implemented that reduce exposure of pollinators to malathion applications on pasture and residential uses, the two main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

Both conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of Shivwits milk-vetch, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not appreciably alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be appreciably impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Shivwits milk-vetch.

Citation:

U.S. Fish and Wildlife Service. 2006. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Astragalus ampullarioides* (Shivwits milk-vetch) and *Astragalus holmgreniorum* (Holmgren milk-vetch). Final Rule. Federal Register 71:77972-78012.

***Astragalus holmgreniorum* (Holmgren Milk-Vetch)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Appropriate geological layers or soils that support individual *A. holmgreniorum* plants
- Topographic features/relief, including mesas, ridge remnants, alluvial fans, and fan terraces
- Insect visitors or pollinators

Pollen dispersal for this species is provided mainly by insect pollinators (e.g., *Anthophora captognatha*, *A. damnersi*, *A. porterae*, *Anthophora* spp., *Eucera quadricincta*, *Osmia titus*, *O. clavescens*, and two types of *Dialictus* spp.), which are listed as a PBF in the Final Rule.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	abiotic and biotic	high concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
98.56	3.81	7.95	0.33	43.05
Total % Use Overlap = 100 ²		Total % Usage overlap = 8.28 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of this species. Impacts can be direct (through killing of pollinators) and indirect (through impacts to vegetation that support a healthy pollinator community). The dichotomous key indicates these impacts are of high concern primarily due to the high mosquito adulticide usage within the critical habitat of this species. However, as described below, we do not

anticipate impacts to the pollinator PBF to be appreciable. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Holmgren milk-vetch.

Almost half of the species' critical habitat (43%) is on Federal lands, where malathion usage is expected to be extremely low and carried out with avoidance and minimization measures for listed species and critical habitats, as described in the effects of the action section of the Opinion. Thus, while usage may occur anywhere within the overlapping use sites, in our analysis of whether the Action would appreciably diminish the value of the critical habitat as a whole for the conservation of the listed species, we are primarily concerned about effects occurring on the non-Federal portion of the critical habitat, as we anticipate no more than low level effects on the Federal portion.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates we anticipate malathion being applied as a mosquito adulticide on a moderate portion of the critical habitat (8%). However, conservation measures to be implemented for mosquito adulticide use will prohibit application during most daylight hours (from two hours after dawn until two hours before sunset). This period is when many diurnal insect pollinators are most active, including those for the Holmgren milk-vetch, thus substantially limiting the anticipated exposure of pollinators present in and around the critical habitat of this species to malathion when used as a mosquito adulticide.

In addition, because we are not aware that the listed species is dependent on any specific or obligate pollinators, and the species can depend on multiple avenues of seed dispersal (both biotic and abiotic), the impacts to pollinators will not appreciably alter the ability for the critical habitat to support the reproduction of this listed species.

Application rates when malathion is applied as a mosquito adulticide are very low (ultra-low volume, or ULV) and have not been found to cause effects to native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor (see General Effects - Effects to Plants). Since the primary usage within the critical habitat of the Holmgren milk-vetch is mosquito adulticide, the pollinator community is not likely to be impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Holmgren milk-vetch.

Citation:

U.S. Fish and Wildlife Service. 2006. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Astragalus ampullarioides* (Shivwits milk-vetch) and *Astragalus holmgreniorum* (Holmgren milk-vetch). Final Rule. Federal Register 71:77972-78012.

***Astragalus lentiginosus* var. *piscinensis* (Fish Slough Milk-Vetch)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Alkaline soils that occur in areas with little or no slope and which overlay the groundwater table that is 19-60 in (48-152 cm) below the land surface
- Plant associations dominated by *Spartina-Sporobolus*, or where a sparse amount of *Chrysothamnus albidus* occurs in the transition zone between *Spartina-Sporobolus* and *Chrysothamnus albidus-Distichlis* plant associations
- Pollinator populations
- Hydrologic conditions that provide suitable periods of soil moisture and chemistry

A. lentiginosus var. *piscinensis* is dependent on insects for flower pollination and fertilization and the taxon is not capable of producing fruits in the absence of pollinators (e.g., bumblebees, bees in Megachilidae family, potentially others), which are listed as a PBF in the Final Rule.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
32.27	12.7	0	0	66.6
Total % Use Overlap = 44.97 ²		Total % Usage overlap = 0 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Fish Slough milk-vetch.

A fairly large portion of the species' critical habitat (66.6%) is on Federal lands, where malathion

usage is expected to be extremely low and carried out with avoidance and minimization measures for listed species and critical habitats (as described in the effects of the action section of the Opinion). Thus, while usage may occur anywhere within the overlapping use sites, we are primarily concerned about effect of malathion on the non-Federal portion of the critical habitat, as we anticipate no more than low level effects on the Federal portion. While expected use and usage may be high outside of the Federal portion of critical habitat, and while this usage may change in amount over time, the large portion of critical habitat contained in Federal lands are assured to remain high quality with low impacts from malathion use.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. However, usage data indicates that malathion is not anticipated to be applied within the critical habitat (0% usage) of this species. Therefore, we do not anticipated effects to the pollinators of this plant from malathion use within its range.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Fish Slough milk-vetch.

Citation:

U.S. Fish and Wildlife Service. 2005. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Astragalus lentiginosus* var. *piscinensis*). Final Rule. Federal Register 70:33774-33795.

***Astragalus pycnostachyus* var. *lanosissimus* (Ventura Marsh Milk-Vetch)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Vegetation cover of at least 50% but not exceeding 75%, including *Baccharis salicifolia*, *Baccharis pilularis*, *Salix lasiolepis*, *Lotus scoparius* (deerweed), and *Ericameria ericoides* (coast goldenbush)
- Low densities of nonnative annual plants
- High water table, either fresh or brackish, as evidenced by the presence of channels, sloughs, or depressions that may support stands of *Salix lasiolepis*, *Typha* spp., and *Scirpus* spp. (cattail)
- Soils that are fine-grained, composed primarily of sand with some clay and silt, yet are well-drained
- Soils that do not exhibit a white crystalline crust that would indicate saline or alkaline conditions

In the Final Rule (see Effects of the Critical Habitat Designation), “[u]se of pesticides or other chemicals that can directly affect *Astragalus pycnostachyus* var. *lanosissimus*, its associated native vegetation, or pollinators” may affect critical habitat.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	69.92	0	1.86	0
Total % Use Overlap = 100 ²		Total % Usage overlap = 1.86 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages. See rationale for discussion on the usage specific to the critical habitat of the Ventura Marsh milk-vetch.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Ventura Marsh milk-vetch.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Approximately 15% of designated critical habitat for Ventura Marsh milk-vetch occurs outside the range of the species. The small portion outside the range is immediately adjacent to the range and in the same county. Since the small portion is in such close proximity to the range, we assumed the usage in this portion would be the same or very similar to the usage in the rest of the range. As such, we were able to utilize the usage data from the range of the species for our analysis of the entire critical habitat (see *Description of Critical Habitat Analysis* section of this Opinion for further discussion of usage).

Usage data indicates that malathion application areas represent a very small portion of the critical habitat (1.86%). Furthermore, conservation measures will be implemented that reduce exposure of pollinators to malathion applications on orchards and vineyards, pasture, and residential areas, the three main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton, orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All three conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the Ventura marsh milk-vetch, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not appreciably alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be appreciably impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Ventura Marsh milk-vetch.

Citation:

U.S. Fish and Wildlife Service. 2004. Endangered and Threatened Wildlife and Plants; Final

Designation of Critical Habitat for *Astragalus pycnostachyus* var. *lanosissimus* (VenturaMarsh milk-vetch). Final Rule. Federal Register 98:29081-29110.

Brickellia mosieri (Florida Brickell-Bush)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Areas of pine rockland habitat that contain:
 - Open canopy, semi-open subcanopy, understory
 - Substrate of oolitic limestone
 - Plant community of predominantly native vegetation
- Disturbance regime that naturally or artificially duplicates natural ecological processes and maintains pine rockland habitat
- Habitats that are connected and of sufficient area to sustain viable populations
 - Availability of pollinators of appropriate type and in sufficient numbers

Pollen dispersal for this species is provided mainly by insect pollinators, which are listed as a PCE in the Final Rule. Because the specific type(s) and number of pollinators of *B. mosieri* are unknown, and may include non-generalist species closely tied to pine rockland habitats, preserving and restoring connectivity of pine rockland habitat fragments is essential to the long-term conservation of the species. Sufficient connectivity of pine rockland habitat is necessary to support establishment of new populations through seed dispersal, and to preserve and enhance genetic diversity. Therefore, habitat connectivity of sufficient size and suitability that supports the species' growth, distribution, and population expansion is included as a PCE for *B. mosieri*.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	abiotic and biotic	high concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	38.42	45.78	1.63	0
Total % Use Overlap = 100 ²		Total % Usage Overlap = 47.41 ³		

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
--	--	---	---	--

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of this species. Impacts can be direct (through killing of pollinators) and indirect (through impacts to vegetation that support a healthy pollinator community). The dichotomous key indicates these impacts are of high concern primarily due to the high mosquito adulticide usage within the critical habitat of this species. However, as described below, we do not anticipate impacts to the pollinator PBF to be appreciable. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Florida brickell-bush.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates we anticipate malathion being applied as a mosquito adulticide in a high portion of the critical habitat (46%). However, conservation measures to be implemented for mosquito adulticide use will prohibit application during most daylight hours (from two hours after dawn until two hours before sunset). This period is when many diurnal insect pollinators are most active, including those for the Gierisch mallow, thus limiting the anticipated exposure of pollinators present in and around the critical habitat of this species to malathion when used as a mosquito adulticide.

In addition, because we are not aware that the listed species is dependent on any specific or obligate pollinators, and the species can depend on multiple avenues of seed dispersal (both biotic and abiotic), the impacts to pollinators will not appreciably alter the ability for the critical habitat to support the reproduction of this listed species.

Application rates when malathion is applied as a mosquito adulticide are very low (ultra-low volume, or ULV) and have not been found to cause effects to native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor (see General Effects - Effects to Plants). Since the primary usage within the critical habitat of the Florida brickell-bush is mosquito adulticide, the pollinator community is not likely to be impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Florida brickell-bush.

Citation:

U.S. Fish and Wildlife Service. 2015. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Brickellia mosieri* (Florida Brickell-bush) and *Linum carteri* var. *carteri* (Carter's Small-flowered Flax). Final Rule. Federal Register 80:49846-49886.

