

Integration and Synthesis Summary for Plants, Pacific Islands
Flowering Plants Assessment Group 8 – Dicots using abiotic pollination vectors

The tables below contain summaries of the information and data we used to determine the ranking (high, medium, low) for vulnerability, risk and usage indicators. Information in most of the columns was used directly in the ranking determination (green fill). Where indicated, information in other columns was not used directly in the ranking calculation, but provided additional information about the species that fed into one of the ranking metrics or was used to make the draft determination when relevant. The summary for this assessment group also includes new conservation measures¹ that have been incorporated into the Action since the draft biological opinion was released. The measures and our related assumptions are incorporated into our analysis (immediately above Table 3), and also factor into the rationales for our conclusions for each species, as described below.

All species in this assessment groups are dicots, a class of angiosperm flowering plant defined by having two cotyledons (embryonic seed leaves). Dicots are a hugely diverse class of flowering plants, with tens of thousands of species. Familiar dicots include plants such as daisies, roses and oak trees. The dicots in this assessment group utilize abiotic vectors to accomplish pollination, such as wind and water. Seed dispersal for the species in this group is achieved by biotic (dispersal by animals) and/or abiotic (dispersal by wind, water or gravity) means.

Table 1: Summarizing Data and Information for Vulnerability Ranking

Data Sources: Status of the Species (SOS) accounts updated as of November 2019 (Appendix C); NA=Not Applicable; HI=Hawaii; GU=Guam; CNMI=Commonwealth of Northern Marianas Islands

Scientific Name	Common Name	Location	Status	Population Level Trends	Species Level Trends	Number of Populations	Distribution	Number of Individuals	Pesticides Listed as a Threat	Pollinator Loss Listed as a Threat	Vulnerability Ranking
<i>Neraudia angulata</i>	No common name	HI	Endangered	Increasing (USFWS, 2016)	Not Available	9 (USFWS, 2016)	Endemic to Waianae Mountains, Oahu.	380 individuals (USFWS, 2016)	No Mention	No Mention	High
<i>Schiedea kealiae</i>	Ma`oli`oli	HI	Endangered	Not Available	Not Available	4 (USFWS, 2003)	Currently, populations are located on the cliffs above Dillingham Airfield and Camp Erdman and at Kaena Point at the northern end of the Waianae Mountains (USFWS, 2003).	265 - 315 (USFWS, 2003)	No Mention	No Mention	High
<i>Schiedea sarmentosa</i>	No common name	HI	Endangered	Increasing (USFWS, 2011)	Not Available	3 (USFWS, 2016)	Current range includes Molokai. (NatureServe, 2015)	Several thousand (USFWS, 2016)	No Mention	No Mention	High
<i>Urera kaalae</i>	Opuhe	HI	Endangered	Not Available	Not Available	<10 (USFWS, 2011)	Current range: Waianae Mountains of Oahu. (NatureServe, 2015)	15-16 individuals (USFWS, 2011)	No Mention	No Mention	High

*Information in this column was used to inform the ranking metrics or the draft determination when relevant.

Table 2: Summarizing Data and Information for Risk Ranking

Data Sources: SOS accounts (Appendix C); NA=Not Applicable; HI=Hawaii; GU=Guam; CNMI=Commonwealth of Northern Marianas Islands

Risk to Individuals and Pollinators if exposed: The individual plants in this assessment group are estimated to experience up to a 12% decrease in dry weight if exposed to malathion on the following use sites, based on labeled application rates: orchards and vineyards, developed, nurseries, open space developed and Christmas trees. No effects are expected on other use sites.

The dicots in this assessment group do not rely on animal species for pollination, thus no effects are expected to these plants from loss in pollinator populations from malathion exposure across use sites within their ranges. Mortality is expected for insect seed dispersers exposed to malathion on use sites or via spray drift. Some bird seed dispersers exposed to malathion on use sites may experience mortality or sublethal effects, depending on the site of exposure and size of the bird.

¹ Additional information on these new conservation measures can be found in the Description of the Action section of this biological opinion.

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. Exposure to spray drift is not expected to result in effects to bird seed dispersers. No effects (mortality or sublethal effects) are expected for mammalian seed dispersers from malathion exposure either on use sites or from spray drift.

Scientific Name	Common Name	Direct effects expected (yes or no, reduction in dry weight when exposed in use areas that may have effects)	Effects to Pollinators	Method of Reproduction (risk modifier)	Seed Dispersal Vector (risk modifier)	Obligate or Specific Pollinator (risk modifier)	Pollination Vector*	% Range Overlap with Federal Lands	Risk Ranking
<i>Neraudia angulata</i>	No common name	Yes (12%)	Low	Abiotic - Pollinating Agent	Abiotic, Biotic	Not Applicable	Abiotic	30.18546	Low
<i>Schiedea kealiae</i>	Ma`oli`oli	Yes (12%)	Low	Abiotic - Pollinating Agent	Abiotic, Biotic	Not Applicable	Abiotic	17.76373	Low
<i>Schiedea sarmentosa</i>	No common name	Yes (12%)	Low	Abiotic - Pollinating Agent	Abiotic, Biotic	Not Applicable	Abiotic	2.825384	Low
<i>Urera kaalae</i>	Opuhe	Yes (12%)	Low	Abiotic - Pollinating Agent	Abiotic, Biotic	Not Applicable	Abiotic	36.49477	Low

*Information in this column was used to inform the ranking metrics or the draft determination when relevant.