***Brodiaea filifolia* (Thread-Leaved Brodiaea)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Appropriate soil series at a range of elevations and in a variety of plant communities, including:
 - Clay soil series at elevations 100-2,500 ft (30-762 m)
 - Soils altered by hydrothermal activity at elevations 1,000-2,500 ft (305-762 m)
 - Silty loam soil series underlain by a clay subsoil or caliche that are generally poorly drained, moderately to strongly alkaline, granitic in origin, and at elevations 600-1,800 ft (183-549 m)
 - Clay loam soil series underlain by heavy clay loams or clays derived from olivine basalt lava at elevations 1,700-2,500 ft (518-762 m)
 - Sandy loam soils derived from basalt and granodiorite parent materials; deposits of gravel, cobble, and boulders; or hydrologically fractured, weathered granite in intermittent streams and seeps at elevations 1,800-2,500 ft (549-762 m)
- Areas with a natural, generally intact surface and subsurface soil structure, not permanently altered by anthropogenic land use activities extending out up to 820 ft (250 m) from mapped occurrences of *B. filifolia* to provide space for pollinators

As stated in the Final Rule (see PCEs section), *B. filifolia* cannot sexually reproduce without the aid of insect pollinators. Insects known to pollinate *B. filifolia* include tumbling flower beetles (Mordellidae, Coleoptera) and bees (Anthrophoridae, Halictidae, Hymenoptera, *Bombus californicus*, *Hoplitis* spp., *Osmia* spp.). “Supporting and maintaining pollinators and pollinator habitat is essential to the conservation of *B. filifolia* because this species cannot set viable seed without cross-pollination” (see Habitat for Pollinators section).

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
6	No	Insect	abiotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with critical habitat)
89.15	58.52	0	0.06	8.85
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0.06 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Thread-leaved brodiaea.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.06%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications in residential areas, the main use type overlapping with the critical habitat of this species:

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

We anticipate this conservation measure will further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the thread-leaved Brodiaea, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species depends solely on abiotic methods of seed dispersal, we anticipate impacts to pollinators in a

small portion of the critical habitat will not appreciably alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be appreciably impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the thread-leaved brodiaea.

Citation:

U.S. Fish and Wildlife Service. 2011. Endangered and Threatened Wildlife and Plants; Final Revised Critical Habitat for *Brodiaea filifolia* (ThreadLeaved Brodiaea). Final Rule. Federal Register 76:6848-6925.

Chlorogalum purpureum (Purple Amole)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Soils that are sandy clay to loamy clay, well-drained on the surface and often overlain with fine gravel
- Plant communities in functioning ecosystems that support associated plant and animal species (e.g., pollinators, predator-prey species, etc), including valley and foothill grassland and open areas within shrubland communities

Pollen dispersal for this species is provided mainly by insect pollinators, which are listed as a PCE in the Final Rule. Pollinators of *C. purpureum* are likely to be generalist species that also pollinate other plants in the habitats where *C. purpureum* occur. "A reduction in pollinator visitation to the species could reduce seed output, resulting in decreases in flowering plant density, inflorescence density, or population size."

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
7	No	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with critical habitat)
74.09	64.43	0	0.03	20.13
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0.03 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Purple amole.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.03%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas, orchards and vineyards, and pasture, the main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton, orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (previously ranging from 3-13 applications per year, depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to

degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the purple amole, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the purple amole.

Citation:

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Chlorogalum purpureum*, a Plant from the South Coast Ranges of California. Final Rule. Federal Register 67:65414-65445.

Chorizanthe pungens var. pungens (Monterey Spineflower)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Vegetation structure arranged in a mosaic with openings between the dominant elements (e.g., scrub, shrub, oak trees, or clumps of herbaceous vegetation)

As stated in the PCE section of the Final Rule, “small patches of plants have been documented to suffer reproductive failure due to lack of effective pollination” and “[c]onservation of *Chorizanthe pungens* var. *pungens* depends on adequate space to promote pollinator activity and minimize the edge effects associated with urban development.” One example of an activity that could induce edge effects, as defined in the critical habitat final rule, is “pesticide drift.” The use of pesticides could reduce the pollinator population, increasing the magnitude or frequency of reproductive failure and decreasing the value of critical habitat for this species.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	Unknown	Insect	birds and mammals	high concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
99.04	27.66	0	5.84	11
Total % Use Overlap = 100 ²		Total % Usage Overlap = 5.84 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of this species. Impacts can be direct (through killing of pollinators) and indirect (through impacts to vegetation that support a healthy pollinator community). The dichotomous key indicates these impacts are of preliminary high concern due primarily to the moderate non-mosquito adulticide usage within the critical habitat of this species. However, as described below, we do not anticipate impacts to the pollinator PBF to be appreciable. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Monterey spineflower.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates we anticipate malathion being applied on a moderate portion of the critical habitat (5.8%). However, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas and all agricultural use types overlapping with the critical habitat of this species.

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated

applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

Species-specific measures for agricultural uses: Requirement of: (1) a 20-foot vegetated buffer along water bodies (including rivers, creeks, streams, wetlands, vernal pools, stock ponds, and downhill side of fields), (2) minimum of 24 hours between application of malathion and any irrigation that results in run-off into natural waters, and (3) a 600-foot aerial buffer and 120-foot ground buffer downwind from occupied habitat for all agricultural uses. This species-specific measure is now part of the Action and will be included in *BulletinsLive! Two*.

The above conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of Monterey spineflower, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because we are not aware that the listed species is dependent on any specific or obligate pollinators, and the species can depend on multiple avenues of seed dispersal (both biotic and abiotic), the impacts to pollinators will not appreciably alter the ability for the critical habitat to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be appreciably impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Monterey spineflower.

Citation:

U.S. Fish and Wildlife Service. 2008. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Monterey Spineflower (*Chorizanthe pungens* var. *pungens*). Final Rule. Federal Register 73:1525-1554.

Chorizanthe robusta var. hartwegii (Scotts Valley Spineflower)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Thin soils in the Bonnydoon series that have developed over outcrops of Santa Cruz mudstone and Purisima sandstone

- “Wildflower field” habitat
- Grassland plant community that supports the “wildflower field” habitat that is stable over time and in which nonnative species are absent or are at a density that has little or no adverse effect on resources available for growth and reproduction of the species
- Sufficient areas around each population to allow for recolonization to adjacent suitable microhabitat sites in the event of catastrophic events
- Pollinator activity between existing colonies of *C. robusta* var. *hartwegii*
- Seed dispersal mechanisms between existing colonies and other suitable sites
- Sufficient integrity of the watershed above habitat for *C. robusta* var. *hartwegii* to maintain soil and hydrologic conditions that provide seasonally wet substrate

As stated in the PCE section of the Final Rule, “the small range of this species makes it vulnerable to edge effects from adjacent human activities, including...the application of herbicides, pesticides, and other contaminants.” In the Special Management Considerations or Protections section, “use of pesticides should be limited or restricted so that healthy populations of pollinators are present to effect seed set.”

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	Unknown	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	53.06	0	0.12	0
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0.12 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical

habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Scotts Valley spineflower.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.12%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas and orchards and vineyards, the two main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton, orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (previously ranging from 3-13 applications per year, depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the Scotts Valley spineflower, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not appreciably alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be appreciably impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Scotts Valley spineflower.

Citation:

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Critical Habitat Designation for *Chorizanthe robusta* var. *hartwegii* (Scotts Valley Spineflower). Final Rule. Federal Register 67:37336-37354.

***Chorizanthe robusta* var. *robusta* (Robust Spineflower)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Sandy soils associated with active coastal dunes and inland sites with sandy soils
- Plant communities that support associated species, including coastal dune, coastal scrub, grassland, maritime chaparral, and oak woodland communities
- Plant communities that contain little or no cover by nonnative species which would compete for resources
- Physical processes (occasional soil disturbance) that support natural dune dynamics along coastal areas

As stated in the Special Management Considerations or Protections section of the Final Rule, “use of pesticides should be limited or restricted so that viable populations of pollinators are present to facilitate reproduction.” “The associated plant communities must be maintained to ensure that the habitat needs of pollinators and dispersal agents are maintained.”

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
10	Unknown	Insect	mammals	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with critical habitat)
99.91	30.12	0	0	0
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages. See rationale for discussion on the usage specific to the critical habitat of the robust spineflower.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the robust spineflower.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Critical habitat for robust spineflower occurs completely outside the range of the species. Critical habitat is designated in six small areas of Santa Cruz County, California (a total of 469 acres). Since the usage overlap in our analysis comes from the range of this species (see discussion in the *Effects of the Action* section of this Opinion), and the critical habitat is not found in the range, we could not rely on the usage data from the species for our analysis of this critical habitat. However, the use overlap is specific to the critical habitat, and indicates that there is overlap with mosquito adulticide, agriculture (pasture and vegetables and ground fruit), and residential uses (developed and open space developed use layers). We then were able to compare usage data from the State of California (CalPUR) specific to Santa Cruz County, and the use types with overlap for the critical habitat. This comparison indicated there was no mosquito control usage in Santa Cruz County, and very little agricultural and residential usage, which we anticipate would likely represent exposure to an extremely small portion of the critical habitat.

Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas, orchards and vineyards, and pasture, the main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton, orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (previously ranging from 3-13 applications per year, depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

These conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the robust spineflower, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species depends on mammals for seed dispersal, we anticipate impacts to pollinators in a small portion of the critical habitat will not appreciably alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be appreciably impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the robust spineflower. **Citation:**

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Critical Habitat Designation for *Chorizanthe robusta* var. *robusta* (Robust Spineflower). Final Rule. Federal Register 67:36822-36845.

***Cirsium hydrophilum* var. *hydrophilum* (Suisun Thistle)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Persistent emergent, intertidal, estuarine wetland at or above the mean high-water line
- Open channels that periodically contain moving water with ocean-derived salts in excess of 0.5%
- Gaps in surrounding vegetation to allow for seed germination and growth

As stated in the Final Rule (*see* Critical Habitat Designation), “mosquito abatement activities (dredging, and chemical spray operations)” may damage the plants directly by trampling and soil disturbance, and indirectly by altering hydrologic processes. In the Adverse Modification Standard section, “chemical spraying” is considered an activity that “may destroy or adversely modify critical habitat.”

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	No Mention	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with critical habitat)
100	24.2	0	0.01	0
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0.01 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Suisun thistle.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.01%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential uses, orchards and

vineyards, and pasture, the main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton, orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (previously ranging from 3-13 applications per year, depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of Suisun thistle, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not appreciably alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be appreciably impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Suisun thistle.

Citation:

U.S. Fish and Wildlife Service. 2007. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for *Cirsium hydrophilum* var. *hydrophilum* (Suisun thistle) and *Cordylanthus mollis* ssp. *mollis* (soft bird’s-beak). Final Rule. Federal Register 72:18518-

18553.

Cirsium loncholepis (La Graciosa Thistle)**Conclusion:** Not likely to destroy or adversely modify designated critical habitat.**Physical and Biological Features/Primary Constituent Elements:**

- Mesic areas associated with:
 - Margins of dune swales, dune lakes, marshes, and estuaries
 - Margins of dynamic riparian systems
 - Freshwater seeps and intermittent streams found in other habitats
- Associated plant communities, including Central dune scrub, coastal dune, coastal scrub, freshwater seep, coastal and valley freshwater marsh and fen, riparian scrub, oak woodland, intermittent streams, and other wetland communities
- Soils with a sandy component including dune sands, Oceano sands, Camarillo sandy loams, riverwash, and sandy alluvial soils
- Features that allow dispersal and connectivity between populations:
 - Natural riparian drainages that are not channelized or confined by barriers or dams
 - Natural Aeolian geomorphology

As described in the Pollinators section of the final rule (under PCEs), *C. loncholepis* is “pollinated by bees (e.g., mason bees, carpenter bees, leaf cutter bees, introduced honeybees), butterflies, flies, beetles, ground beetles, black ants, and hummingbirds”, though the species is “capable of both self-fertilization and cross-fertilization”. Pollinators are not listed as a PCE for this species, though connectivity between populations is listed as a PCE and is essential for dispersal (primarily by wind).

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	No Mention	Insect	abiotic	high concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with critical habitat)
99.79	52.46	0	6.53	10.2
Total % Use Overlap = 100 ²		Total % Usage Overlap = 6.53 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of this species. Impacts can be direct (through killing of pollinators) and indirect (through impacts to vegetation that support a healthy pollinator community). The dichotomous key indicates these impacts are of high concern primarily due to the moderate non-mosquito adulticide usage within the critical habitat of this species. However, as described below, we do not anticipate impacts to the pollinator PBF to be appreciable. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the La Graciosa thistle.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates we anticipate malathion being applied on a moderate portion of the critical habitat (6.5%). However, conservation measures will be implemented that will reduce exposure of pollinators to malathion application on residential areas and orchards and vineyards, the two primary use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton, orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (previously ranging from 3-13 applications per year, depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year

(depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of La Graciosa thistle, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because we are not aware that the listed species is dependent on any specific or obligate pollinators, and the species depends solely abiotic vectors for seed dispersal, the impacts to pollinators will not appreciably alter the ability for the critical habitat to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area will be implemented of the critical habitat where we anticipate malathion to be applied is small and conservation measures for the main use drivers for this critical habitat, the pollinator community is not likely to be appreciably impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the La Graciosa thistle.

Citation:

U.S. Fish and Wildlife Service. 2009. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for *Cirsium loncholepis* (La Graciosa Thistle). Final Rule. Federal Register 74:56978-57046

***Cirsium wrightii* (Wright's marsh thistle)**

Conclusion: Not likely to destroy or adversely modify proposed critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Water-saturated soils with surface or subsurface water flows that allows permanent root saturation and seed germination
- Alkaline soils
- Full sunlight
- Diverse floral communities to attract pollinators

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	Biotic, abiotic	low concern

Critical habitat exposure to malathion - use and usage data¹

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
28	2.98	0	0.37	30
Total % Use Overlap = 30.98 ²		Total % Usage Overlap = 0.37 ³		

¹The species' critical habitat shapefile was unavailable at the time of analysis so both species range overlap and usage were used as surrogates for critical habitat

²Total overlap is capped at 100%.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Wright's marsh thistle.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.37%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential uses, other crops, corn, and pasture, the main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of Wright’s marsh thistle, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is very small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Wright’s marsh thistle.

Citation:

U.S. Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Wright’s marsh thistle (*Circium wrightii*) With a 4(d) Rule and Designation of Critical Habitat. Proposed Rule. Federal Register 85:61460.

Consolea corallicola (Florida Semaphore Cactus)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Areas of upland habitats consisting of coastal berm, rockland hammocks, and buttonwood forest

- Plant community of predominantly native vegetation with no invasive, nonnative animal or plant species or such species in quantities low enough to have minimal effect on survival of

C. corallicola

- Disturbance regime, due to the effects of strong winds or saltwater inundation from storm surge or infrequent tidal inundation that creates canopy openings in coastal berm, rockland hammocks, and buttonwood forest
- Habitats that are connected and of sufficient size to sustain viable populations
- Habitats that provide populations of the generalist pollinators that visit the flowers of *C. corallicola*

Pollen dispersal for this species is provided mainly by insect pollinators (e.g., bees, butterflies, beetles), habitat for which is listed as a PCE in the Final Rule.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	Unknown	Insect	abiotic and biotic	high concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ²	Federal Lands (% acres overlap with the critical habitat)
57.81	0	19.43	0	48.4
Total % Use Overlap = 57.81 ³		Total % Usage Overlap = 19.43 ³		

¹ Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable

² Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³ Mosquito control usage may overlap with other uses and usages.

Citation:

U.S. Fish and Wildlife Service. 2016. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for *Consolea corallicola* (Florida Semaphore Cactus) and *Harrisia aboriginum* (Aboriginal Prickly-Apple). Final Rule. Federal Register 81:3866- 3925.

Cordylanthus mollis ssp. mollis (Soft Bird's-Beak)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Persistent emergent, intertidal, estuarine wetland at or above the mean high-water line
- Rarity or absence of plants that naturally die in late spring (winter annuals)
- Partially open spring canopy cover (approximately 790 nMol/m²/s) at ground level, with many small openings to facilitate seedling germination

As stated in the Final Rule (*see* Critical Habitat Designation), “mosquito abatement activities (dredging, and chemical spray operations)” may damage the plants directly by trampling and soil disturbance, and indirectly by altering hydrologic processes. In the Adverse Modification Standard section, “chemical spraying” is considered an activity that “may destroy or adversely modify critical habitat.”

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	Unknown	Insect	abiotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
99.99	14.1	0	0	0
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages. See rationale for discussion on the usage specific to the critical habitat of the soft bird's-beak.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described

below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Soft bird's-beak.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Approximately 30% of designated critical habitat for the soft bird's-beak occurs outside the range of the species. Critical habitat outside of the range occurs in Napa County, California. Since the usage overlap in our analysis comes from the range of this species (see discussion in the *Effects of the Action* section of this Opinion), and some of the critical habitat is not found in the range, we could only rely on usage data from the species range for those portions of critical habitat occurring within the range. To determine usage for the portion occurring in Napa County, we compared usage data from the State of California (CalPUR) specific to Napa County, to the use types with overlap for the critical habitat. Use type overlap is specific to critical habitat and indicates use overlap with mosquito control, agricultural use on pasture and 'other crops,' and residential. This comparison indicated there was no mosquito control usage in Napa County, no agricultural use on pasture or 'other crops,' and very little residential usage, which we anticipate would likely represent exposure to an extremely small portion of the critical habitat. As indicated in the table above, no usage is anticipated in the portion of critical habitat occurring within the range.

Furthermore, a conservation measure will be implemented that will reduce exposure of pollinators to malathion applications in residential areas, the only use type with overlap and usage in Napa County:

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from "repeat as necessary" to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species depends solely on abiotic methods of seed dispersal, we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the soft bird's-beak.

Citation:

U.S. Fish and Wildlife Service. 2007. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for *Cirsium hydrophilum* var. *hydrophilum* (Suisun thistle) and *Cordylanthus mollis* ssp. *mollis* (soft bird's-beak). Final Rule. Federal Register 72:18518-18553.

Deinandra (=Hemizonia) conjugens (Otay Tarplant)

Conclusion: ☑ Will not destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Soils with a high clay content (generally >25%) (or clay intrusions or lenses) that are associated with grasslands, open coastal sage scrub, or maritime succulent scrub communities between 25-300 m (80-1,000 ft)
 - Plant communities containing natural openings that provide habitat for the *D. conjugens* life-cycle, and pollen and seed dispersal agents

As stated in the Final Rule (*see* PCEs section), “[t]he small, fragmented range of this species, coupled with its breeding system, makes it especially vulnerable to natural and anthropogenic effects including...nearby use of herbicides, pesticides, and other contaminants.”

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No	Insect	birds and mammals	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	43.83	0	0	30.01
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community).

However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Otay tarplant.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. However, usage data indicates that malathion is not anticipated to be applied within the critical habitat (0% usage) of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (birds and mammals), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Otay tarplant.

Citation:

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for *Deinandra conjugens* (Otay tarplant). Final Rule. Federal Register 67:76030-76053.

Delphinium bakeri (Baker's Larkspur)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Soils that are derived from decomposed shale
- Plant communities that support associated species, including, but not limited to:

Umbellularia californica (California bay), *Aesculus californica* (California buckeye), *Quercus agrifolia* (coastal live oak), *Baccharis pulularis* ssp. *Consanguinea* (coyotebrush), *Symphoricarpos* cf. *rivularis* (snowberry), *Rubus ursinus* (California blackberry), *Pteridium aquilinum* (braken fern), *Polystichum munitum* (sword fern), *Pityrogramma triangularis* (goldback fern), *Dryopteris arguta* (coastal woodfern), *Adiantum ordanii* (maidenhair fern), *Polypodium glycyrrhiza* (licorice fern), *Toxicodendron diversilobum* (poison oak), *Ceanothus thyrsiflorus* (blueblossom ceanothus), *Lithophragma affine* (woodland star), and *Holodiscus discolor* (oceanspray)
- Mesic (moderate moisture) conditions on extensive north-facing slopes.

As stated in the Final Rule (*see* Effects of Critical Habitat Designation), “[a]ctivities which

significantly degrade or destroy likely pollinator populations for *D. bakeri* (e.g., pesticide applications that degrade or destroy large hymenoptera, especially *Bombus* spp. (bumblebees)) in proximity to the designated critical habitat for *D. bakeri*” may directly or indirectly destroy or adversely modify critical habitat. In the Special Management Considerations or Protections section, “[a]erial application of herbicides and insecticides that are likely to be deleterious to the species need to be curtailed in the critical habitat. Exposure to deleterious herbicides and insecticides from drift needs to be avoided.”

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No	Insect, Bird	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	19.84	0	0	0
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages. See rationale for discussion on the usage specific to the critical habitat of the robust spineflower.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Baker’s larkspur.

The insect pollinators of this species are anticipated to experience mortality where malathion is applied, and the avian pollinators may experience mortality or sub-lethal effects, depending on the site of exposure and size of the bird. Smaller birds exposed on use sites with higher allowable use rates (e.g. developed, open space developed, orchards and vineyards) have a greater chance of being affected. However, exposure to spray drift is not expected to result in effects to avian pollinators.

Approximately 13% of designated critical habitat for Baker's larkspur occurs outside the range of the species. The small portion outside the range is immediately adjacent to the range and in the same county. Since the small portion is in such close proximity to the range, we assumed the usage in this portion would be the same or very similar to the usage in the rest of the range. As such, we utilized the usage data from the range of the species for our analysis of the entire critical habitat (see *Description of Critical Habitat Analysis* section of this Opinion for further discussion of usage). Usage data indicates that malathion is not anticipated to be applied within the critical habitat (0% usage) of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Baker's larkspur.