Cumulative Effects and Environmental Baseline: Please refer to the Status of the Species accounts (Appendix C) and overarching Environmental Baseline and Cumulative Effects sections of this Opinion.

Additional Conservation Measures:

Additional information on these new conservation measures can be found in the *Description of the Action* section and Appendix A-2 of this biological opinion, and further information on the anticipated impacts of each measure in the *Effects of the Action* section.

General Conservation Measures

Several additional conservation measures have been recently provided by EPA and will be implemented as part of the Action. These measures will apply to all species in this assessment group with corresponding use type overlap and usage (i.e., mosquito adulticide, agricultural and residential uses). All measures are anticipated to limit the exposure of seed dispersers to malathion in the described use area where it occurs in or around the range of the species, thus further reducing the risk of reproductive effects to the species. We summarize the new measures and our related assumptions below.

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. This measure is anticipated to limit the exposure of seed dispersers to malathion in this use area where it occurs in or around the range of the species, reducing the risk of impacts to reproduction where seed dispersers are active prior to the completion of petal fall for the crop.

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 (previously ranging from 3-13 applications per year, depending on the specific crop) to 2-4 per year, as described in the Description of the Action of this Opinion. This is anticipated to reduce the amount of malathion used and decrease exposure to seed dispersers, thus decreasing the risk of impacts to the reproduction of these plants.

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are anticipated to significantly reduce exposure to species and their pollinators/seed dispersers 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. While these species have no biotic pollinators, we anticipate this measure will further reduce exposure to biotic seed dispersers, thus decreasing the risk of impacts to the reproduction of these plants.

Table 3: Summary of Conclusions

Scientific Name	Common Name	Vulnerability Ranking	Risk Ranking	Potential Exposure Ranking	Species Conclusion (J, NJ)*
<i>Neraudia angulata</i>	No common name	High	Low	Not determined**	NJ
<i>Schiedea kealiae</i>	Ma`oli`oli	High	Low	Not determined**	NJ
<i>Schiedea sarmentosa</i>	No common name	High	Low	Not determined**	NJ
<i>Urera kaalae</i>	Opuhe	High	Low	Not determined**	NJ

*J = Jeopardy; NJ = No Jeopardy

**A Potential Exposure ranking was not undertaken for species in this assessment group as the magnitude of exposure for these species should not affect the outcome of the analysis given they do not use biotic vectors in their life cycle.

Rationale for Species Conclusions

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed registration of malathion, and the cumulative effects, it is the Service's biological opinion that the registration of malathion, as proposed, is not likely to jeopardize the continued existence of the plant species in this assessment group.

The species in this assessment group have high vulnerabilities based mainly on their endangered status and restricted distribution. We expect some individual plants will experience reduced growth due to direct exposure to malathion, but we do not anticipate this reduction in growth to rise to the level of species-level effects. We anticipate the conservation measures described above will further reduce the likelihood of exposure.

The risk to all species in this group posed by labeled uses across the range is low. Pollinating animals do not play a role in the life cycle of this group of dicot plants. Instead, they utilize wind or water to transport pollen between individuals and populations. As a result, we expect there will be no effects to pollination.

However, these species may rely on animals to disperse some portion of their seeds, though exact vector taxa and species are unknown. Biotic seed dispersal species are likely to be insects, birds or mammals, or a combination of these taxa. Mammalian seed dispersers are not expected to experience effects from malathion exposure either on use sites or from spray drift. Insect seed dispersers are anticipated to experience mortality if exposed to malathion. Bird seed dispersers exposed to malathion on use sites may experience mortality or sublethal 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. Exposure to spray drift is not expected to result in effects to bird seed dispersers. We anticipate adverse effects to this species due to the reduction in pollinating and seed dispersing insects and birds that would result in reduced reproductive success.

We anticipate low probability of these species existing on or near a malathion agricultural use area and low anticipated usage in non-agricultural use areas (<5% as discussed in the Approach to the Analysis for Pacific and Caribbean Island Species). We anticipate the conservation measures described above will substantially reduce the risk of exposure of seed dispersers in the portion of the range where we anticipate malathion to be applied. For example, exposure of biotic seed dispersers such as ants and birds to malathion will be reduced in areas of residential use as applications in these areas would be limited to spot treatments (no broadcast use), and the number of treatments per year has been reduced to two from "repeat as necessary." Thus, based on the low level of exposure expected, no anticipated reproductive effects from loss of pollination, the ability of these species to partially rely on abiotic seed dispersers, and the conservation measures that will be implemented, we do not anticipate the reductions in seed disperser numbers and resulting reduction in reproductive capacity for these species to rise to the level of species-level effects.

Therefore, we do not anticipate that the proposed action would appreciably reduce survival and recovery of these species in the wild.