Citation:

U.S. Fish and Wildlife Service. 2003. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for Two Larkspurs from Coastal Northern California. Final Rule. Federal Register 68:12834-12863.

Delphinium luteum (Yellow Larkspur)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Plant communities, including north coastal scrub or coastal prairie communities, including, but not limited to, species such as: *Arabis blepharophylla* (rose rockcress), *Calochortus tolmei* (Tolmei startulip), *Mimulus aurantiacus* (orange bush monkeyflower), *Dudleya caespitosa* (sea lettuce), *Polypodium californicum* (California polyploidy), *Eriogonum parviflorum* (sea cliff buckwheat), *Toxicodendron diversilobum* (poison oak), *Romanzoffia californica* (California mistmaiden), *Hesperis matronalis* (evax), *Pentagramma triangularis* (goldenback fern), and *Sedum spathulifolium* (broadleaf stonecrop)
- Relatively steep sloped soils (30 % or greater) derived from sandstone or shale, with rapid runoff and high erosion potential, such as Kneeland or Yorkville series soils
- Generally north aspected areas
- Habitat upslope and downslope from known populations to maintain disturbance such as occasional rock slides or soil slumping that the species appears to require. In the Special

Management Considerations or Protections section, “[a]erial application of herbicides and insecticides that are likely to be deleterious to the species need to be curtailed in the critical habitat. Exposure to deleterious herbicides and insecticides from drift needs to be avoided.” Pollinators for the genus *Delphinium* typically include bumblebees, though pollinators for *D. luteum* are believed to be hummingbirds.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	No Mention	Insect, Bird	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
99.63	62.2	0	0.02	0.03
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0.02 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Yellow larkspur.

The insect pollinators of this species are anticipated to experience mortality where malathion is applied, and the avian pollinators may experience mortality or sub-lethal effects, depending on the site of exposure and size of the bird. Smaller birds exposed on use sites with higher allowable use rates (e.g. developed, open space developed, orchards and vineyards) have a greater chance of being affected. However, exposure to spray drift is not expected to result in effects to avian pollinators. Additionally, usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.02%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas, orchards and vineyards and pasture, the main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the yellow larkspur, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the yellow larkspur.

Citation:

U.S. Fish and Wildlife Service. 2003. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for Two Larkspurs from Coastal Northern California. Final Rule. Federal Register 68:12834-12863.

Echinomastus erectocentrus var. acunensis (Acuña Cactus)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Native vegetation within the Paloverde-Cacti-Mixed Scrub Series of the Arizona Upland Subdivision of the Sonoran Desert-scrub at elevations 365-1,150 m (1,198-3,773ft). This vegetation must contain predominantly native plant species that:
 - Provide protection to the acuña cactus (e.g., creosote bush, ironwood, and palo verde)
 - Provide for pollinator habitat with a radius of 900 m (2,953 ft) around each individual cactus
 - Allow for seed dispersal through the presence of bare soils immediately adjacent to and within 10 m (33 ft) of individual cactus
- Soils overlying rhyolite, andesite, tuff, granite, granodiorite, diorite, or Cornelia quartz monzonite bedrock that are in valley bottoms, on small knolls, or on ridgetops, and are generally on slopes of less than 30 percent.

In the Final Rule (*see* Application of the ‘Adverse Modification’ Standard), “use of pesticides” “within or near designated critical habitat that would significantly reduce pollination or seed set” and may affect critical habitat.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	insects, birds, and mammals	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
44.23	0	0	0	62.8
Total % Use Overlap = 44.23 ²		Total % Usage Overlap = 0 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Acuña Cactus.

A fairly large portion of the species' critical habitat (62.8%) is on Federal lands, where malathion usage is expected to be extremely low and carried out with avoidance and minimization measures for listed species and critical habitats (as described in the effects of the action section of the Opinion). Thus, while usage may occur anywhere within the overlapping use sites, we are primarily concerned about effect of malathion on the non-Federal portion of the critical habitat, as we anticipate no more than low level effects on the Federal portion. While expected use and usage may be high outside of the Federal portion of critical habitat, and while this usage may change in amount over time, the large portion of critical habitat contained in Federal lands are assured to remain high quality with low impacts from malathion use.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. However, usage data indicates that malathion is not anticipated to be applied within the critical habitat (0% usage) of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (insects, birds, and mammals), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Acuña Cactus.

Citation:

U.S. Fish and Wildlife Service. 2016. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Acuña Cactus and the Fickeisen Plains Cactus. Final Rule. Federal Register 81:55266-55313.

Harrisia aboriginum (Aboriginal Prickly-Apple)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Areas of upland habitats consisting of coastal strand, coastal grassland, coastal berm,

maritime hammocks, and shell mounds

- Plant community of predominantly native vegetation with no invasive, nonnative animal or plant species or such species in quantities low enough to have minimal effect on survival of

H. aboriginum

- Canopy openings in coastal strand, coastal grassland, coastal berm, maritime hammock, and shell mound habitats (created by strong winds or saltwater intrusion)
- Habitats that are connected and of sufficient size to sustain viable populations
- Habitats that provide populations of the generalist pollinators that visit the flowers of *H. aboriginum*

Pollen dispersal for this species is provided mainly by insect pollinators (e.g., bees, butterflies, beetles), habitat for which is listed as a PCE in the Final Rule.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	abiotic and biotic	high concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
80.9	0	13.16	0	0.26
Total % Use Overlap = 80.9 ²		Total % Usage Overlap = 13.16 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of this species. Impacts can be direct (through killing of pollinators) and indirect (through impacts to vegetation that support a healthy pollinator community). The dichotomous key indicates these impacts are of high concern primarily due to the high mosquito adulticide usage within the critical habitat of this species. However, as described below, we do not

anticipate impacts to the pollinator PBF to be appreciable. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Aboriginal prickly-apple.

The main pollinators of this species are insects, specifically moths, which pollinate this night-blooming species. We anticipate insect pollinator mortality will occur where malathion is applied. Usage data indicates we anticipate malathion being applied as a mosquito adulticide on a high portion of the critical habitat (13%). However, a species-specific conservation measure will be implemented, where feasible, that will prohibit application over, or allowing drift into the critical habitat of this species from May through December. This avoidance period coincides with the flowering period of the aboriginal prickly-apple, when it is crucial for adequate numbers of pollinators visit the flowers of this species in order to ensure successful reproduction. We anticipate this measure will substantially limit the exposure of pollinators present in the critical habitat of this species to malathion when used as a mosquito adulticide and reduce the risk of impacts to the function of the pollinator PBF of this species. If avoidance is not feasible or impairs the ability of the mosquito control district or agency to protect the public's health and welfare, applicators must coordinate with the local FWS Ecological Services field office 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 and maps of designated critical habitat are available through the Information, Planning, and Consultation (IPaC) website <https://ecos.fws.gov/ipac/>). Discussions at the local level allow for greater flexibility based on site- or species-specific considerations, such as timing, species life history, and geographic or habitat factors. Applicators subject to this conservation measures will be required to maintain documentation of the technical assistance and the agreed upon species-specific measures that were implemented.

In addition, because we are not aware that the listed species is dependent on any specific or obligate pollinators, and the species can depend on multiple avenues of seed dispersal (both biotic and abiotic), the impacts to pollinators will not substantially alter the ability for the critical habitat to support the reproduction of this listed species.

Application rates when malathion is applied as a mosquito adulticide are very low (ultra-low volume, or ULV) and have not been found to cause effects to native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor (see General Effects - Effects to Plants). Since the primary usage within the critical habitat of the Aboriginal prickly-apple is mosquito adulticide, the pollinator community is not likely to be impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Aboriginal prickly-apple.

Citation:

U.S. Fish and Wildlife Service. 2016. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for *Consolea corallicola* (Florida Semaphore Cactus) and *Harrisia aboriginum* (Aboriginal Prickly-Apple). Final Rule. Federal Register 81:3866-3925.

Holocarpa macradenia (Santa Cruz Tarplant)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Soils associated with coastal terrace prairies, including Watsonville, Tierra, Elkhorn, Santa Inez, and Pinto series
- Plant communities that support associated species, including native grasses such as *Nassella* spp. (needlegrass) and *Danthonia californica* (California oatgrass); native herbaceous species such as members of the genus *Hemizonia* (other tarplants), *Perideridia gairdneri* (Gairdner's yampah), *Plagiobothrys diffusus* (San Francisco popcorn flower), and *Trifolium buckwestiorum* (Santa Cruz clover)
- Physical processes (soils and hydrologic) that maintain the soil structure and hydrology that produce seasonally saturated soils

As stated in the Special Management Considerations or Protections section of the Final Rule, "use of pesticides should be limited or restricted so that viable populations of pollinators are present to facilitate reproduction." "The associated plant communities must be maintained to ensure that the habitat needs of pollinators and dispersal agents are maintained."

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No	Insect	abiotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	83.03	0	3.51	0
Total % Use Overlap = 100 ²		Total % Usage Overlap = 3.51 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Santa Cruz tarplant.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a small portion of the critical habitat (3.51%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas, pasture, orchards and vineyard, and vegetables and groundfruit, the main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of Santa Cruz tarplant, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species depends solely on abiotic methods of seed dispersal, we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied

is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Santa Cruz tarplant.

Citation:

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for *Holocarpha macradenia* (Santa Cruz Tarplant). FinalRule. Federal Register 67:63968-64007.

Ipomopsis polyantha (Pagosa Skyrocket)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Mancos shale soils
- Elevations 6,400-8,100 ft (1,950-2,475 m) and current climatic conditions similar to those that historically occurred, including suitable precipitation, cold/dry springs, and winter snow
- Suitable native plant communities with small (<100 ft² (10 m²)) or larger barren areas with less than 20% plantcover in the actual barren areas
- Appropriate native plant communities, preferably that reflects historical composition
- Clearings within the Ponderosa pine/Rocky Mountain juniper and Utah juniper/oak communities
- Pollinator ground and twig nesting areas: a mosaic of native plant communities and habitat types generally would provide for pollinator diversity
 - Connectivity between areas allowing pollinators to move from one site to the next
 - Availability of other floral resources, including other plant species that provide nectar and pollen for pollinators.
 - 3,2800-ft (1,000-m) area beyond occupied habitat to conserve the pollinators essential for plant reproduction
- Appropriate disturbance levels (naturally-maintained)

As stated in the Application of the ‘Adverse Modification’ Standard section of the Final Rule, “actions that would result in the loss of pollinators or their habitat”, including “spraying pesticides that will kill pollinators”, may affect critical habitat.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	abiotic, birds, and mammals	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
0	16.51	0	0.27	17.74
Total % Use Overlap = 16.51 ²		Total % Usage Overlap = 0.27 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Pagosa skyrocket.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.27%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas and pasture, the two main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and

groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the Pagosa skyrocket, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic, birds, and mammals), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Pagosa skyrocket.

Citation:

U.S. Fish and Wildlife Service. 2012. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Ipomopsis polyantha* (Pagosa skyrocket), *Penstemon debilis* (Parachute beardtongue), and *Phacelia submutica* (DeBeque phacelia). Final Rule. Federal Register 77:48368-48418.

Ivesia webberi (Webber's Ivesia)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Open to sparsely vegetated areas composed of generally short-statured associated plant species
- Appropriate associated species that can include: *Antennaria dimorpha*, *Artemisia arbuscula*, *Balsamorhiza hookeri*, *Elymus elymoides*, *Erigeron bloomeri*, *Lewisia rediviva*, *Poa secunda*, and *Viola beckwithii*.
- Intact assemblage of appropriate associated species to attract the floral visitors that may be acting as pollinators of *I. webberi*
- Flats, benches, or terraces that are generally above or adjacent to large valleys
- Elevations 4,475-6,237 ft (1,364-1,901 m)
- Vernal moist soils with an argillic horizon that shrink and swell upon drying and wetting
 - Suitable soils could include Reno, Xman, Aldi, and Barshad

As stated in the Application of the ‘Adverse Modification’ Standard section of the Final Rule, “actions that would result in the loss of pollinators or their habitat”, including “spraying pesticides that will kill pollinators”, may affect critical habitat.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	abiotic	high concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
40.96	3.91	5.5	0	78.75
Total % Use Overlap = 44.87 ²		Total % Usage Overlap = 5.5 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages. See rationale for discussion on the usage specific to the critical habitat of Webber's ivesia.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of this species. Impacts can be direct (through killing of pollinators) and indirect (through impacts to vegetation that support a healthy pollinator community). The dichotomous key indicates these impacts are of preliminary high concern due primarily to the moderate mosquito adulticide usage within the critical habitat of this species. However, as described below, we do not anticipate impacts to the pollinator PBF to be appreciable. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Webber's ivesia.

A large portion of the species' critical habitat (79%) is on Federal lands, where malathion usage is expected to be extremely low and carried out with avoidance and minimization measures for listed species and critical habitats, as described in the effects of the action section of the Opinion. Thus, while usage may occur anywhere within the overlapping use sites, in our analysis of whether the Action would appreciably diminish the value of the critical habitat as a whole for the conservation of the listed species, we are primarily concerned about effects occurring on the non-Federal portion of the critical habitat, as we anticipate no more than low level effects on the Federal portion.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Approximately 14% of designated critical habitat for Webber's ivesia occurs outside the range of the species. Critical habitat outside of the range occurs in Plumas County, California. Since the usage overlap in our analysis comes from the range of this species (see discussion in the *Effects of the Action* section of this Opinion), and some of the critical habitat is not found in the range, we could only rely on usage data from the species range for those portions of critical habitat occurring within the range. To determine usage for the portion occurring in Plumas County, we compared usage data from the State of California (CalPUR) specific to Plumas County, to the use types with overlap for the critical habitat. Use type overlap is specific to critical habitat and indicates use overlap with pasture and mosquito control uses. The comparison indicated there was no mosquito control usage or usage on pasture in Plumas County.

Usage data indicates we anticipate malathion being applied as a mosquito adulticide on a moderate portion of the critical habitat (5.5%), that occurs within the range of the species. However, conservation measures to be implemented for mosquito adulticide use will prohibit application during most daylight hours (from two hours after dawn until two hours before sunset). This period is when many diurnal insect pollinators are most active, including those for the Webber's ivesia, thus limiting the anticipated exposure of pollinators present in and around the critical habitat of this species to malathion when used as a mosquito adulticide and reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because we are not aware that the listed species is dependent on any specific or obligate pollinators, and the species depends solely on abiotic methods for seed dispersal, the impacts to pollinators will not substantially alter the ability for the critical habitat to support the reproduction of this listed species.

Application rates when malathion is applied as a mosquito adulticide are very low (ultra-low volume, or ULV) and have not been found to cause effects to native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor (see General Effects - Effects to Plants). Since the primary usage within the critical habitat of the Webber's ivesia is mosquito adulticide, the pollinator community is not likely to be impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Webber's ivesia.

Citation:

U.S. Fish and Wildlife Service. 2014. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Ivesia webberi*. Final Rule. Federal Register 79:32126-32155.

***Leavenworthia exigua* var. *laciniata* (Kentucky Glade Cress)**

Conclusion: Not likely to destroy or adversely modify proposed critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Cedar glades and gladelike areas within the range of *L. exigua* var. *laciniata* that include:
 - Areas of rock outcrop, gravel, flagstone of Silurian dolomite or dolomitic limestone, and/or shallow (1-5 cm (0.393-1.97 in), calcareous soils
 - Intact cyclic hydrologic regime involving saturation and/or inundation of the area in winter and early spring, then drying quickly in the summer
 - Full or nearly full sunlight
 - Undisturbed seed bank
- Vegetated land around glades and gladelike areas that extends up and down slope and ends at natural (e.g., stream, topographic contours) or manmade breaks (e.g., roads)

In the Application of the 'Adverse Modification' Standard section of the Final Rule, "insecticide applications" within or near critical habitat would remove or alter vegetation and may affect critical habitat for *L. exigua* var. *laciniata*.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	Unknown	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
0	10.01	0	2.34	0
Total % Use Overlap = 10.01 ²		Total % Usage Overlap = 2.34 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Kentucky glade cress.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (2.34%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas, corn and pasture, the main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of Kentucky glade cress, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Kentucky glade cress.

Citation:

U.S. Fish and Wildlife Service. 2014. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Leavenworthia exigua* var. *laciniata* (Kentucky GladeCress). Final Rule. Federal Register 79:25689-25707.

Lepidium papilliferum (Slickspot peppergrass)

Conclusion: Not likely to destroy or adversely modify proposed critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Ecologically-functional microsites or “slickspots” characterized by:
 - High sodium and clay content, 3-layer soil horizonation sequence
 - Sparse vegetation with low to moderate introduced, invasive, nonnative plant species cover
- Relatively-intact, native *Artemisia tridentata* ssp. *wyomingensis* vegetation assemblages, represented by native bunchgrasses, shrubs, and forbs within 250 m (820 ft) of *L. papilliferum* occurrences
- Diversity of native plants whose blooming times overlap to provide pollinator species with sufficient flowers for foraging and nesting
- Sufficient pollinators for successful fruit and seed production, particularly pollinator species of the sphecid and vespidae wasp families, bombyliid and tachinid fly families, honeybees, and halictid bee species

Pollen dispersal for this species is provided mainly by insect pollinators, which are listed as a PCE in the Proposed Rule.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	abiotic and biotic	high concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
57.75	28.15	0	5.47	53.73
Total % Use Overlap = 85.9 ²		Total % Usage Overlap = 5.47 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of this species. Impacts can be direct (through killing of pollinators) and indirect (through impacts to vegetation that support a healthy pollinator community). The dichotomous key indicates these impacts are of preliminary high concern due primarily to the moderate non-mosquito adulticide usage within the critical habitat of this species. However, as described below, we do not anticipate impacts to the pollinator PBF to be appreciable. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the slickspot peppergrass.

Over half of the species' critical habitat (54%) is on Federal lands, where malathion usage is expected to be extremely low and carried out with avoidance and minimization measures for listed species and critical habitats, as described in the effects of the action section of the Opinion. Thus, while usage may occur anywhere within the overlapping use sites, in our analysis of whether the Action would appreciably diminish the value of the critical habitat as a whole for the conservation of the listed species, we are primarily concerned about effects occurring on the non-Federal portion of the critical habitat, as we anticipate no more than low level effects on the Federal portion.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates we anticipate malathion being applied on a moderate portion of the critical habitat (5.5%). However, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas, orchards and vineyards, and pasture, the main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will

prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the slickspot peppergrass, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because we are not aware that the listed species is dependent on any specific or obligate pollinators, and the species can depend on multiple avenues of seed dispersal (both biotic and abiotic), the impacts to pollinators will not substantially alter the ability for the critical habitat to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the slickspot peppergrass.

Citation:

U.S. Fish and Wildlife Service. 2011. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Lepidium papilliferum* (Slickspot Peppergrass). Proposed Rule. Federal Register 76:27184-27215.

***Linum carteri carteri* (Carter's Small-Flowered Flax)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Areas of pine rockland habitat that contain:
 - Open canopy, semi-open subcanopy, understory
 - Substrate of oolitic limestone
 - Plant community of predominantly native vegetation
- Disturbance regime that naturally or artificially duplicates natural ecological processes and maintains pine rockland habitat
- Habitats that are connected and of sufficient area to sustain viable populations
 - Availability of pollinators of appropriate type and in sufficient numbers

Pollen dispersal for this species is provided mainly by insect pollinators, which are listed as a PCE in the Final Rule. Because the specific type(s) and number of pollinators of *L. carteri carteri* are unknown, and may include nongeneralist species closely tied to pine rockland habitats, preserving and restoring connectivity of pine rockland habitat fragments is essential to the long-term conservation of the species. Sufficient connectivity of pine rockland habitat is necessary to support establishment of new populations through seed dispersal, and to preserve and enhance genetic diversity. Therefore, habitat connectivity of sufficient size and suitability that supports the species' growth, distribution, and population expansion is included as a PBF for

L. carteri carteri.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	abiotic and biotic	high concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
83.78	39.55	45.78	1.63	46.07
Total % Use Overlap = 100 ²		Total % Usage Overlap = 47.41 ³		

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
--	--	---	---	--

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of this species. Impacts can be direct (through killing of pollinators) and indirect (through impacts to vegetation that support a healthy pollinator community). The dichotomous key indicates these impacts are of high concern primarily due to the high mosquito adulticide usage within the critical habitat of this species. However, as described below, we do not anticipate impacts to the pollinator PBF to be appreciable. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Carter's small-flowered flax.

Almost half of the species' critical habitat (46%) is on Federal lands, where malathion usage is expected to be extremely low and carried out with avoidance and minimization measures for listed species and critical habitats, as described in the effects of the action section of the Opinion. Thus, while usage may occur anywhere within the overlapping use sites, in our analysis of whether the Action would appreciably diminish the value of the critical habitat as a whole for the conservation of the listed species, we are primarily concerned about effects occurring on the non-Federal portion of the critical habitat, as we anticipate no more than low level effects on the Federal portion.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates we anticipate malathion being applied as a mosquito adulticide in a high portion of the critical habitat (46%). However, conservation measures will be implemented for mosquito adulticide use will prohibit application during most daylight hours (from two hours after dawn until two hours before sunset). This period is when many diurnal insect pollinators are most active, including those for the Gierisch mallow, thus limiting the anticipated exposure of pollinators present in and around the critical habitat of this species to malathion when used as a mosquito adulticide and reducing the risk of impacts to the function of the pollinator PBF Of this species.

In addition, the final critical habitat rule (USFWS 2015) indicates this species may utilize self-pollination for reproduction, therefore reducing its reliance on pollinators. Furthermore, because we are not aware that the listed species is dependent on any specific or obligate pollinators, and the species can depend on multiple avenues of seed dispersal (both biotic and abiotic), the impacts to pollinators will not substantially alter the ability for the critical habitat to support the reproduction of this listed species.

Application rates when malathion is applied as a mosquito adulticide are very low (ultra-low volume, or ULV) and have not been found to cause effects to native vegetation (and thereby indirectly affect

the pollinator community) by reducing plant size or vigor (see General Effects - Effects to Plants). Since the primary usage within the critical habitat of the Carter's small-flowered flax is mosquito adulticide, the pollinator community is not likely to be impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Carter's small-flowered flax.

Citation:

U.S. Fish and Wildlife Service. 2015. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Brickellia mosieri* (Florida Brickell-bush) and *Linum carteri* var. *carteri* (Carter's Small-flowered Flax). Final Rule. Federal Register 80:49846-49886.

***Lupinus sulphureus ssp. kincaidii* (Kincaid's Lupine)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Early seral upland prairie, or oak savanna habitat with a mosaic of low-growing grasses and forbs and spaces to establish seedlings or new vegetative growth, an absence of dense canopy vegetation, and undisturbed subsoils
- Insect outcrossing pollinators (e.g., *Bombus mixtus*, *B. californicus*) with unrestricted movement between existing lupine patches

Pollen dispersal for this species is provided mainly by insect pollinators, which are listed as a PCE in the Final Rule.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
37.97	83.7	0	1.87	0

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
Total % Use Overlap = 100 ²		Total % Usage Overlap = 1.87 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Kincaid's Lupine.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (1.87%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas, corn, pasture, orchards and vineyards, and vegetables and groundfruit, the main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from "repeat as necessary" to a maximum of 2-4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the Kincaid's lupine, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Kincaid's lupine.

Citation:

U.S. Fish and Wildlife Service. 2006. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Fender's blue butterfly (*Icaricia icarioides fenderi*), *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's lupine), and *Erigeron decumbens* var. *decumbens* (Willamette daisy). Final Rule. Federal Register 71:63862-63977.

Mimulus fremontii var. vandenbergensis (Vandenberg Monkeyflower)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Native maritime chaparral communities of Burton Mesa comprising maritime chaparral and maritime chaparral mixed with coastal scrub, oak woodland, and small patches of native grasslands
- Loose sandy soils: Arnold Sand, Marina Sand, Narlon Sand, Tangair Sand, Botella Loam, Terrace Escarpments, and Gullied Land

In the Final Rule (see Application of the 'Adverse Modification' Standard), "reduction of pollinators" is listed as an action that "would lead to the destruction or alteration of Vandenberg monkeyflower habitat" and "may affect critical habitat."

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
91.53	19.56	0	2.06	50.2
Total % Use Overlap = 100 ²		Total % Usage Overlap = 2.06 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Vandenberg monkeyflower.

A fairly large portion of the species' critical habitat (50.2%) is on Federal lands, where malathion usage is expected to be extremely low and carried out with avoidance and minimization measures for listed species and critical habitats (as described in the effects of the action section of the Opinion). Thus, while usage may occur anywhere within the overlapping use sites, we are primarily concerned about effect of malathion on the non-Federal portion of the critical habitat, as we anticipate no more than low level effects on the Federal portion. While expected use and usage may be high outside of the Federal portion of critical habitat, and while this usage may change in amount over time, the large portion of critical habitat contained in Federal lands are assured to remain high quality with low impacts from malathion use.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (2.06%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas, pasture, orchards and vineyards, and vegetables and groundfruit, the main use types overlapping with the

critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of Vandenberg monkeyflower, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Vandenberg monkeyflower.

Citation:

U.S. Fish and Wildlife Service. 2015. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Diplacus vanderbergensis* (Vandenberg Monkeyflower). Final Rule. Federal Register 80:48142-48170.

Monardella viminea (Willow Monardella)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Riparian channels with ephemeral drainages and adjacent floodplains
 - With a natural hydrological regime that has water flows only after peak seasonal rainfalls; high runoff events that periodically scour riparian vegetation and redistribute alluvial material to create new stream channels, benches and sandbars; and water flows for usually less than 48 hours after a rain event, without long-term standing water
 - With surrounding vegetation that provides semi-open, foliar cover with:
 - Little or no herbaceous understory
 - Little to no canopy cover
 - Open ground cover, less than half of which is herbaceous vegetation cover
 - Some shrub cover
 - An association of other plants, including *Eriogonum fasciculatum* (California buckwheat) and *Baccharis sarothroides* (broom baccharis)
 - That contain ephemeral drainages that:
 - Are made up of coarse, rocky, or sandy alluvium
 - Contain terraced floodplains, terraced secondary benches, stabilized sandbars, channel banks, or sandy washes
 - That have soil with high sand content, typically characterized by sediment and cobble deposits and a high content of coarse, sandy grains and low silt/clay content

In the Final Rule (*see* Application of the ‘Adverse Modification’ Standard), “[d]estruction of critical habitat that contains pollinators... and application of pesticides” are listed as actions that “would significantly affect pollinator abundance or efficacy, directly or indirectly, to a degree that appreciably reduces the value of the critical habitat for the long-term survival or recovery of the species.”

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
10	No	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	23.03	0	0	0.17
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Willoway monardella.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. However, usage data indicates that malathion is not anticipated to be applied within the critical habitat (0% usage) of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the willoway monardella.

Citation:

U.S. Fish and Wildlife Service. 2012. Endangered and Threatened Wildlife and Plants; Revised

Endangered Status, Revised Critical Habitat Designation, and Taxonomic Revision for *Monardella linoides* ssp. *viminea*. Final Rule. Federal Register 77:13394-13447.

***Pectis imberbis* (Beardless Chinchweed)**

Conclusion: Not likely to destroy or adversely modify proposed critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Native-dominated plant communities:
 - Plains, great basin, and semi-desert grasslands, oak savanna, or Madrean evergreen woodland
 - Communities dominated by bunchgrasses with open spacing (adjacent to and within 10 m (33 ft) of individual beardless chinchweed) and with little competition from other plants
 - Communities with plant for pollinator foraging and nesting within 1 km (0.62 mi) of beardless chinchweed populations
- 1,158-1,737 m (3,799-5,699 ft) elevation
- Eroding limestone or granite bedrock substrate
- Steep, south-facing, sunny to partially shaded hillslopes
- Presence of pollinators (i.e., flies, bees, butterflies)

Pollen dispersal for this species is provided mainly by insect pollinators, which are listed as a PCE in the Proposed Rule.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	unknown	unknown	unknown	not a factor

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
0.01	5.54	0	0.48	30.38

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
Total % Use Overlap = 5.55 ²		Total % Usage Overlap = 0.48 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Beardless chinch weed.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.48%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas, the main use type overlapping with the critical habitat of this species:

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

We anticipate this conservation measure will further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the beardless chinch weed, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (unknown), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the beardless chinch weed.

Citation:

U.S. Fish and Wildlife Service. 2019. Endangered and Threatened Wildlife and Plants; Endangered Species Status for Beardless Chinchweed with Designation of Critical Habitat, and Threatened Species Status for Bartram's Stonecrop With Section 4(d) Rule. Proposed Rule. Federal Register 84:67060-67104.

Pediocactus peeblesianus var. fickeiseniae (Fickeisen Plains Cactus)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Soils derived from limestone that are found on mesas, plateaus, terraces, the toe of gently sloping hills with up to 20% slope, margins of canyon rims, and desert washes. These soils:
 - Occur on the Colorado Plateau in Coconino and Mohave Counties of northern Arizona
 - Are derived from alluvium, colluvium, or eolian deposits of limestone from the Harrisburg Member of the Kaibab Formation and limestone, siltstone, and sandstone of the Toroweap and Moenkopi Formations
 - Are nonsaline to slightly saline, gravelly, shallow to moderately deep, and well-drained with little signs of soil movement. Soil textures: gravelly loam, fine sandy loam, gravelly sandy loam, very gravelly sandy loam, clay loam, and cobbly loam
- Native vegetation within the Plains and Great Basin grassland and Great Basin desertscrub vegetation communities from 1,310-1,813 m (4,200-5,950 ft) in elevation that has a natural, generally intact surface and subsurface that preserves the bedrock substrate and are supportive of microbiotic soil crusts where they are naturally found
- Native vegetation that provides for habitat of identified pollinators within the effective pollinator distance of 1,000 m (3,280 ft) around each individual Fickeisen plains cactus

As stated in the Final Rule (*see* PBFs section) primary pollinators for the Fickeisen plains cactus include halictid bees from the genera *Lasioglossum*, *Halictus*, and *Agapostemon*. In the Final Rule (*see* Application of the ‘Adverse Modification’ Standard), “use of pesticides” “within or near designated critical habitat that would significantly reduce pollination or seed set” and may affect critical habitat.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
9	No Mention	Insect	insects, birds, and mammals	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	0	1.58	0	82.62
Total % Use Overlap = 100 ²		Total % Usage Overlap = 1.58 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Fickeisen plains cactus.

A fairly large portion of the species’ critical habitat (82.62%) is on Federal lands, where malathion usage is expected to be extremely low and carried out with avoidance and minimization measures for listed species and critical habitats (as described in the effects of the action section of the Opinion). Thus, while usage may occur anywhere within the overlapping use sites, we are primarily concerned about effect of malathion on the non-Federal portion of the critical habitat, as we anticipate no more than low level effects on the Federal portion. While expected use and usage may be high outside of the Federal portion of critical habitat, and while this usage may change in amount over time, the large portion of critical habitat contained in Federal lands are assured to remain high quality with low impacts from malathion use.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (1.58%). However, conservation measures will be implemented for mosquito adulticide use will prohibit application during most daylight hours (from two hours after dawn until two hours before sunset). This period is when many diurnal insect pollinators are most active, including those for the Gierisch mallow, thus limiting the anticipated exposure of pollinators present in and around the critical habitat of this species to malathion when used as a mosquito adulticide and reducing the risk of impacts to the function of the pollinator PBF Of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (insects, birds, and mammals), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Application rates when malathion is applied as a mosquito adulticide are very low (ultra-low volumes or ULV) and have not been found to cause effects to native vegetation (and thereby indirectly affecting the pollinator community) by reducing plant size or vigor (see General Effects - Effects to Plants). Since the primary usage within the critical habitat of the Fickeisen plains cactus is mosquito adulticide, the pollinator community is not likely to be impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Fickeisen plains cactus.

Citation:

U.S. Fish and Wildlife Service. 2016. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Acuña Cactus and the Fickeisen Plains Cactus. Final Rule. Federal Register 81:55266-55313.

Penstemon debilis (Parachute Beardtongue)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Appropriate soil morphology characterized by a surface layer of small to moderate shale channers (small flagstones) that shift continually due to the steep slopes and below a weakly developed calcareous, sandy to loamy layer with 40-90% coarse material
- Elevations 5,250-9,600 ft (1,600-2,920 m) and climatic conditions similar to those of Mahogany Bench
- Barren areas with <10% plant cover

- Oil shale endemics, which can include: *Mentzelia rhizomata*, *Thalictrum heliophilum*, *Astragalus lutosus*, *Lesquerella parviflora*, *Penstemon osterhoutii*, and *Festuca dasyclada*.
- *Penstemon caespitosa* for support of pollinators and connectivity between sites
- Pollinator ground, twig, and mud nesting areas: a mosaic of native plant communities and habitat types generally would provide for pollinator diversity
 - Connectivity between areas allowing pollinators to move from one site to the next
 - Availability of other floral resources, including other plant species that provide nectar and pollen for pollinators
 - 3,2800-ft (1,000-m) area beyond occupied habitat to conserve the pollinators essential for plant reproduction
- High levels of natural disturbance (very little to no soil formation)

As stated in the Application of the ‘Adverse Modification’ Standard section of the Final Rule, “actions that would result in the loss of pollinators or their habitat”, including “spraying pesticides that will kill pollinators”, may affect critical habitat.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
10	Unknown	Insect	abiotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	2.38	0	0.12	89.57
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0.12 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical

habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Parachute beardtongue.

A fairly large portion of the species' critical habitat (89.57%) is on Federal lands, where malathion usage is expected to be extremely low and carried out with avoidance and minimization measures for listed species and critical habitats (as described in the effects of the action section of the Opinion). Thus, while usage may occur anywhere within the overlapping use sites, we are primarily concerned about effect of malathion on the non-Federal portion of the critical habitat, as we anticipate no more than low level effects on the Federal portion. While expected use and usage may be high outside of the Federal portion of critical habitat, and while this usage may change in amount over time, the large portion of critical habitat contained in Federal lands are assured to remain high quality with low impacts from malathion use.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.12%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on pasture, the main use type overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Both conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the parachute beardtongue, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species depends solely on abiotic methods of seed dispersal, we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value

of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the parachute beardtongue.

Citation:

U.S. Fish and Wildlife Service. 2012. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Ipomopsis polyantha* (Pagosa skyrocket), *Penstemon debilis* (Parachute beardtongue), and *Phacelia submutica* (DeBeque phacelia). Final Rule. Federal Register 77:48368-48418.

Piperia yadonii (Yadon's Piperia)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Vegetative structure providing filtered sunlight on sandy soils, including coastal pine forest and maritime chaparral ridges with dwarfed shrubs
- Nocturnal, short-tongued moths in the families Pyralidae, Geometridae, Noctuidae, and Pterophoridae

As stated in the Final Rule, pollen dispersal for this species is provided mainly by moths (listed as a PCE) and bees.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
6	No	Insect	abiotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
36.64	19.16	0	4.88	0.13
Total % Use Overlap = 55.8 ²		Total % Usage Overlap = 4.88 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
--	--	---	---	--

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Yadon's piperia.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a small portion of the critical habitat (4.88%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas and pasture, the two main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from "repeat as necessary" to a maximum of 2-4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of Yadon's piperia, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species depends solely on abiotic methods of seed dispersal, we anticipate impacts to pollinators in a

small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Yadon's piperia.

Citation:

U.S. Fish and Wildlife Service. 2007. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Piperia yadonii* (Yadon's piperia). Final Rule. Federal Register 72:60410-60450.

Polygonum hickmanii (Scotts Valley Polygonum)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Thin soils in the Bonnydoon series that have developed over outcrops of Santa Cruz mudstone and Purisima sandstone
- "Wildflower field" habitat
- Grassland plant community that supports the "wildflower field" habitat that supports the pollinator activity and seed dispersal mechanisms that typically occur within the grassland plant
- Areas around each colony to allow for recolonization to adjacent suitable microhabitat sites
- Habitat within the subwatersheds upslope to the ridgelines to maintain the edaphic and hydrologic conditions and slope stability that provide seasonally wet substrate

As stated in the PCE section of the Final Rule, "the small range of this species makes it vulnerable to edge effects from adjacent human activities, including...the application of herbicides, pesticides, and other contaminants." In the Special Management Considerations or Protections section, "use of pesticides should be limited or restricted so that healthy populations of pollinators are present to effect seed set."

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	Unknown	Insect	birds and mammals	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	53.06	0	0.12	0
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0.12 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Scotts Valley Polygonum.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a very small portion of the critical habitat (0.12%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential areas and orchards and vineyards, the two main use types overlapping with the critical habitat of this species:

Bloom restrictions: New restrictions on orchards and vineyards, pasture, and other crops UDLs will prohibit application of malathion within three days prior to bloom, during bloom, and until petal fall is complete on certain crops.

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

Both conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of *Scotts Valley polygonum*, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (birds and mammals), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the *Scotts Valley polygonum*.

Citation:

U.S. Fish and Wildlife Service. 2003. Endangered and Threatened Wildlife and Plants; Endangered Status and Designation of Critical Habitat for *Polygonum hickmanii* (ScottsValley polygonum). Final Rule. Federal Register 68:16970-16990.

***Sidalcea keckii* (Keck's Checker-Mallow)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Minimally shaded annual grasslands in the foothills of the Sierra Nevada Mountains containing open patches in which competing vegetation is relatively sparse

- Serpentine soils or other soils that tend to restrict competing vegetation

As stated in the Final Rule (see Effects of the Critical Habitat Designation), “[a]ctivities which significantly degrade or destroy *Sidalcea keckii* pollinator populations (e.g., pesticide applications)” may “destroy or adversely modify critical habitat for *Sidalcea keckii*.” The primary pollinators of *S. keckii* are likely bees, bumble bees, and bee flies, as these are the primary pollinators of closely-related species (i.e., *S. oregano* ssp. *spicata* and *S. malviflora* ssp. *malviflora*). As stated in the Background of the Final Rule, “[m]any bees of the solitary bee genus *Diadasia* specialize in collecting pollen solely from members of the Malvaceae family.”

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	No Mention	Insect	abiotic and biotic	high concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
46.96	95.9	20.17	0.07	0
Total % Use Overlap = 100 ²		Total % Usage Overlap = 20.24 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of this species. Impacts can be direct (through killing of pollinators) and indirect (through impacts to vegetation that support a healthy pollinator community). The dichotomous key indicates these impacts are of high concern primarily due to the high mosquito adulticide usage within the critical habitat of this species. However, as described below, we do not anticipate impacts to the pollinator PBF to be appreciable. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Keck’s checker-mallow.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates we anticipate malathion being applied as a mosquito adulticide in a high portion of the critical habitat (20%). However, conservation measures will be

implemented for mosquito adulticide use will prohibit application during most daylight hours (from two hours after dawn until two hours before sunset). This period is when many diurnal insect pollinators are most active, including those for the Keck's checker-mallow, thus limiting the anticipated exposure of pollinators present in and around the critical habitat of this species to malathion when used as a mosquito adulticide and reduce the risk of impacts to the function of the pollinator PBF of this species.

In addition, because we are not aware that the listed species is dependent on any specific or obligate pollinators, and the species can depend on multiple avenues of seed dispersal (both biotic and abiotic), the impacts to pollinators will not substantially alter the ability for the critical habitat to support the reproduction of this listed species.

Application rates when malathion is applied as a mosquito adulticide are very low (ultra-low volume, or ULV) and have not been found to cause effects to native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor (see General Effects - Effects to Plants). Since the primary usage within the critical habitat of the Keck's checker-mallow is mosquito adulticide, the pollinator community is not likely to be impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Keck's checker-mallow.

Citation:

U.S. Fish and Wildlife Service. 2003. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for *Sidalcea keckii* (Keck's Checker-mallow). Final Rule. Federal Register 68:12863-12880.

***Sphaeralcea gierischii* (Gierisch Mallow)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Appropriate geological layers or gypsiferous soils
- Appropriate Mojave desert scrub plant community and associated native species for soil types
- Biological soil crusts
- Insect visitors or pollinators (e.g., globemallos bee, other solitary bees)
- Areas free of disturbance and areas with low densities or absence of nonnative, invasive

plants (e.g., red brome, cheatgrass)

Pollen dispersal for this species is provided mainly by insect pollinators, which are listed as a PCE in the Final Rule.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	Unknown	Insect	abiotic and biotic	high concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
99.39	0.41	7.35	0	88.96
Total % Use Overlap = 99.8 ²		Total % Usage Overlap = 7.35 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of this species. Impacts can be direct (through killing of pollinators) and indirect (through impacts to vegetation that support a healthy pollinator community). The dichotomous key indicates these impacts are of high concern primarily due to the moderate mosquito adulticide usage within the critical habitat of this species. However, as described below, we do not anticipate impacts to the pollinator PBF to be appreciable. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Gierisch mallow.

A large portion of the species' critical habitat (89%) is on Federal lands, where malathion usage is expected to be extremely low and carried out with avoidance and minimization measures for listed species and critical habitats, as described in the effects of the action section of the Opinion. Thus, while usage may occur anywhere within the overlapping use sites, in our analysis of whether the Action would appreciably diminish the value of the critical habitat as a whole for the conservation of the listed species, we are primarily concerned about effects occurring on the non-Federal portion of the critical habitat, as we anticipate no more than low level effects on the Federal portion.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur

where malathion is applied. Usage data indicates we anticipate malathion being applied as a mosquito adulticide in a moderate portion of the critical habitat (7.35%). However, conservation measures will be implemented for mosquito adulticide use will prohibit application during most daylight hours (from two hours after dawn until two hours before sunset). This period is when many diurnal insect pollinators are most active, including those for the Gierisch mallow, thus limiting the anticipated exposure of pollinators present in and around the critical habitat of this species to malathion when used as a mosquito adulticide and reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because we are not aware that the listed species is dependent on any specific or obligate pollinators, and the species can depend on multiple avenues of seed dispersal (both biotic and abiotic), the impacts to pollinators will not substantially alter the ability for the critical habitat to support the reproduction of this listed species.

Application rates when malathion is applied as a mosquito adulticide are very low (ultra low volume, or ULV) and have not been found to cause effects to native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor (see General Effects - Effects to Plants). Since the primary use within the critical habitat of the Geirisch mallow is mosquito adulticide, the pollinator community is not likely to be impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Gierisch mallow.

Citations:

U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Sphaeralcea gierischii* (Gierisch Mallow). Final Rule. Federal Register 78:49165-49183.

U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for *Sphaeralcea gierischii* (Gierisch Mallow) Throughout its Range. Final Rule. Federal Register 78: 49149-49165.

***Streptanthus bracteatus* (Bracted twistflower)**

Conclusion: Not likely to destroy or adversely modify proposed critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Karstic, dolomitic limestones underlain by less permeable limestone strata, where perched aquifers seep to the surface along slopes. These are often found within 2 kilometers of the exposed boundary of the Edwards or Devils River and Glen Rose geological formations;
- Native, old-growth juniper-oak woodlands and shrublands along the Balcones Escarpment;

- Herbivory from white-tailed deer and introduced ungulates of such low intensity that it does not severely deplete populations prior to seed dispersal;
- Tree and shrub canopy gaps that allow direct sunlight to reach the herbaceous plant layer at least 6 hours per day; and
- Viable populations of native bee species and the abundant, diverse forb and shrub understory that support them

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	No Mention	Insect	Biotic, abiotic	low concern

Critical habitat exposure to malathion - use and usage data¹

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
28	18.8	0	3.65	0
Total % Use Overlap = 46.8 ²		Total % Usage Overlap = 3.65 ³		

¹The species' critical habitat shapefile was unavailable at the time of analysis so both species range overlap and usage were used as surrogates for critical habitat

²Total overlap is capped at 100%.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the bracted twistflower.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. Usage data indicates that malathion application areas represent a small portion of the critical habitat (3.65%). Furthermore, conservation measures will be implemented that will reduce exposure of pollinators to malathion applications on residential uses and corn, the main use types overlapping with the critical habitat of this species:

Reduced application number and rate: New restrictions on corn, cotton (excluding use for the Boll Weevil Eradication Program), orchards and vineyards, pasture, other crops, and vegetables and

groundfruit lower the maximum allowable number of applications to 2-4 per year (depending on the specific crop).

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are expected to significantly reduce exposure to species that overlap with developed and open space developed areas. Label changes will ensure that residential use is limited to spot treatments only (rendering spray drift offsite unlikely) and reducing the extent of area which can be treated in the developed and open space developed areas by as much as 75% or more from modeled values. In addition, we expect the frequency of exposure to decrease as the number of allowable applications is reduced from “repeat as necessary” to a maximum of 2–4 applications per year (depending on the specific residential use). Retreatment intervals of 7-10 days between any repeated applications are expected to reduce environmental concentrations by allowing initial residues to degrade prior to the next application.

All conservation measures are anticipated to further limit the exposure of pollinators to malathion in these use areas where they occur in or around the critical habitat of the bracted twistflower, reducing the risk of impacts to the function of the pollinator PBF of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Malathion can affect native vegetation (and thereby indirectly affect the pollinator community) by reducing plant size or vigor if the foliage or ground is directly sprayed (see General Effects - Effects to Plants). However, because the area of the critical habitat where we anticipate malathion to be applied is small and conservation measures will be implemented for the main use drivers for this critical habitat, the pollinator community is not likely to be substantially impacted indirectly through changes to native vegetation.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the bracted twistflower.

Citation:

U.S. Fish and Wildlife Service. 2021. Endangered and Threatened Wildlife and Plants; Threatened Species Status With a Section 4(d) Rule for Bracted Twistflower and Designation of Critical Habitat. Proposed Rule. Federal Register 86:62668.

Thlaspi californicum (Kneeland Prairie Penny-Cress)

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

- Thin rocky soils that have developed on exposures of serpentine substrates
- Plant communities that support a relatively sparse assemblage of serpentine indicator or facultative-serpentine indicator species (e.g., native forbs, grasses but not trees or shrubs)
- Serpentine substrates that contain 15% or greater (by surface area) of exposed gravels, cobbles, or larger rock fragments
- Prairie grasslands and oak woodlands within 30 m (100 ft) of the serpentine outcrop area on Ashfield Ridge
 - Essential to the conservation of the *T. californicum* because it provides connectivity among serpentine sites, helps maintain hydrologic and edaphic integrity of the sites, and supports populations of pollinators and seed dispersal organisms.

Pollen dispersal for this species is provided mainly by insect pollinators (e.g., generalist bees and flies), which are listed as a PCE in the Final Rule. Also in the PCEs section of the Final Rule, “nearby use of herbicides and pesticides” is listed as an action that could induce effects to critical habitat for *T. californicum*, even if conducted adjacent to habitat.

Species characteristics summary and preliminary level of concern for pollinator PBF

Plant Assessment Group	Obligate pollinator?	Pollination Vector	Seed Dispersal	Pollinator PBF Preliminary Concern Level
11	Unknown	Insect	abiotic and biotic	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
100	90.65	0	0	0
Total % Use Overlap = 100 ²		Total % Usage Overlap = 0 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact pollinators, which are important PBFs of the critical habitat essential for the conservation of the species. Impacts can be direct (through pollinator

mortality) and indirect (through impacts to vegetation that support a healthy pollinator community). However, these impacts are not anticipated to be appreciable and are of low concern as described below. Thus, while we anticipate effects to PBFs for this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for the Kneeland Prairie penny-cress.

Since the main pollinators of this species are insects, we anticipate pollinator mortality will occur where malathion is applied. However, usage data indicates that malathion is not anticipated to be applied within the critical habitat (0% usage) of this species.

In addition, because the listed species is not dependent on any specific or obligate pollinators and the species can depend on multiple avenues of seed dispersal (abiotic and biotic), we anticipate impacts to pollinators in a small portion of the critical habitat will not substantially alter the ability for the critical habitat as a whole to support the reproduction of this listed species.

Thus, we do not anticipate application of malathion, as proposed, will appreciably diminish the value of critical habitat as a whole for the conservation of the species. Therefore, we have determined the Action is not likely to result in the destruction or adverse modification of designated critical habitat for the Kneeland Prairie penny-cress.

Citation:

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Thlaspi californicum* (Kneeland Prairie Penny-cress). Final Rule. Federal Register 67:62897-62910.

***Zizania texana* (Texas wild-rice)**

Conclusion: Not likely to destroy or adversely modify designated critical habitat.

Physical and Biological Features/Primary Constituent Elements:

The final critical habitat rule does not describe PBFs for the critical habitat. However, water quality maintenance is important for the viability of this species, including known phytotoxic compounds such as copper, zinc, and pesticides. Therefore, we have identified water quality as a relevant PBF.

Water Quality PBF impact summary

Physical/Biological Feature	Feature in Designation?	Feature Characteristics	Preliminary Concern Level
water quality	X	Bin 3	low concern

Critical habitat exposure to malathion - use and usage data

Mosquito Adulticide Use (% overlap of critical habitat)	Non-Mosquito Adulticide Use (% overlap of critical habitat)	Mosquito Adulticide Usage (% usage overlap) ¹	Non-Mosquito Adulticide Usage (% usage overlap) ¹	Federal Lands (% acres overlap with the critical habitat)
0	27.68	0	3.11	0
Total % Use Overlap = 27.68 ²		Total % Usage Overlap = 3.11 ³		

¹Species range usage data used as a surrogate for critical habitat usage data for overlapping sites, as critical habitat usage data was unavailable.

²Total overlap is capped at 100%. Mosquito control sites may overlap with other use sites.

³Mosquito control usage may overlap with other uses and usages.

Critical Habitat Rationale for Conclusion:

Labeled uses of malathion are expected to impact water quality, which is an important PBF of the critical habitat essential for the conservation of this species. While we anticipate impacts to the critical habitat of this species, we do not anticipate the effects would appreciably diminish the value of the critical habitat as a whole for Texas wild-rice.

Malathion use sites overlap with 27.68% of the critical habitat. Available data indicates that usage will occur on 3.11% of critical habitat annually, and all usage will come from non-mosquito adulticides uses (residential areas and cotton for this species). However, as described in the “Approach to the Effects Analysis” section of the main body of this Opinion, specific considerations were made for species that occur in Bins 3 and 4. These Bins were modeled in such a way that likely resulted in the overestimation of estimated environmental concentrations, thus overestimating potential exposure. Further investigation by EPA into Bin 3 and 4 estimated environmental concentrations indicate that the flow rates in these aquatic habitats are sufficient to dilute malathion concentrations to a level that will not cause toxic effects to the species.

Conservation measures also will be implemented to protect aquatic habitats, including the critical habitat of the Texas wild-rice:

Rain restriction: The label specifies agricultural applications are prohibited within 48 hours of a forecasted rain event or when soil is saturated. Given the relatively short half-life of malathion and rapid degradation via hydrolysis and other processes, persistence of malathion in storm run-off into most aquatic habitats is not anticipated to last longer than 48 hours under typical pH values, (ie. 6.5-8.5) and water temperatures corresponding to growing season. Restricting malathion application to periods where rain is not forecasted or when the soil is not saturated will provide time for the pesticide to degrade before runoff into aquatic habitats can occur, thus limiting the amount of malathion in nearby bodies of water.

Aquatic habitat buffers: The label requires 25-foot ground, 50-foot aerial, and 100-foot ULV buffers from aquatic habitats for agricultural applications. These buffers are designed to reduce spray drift from entering sensitive non-target areas, thereby providing protection to aquatic species. While the exact amount of spray drift reduction depends on the physical traits of the aquatic ecosystem (e.g. flow rate, volume, etc.) as well as the application method, we can expect (based on AgDRIFT modeling) spray drift reductions ranging from 40 to 91%, with low flow and low volume aquatic habitats

receiving the most reduction in spray drift deposition. We anticipate that these buffers will significantly reduce the amount of malathion entering the critical habitat of the Texas wild-rice. We anticipate that both conservation measures will appreciably reduce the amount of malathion entering the critical habitat of the Texas wild-rice, and thus reduce impacts to the function of the water quality PBF of this species.

Anticipated malathion usage on use sites that overlap with the critical habitat is low, and conservation measures will be implemented to further reduce malathion runoff into critical habitat. As such, we do not anticipate that malathion will adversely affect water quality to the extent that the critical habitat would no longer continue to provide for the recovery and survival of the species. Thus, we do not anticipate the Action would appreciably diminish the value of the critical habitat as a whole for the conservation of Texas wild-rice. Therefore, the Action is not likely to destroy or adversely modify critical habitat for Texas wild-rice.

Citations:

U.S. Fish and Wildlife Service. 1980. Endangered and Threatened Wildlife and Plants; Listing of the San Marcos Salamander as Threatened, the San Marcos Gambusia as Endangered, and the Listing of Critical Habitat for Texas Wild Rice, San Marcos Salamander, San Marcos Gambusia, and Fountain Darter. 45:47355-47364.

U.S. Fish and Wildlife Service. 2019. Recovery Plan Amendments for Eleven Southwest Species. Southwest Region, Albuquerque, New Mexico. 19 pp.