Integration and Synthesis Summary for Plants, CONUS
Assessment Group 11: Dicots with biotic pollination vectors; reproductive mechanism otherwise unknown

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 measures[1] 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 4), 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 biotic vectors to accomplish pollination, such as insects, birds and mammals; other aspects of their reproductive mechanism are unknown. 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

Scientific Name	Common Name	Number	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
Arabis perstellata	Braun's rock-cress	39	Endangered	Not Available	Not Available	21 - 80 (NatureServe, 2015)	Known range is from Kentucky sites along the Kentucky river system to northcentral Tennessee. Records under the name *Arabis perstellata* for Michigan, Virginia, and West Virgina are instead for Arabis shortii (sometimes treated as *Arabis perstellata var. shortii*), not *A. perstellata* as treated here. (NatureServe, 2015). Within Kentucky, the species is currently restricted to 42 populations (42 occurrences) in three counties (Franklin, Henry, Owen), all of which are associated with the Kentucky River or its tributaries (primarily Elkhorn Creek). The five, extant Tennessee populations (12 occurrences) occupy portions of two counties, Davidson and Rutherford, with the majority of these situated along the Stones River. The majority of the populations occur in Kentucky, and the last significant (range-wide) survey for Kentucky populations was conducted by KSNPC in 2002. Since that time, KSNPC has conducted qualitative surveys at these sites on a 3- to 5-year rotation. Searches by KSNPC from 2006 to 2009 produced seven new occurrences. Surveys were completed for all Tennessee populations in 2003 and 2008. In 2003, two additional populations were found in Rutherford and Wilson counties in TN. The Wilson County, Tennessee population was a new county record. Results of the 2008 surveys indicated that all the Tennessee populations were stable.	2500 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	Medium

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

Scientific Name	Common Name	Number	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
Arctomecon humilis	Dwarf Bear-poppy	60	Endangered	Short-term trends indicate a decline of 10 to 30% (NatureServe, 2015)	Not Available	Not Available	Endemic to the Dixie Corridor; extant in Washington Co., Utah on th eastern edge of the Mohave desert. (USFWS, 1985)	Not Available	No Mention	Loss of Pollinators and Pollinator Diversity (USFWS, 2016)	High
Arctostaphylos franciscana	Franciscan manzanita	61	Endangered	Presumed extirpated until rediscovery in 2009 (NatureServe, 2015)	Stable (inferred from NatureServe, 2015)	1 (USFWS, 2013)	Restricted to a single site in San Francisco, California (NatureServe, 2015). The current range of the species consists of this single wild plant in the San Francisco Presidio (USFWS, 2013).	1 (USFWS, 2013)	No Mention	No Mention	High
Asclepias meadii	Mead's milkweed	40	Threatened	Decline of 70-80% (NatureServe, 2015)	Decline of 10-30% (NatureServe, 2015)	approximately 212 (NatureServe, 2015)	Extant populations are present in eastern Kansas, Missouri, south-central Iowa, and southern Illinois. Populations have been introduced into Indiana and Wisconsin; natural populations are considered extirpated (USFWS, 2012).	Uncertain (NatureServe, 2015)	Herbicide application (USFWS, 2012)	No Mention	Medium
Astragalus clarianus	Clara Hunt's milk-vetch	62	Endangered	Not Available	Declining (NatureServe, 2015)	5 (USFWS, 2009; see current range/distribution)	Highly limited today due to development of vineyards and urbanization (NatureServe, 2015). The species is currently known from five localities in Napa county and Sonoma county (USFWS, 2009).	500 (NatureServe, 2015)	No Mention	No Mention	High
Astragalus cremnophylax var. cremnophylax	Sentry milk-vetch	9	Endangered	Unknown (NatureServe, 2015)	Decline of 10-30% (NatureServe, 2015)	3 (NatureServe, 2015)	Three locations in the Grand Canyon National Park in Coconino County, Arizona (USFWS, 2006).	1,125 individual plants (NatureServe, 2015)	No Mention	No Mention	High
Astragalus tricarinatus	Triple-ribbed milk-vetch	10	Endangered	Not Available	Increasing (USFWS, 2009)	12 (USFWS, 2009)	Since listing, 8 of the original occurrences are considered extant (lower section of Whitewater Canyon, Mission Creek, Dry Morongo Creek and Wash, Big Morongo Canyon, Coyote Hole Spring, Key's Ranch, Orocopia Mountains, and Agua Alta (discounting Cushenberry Canyon); and 4 additional occurrences (Wathier Landing, Catclaw Flat, Long Canyon, and East Deception Canyon; have been detected at the northern end of the historical distribution and in Joshua Tree NP (USFWS, 2009).	< 500 (USFWS, 2009)	No Mention	No Mention	Medium
Baccharis vanessae	Encinitas baccharis	42	Threatened	Not Available	Increasing (USFWS, 2011).	30 (USFWS, 2011)	This species is restricted to a patchy distribution along the coast and occasionally interior areas of San Diego County, California (USFWS, 2011).	Unknown (USFWS, 2011)	No Mention	No Mention	Medium
Calyptridium pulchellum	Mariposa pussypaws	11	Threatened	5 unknown, 2 declining, and 1 fluctuating (CNDDB	5 unknown, 2 declining, and 1 fluctuating	9 or 10 (USFWS, 2007)	Mariposa, Madera, and Fresno counties, California; all are within a 20 mile stretch. (NatureServe, 2015)	1680-1690 individuals (NatureServe, 2015)	No Mention	No Mention	High

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				2006). (USFWS, 2007)	(CNDDB 2006). (USFWS, 2007)						
Cardamine micranthera	Small-anthered bittercress	63	Endangered	Unknown (NatureServe, 2015)	Declining (NatureServe, 2015)	32 (USFWS, 2016)	All populations are in the Dan River drainage (NatureServe, 2015). As of 2014, the species' distribution remains in Stokes County, NC and Patrick County, VA (USFWS, 2016).	Annual fluctuation; < 23,000 (USFWS, 2016)	No Mention	No Mention	High
Castilleja campestris ssp. succulenta	Fleshy owl's-clover	12	Threatened	Not Available	Not Available	90 occurrences (USFWS, 2011)	Found primarily in vernal pools along the lower rolling foothill grasslands in the eastern San Joaquin Valley of the Southern Sierra Foothills Vernal Pool Region. (USFWS, 2011)	Not Available	No Mention	No Mention	Low
Castilleja grisea	San Clemente Island indian paintbrush	43	Threatened	Declining. (NatureServe, 2015)	Not Available	29 (USFWS, 2012)	Endemic to San Clemente Island, CA. (NatureServe, 2015)	10,000 - 100,000 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Castilleja mollis	Soft-leaved paintbrush	14	Endangered	Decline of >10% (NatureServe, 2015)	Not Available	2 (USFWS, 2007)	Confined to the California Channel Islands, perhaps only Santa Rosa Island but possibly San Miguel Island as well. Not seen on San Miguel Island since 1938, despite recent surveys (CNPS 2001). (NatureServe, 2015)	>1000 (NatureServe, 2015)	No Mention	No Mention	High
Caulanthus californicus	California jewelflower	44	Endangered	Decline (NatureServe, 2015)	Not Available	34 (USFWS, 2013)	Appears to be currently extant in Fresno, Kings, Kern, and Santa Barbara Counties (CalFlora Occurrence Database website Feb. 2, 2000). Extirpated from Kings County, but present in San Luis Obispo County (CNPS Inventory, 2001). (NatureServe, 2015)	Not Available	No Mention	Pollinators (USFWS, 2013)	Medium
Ceanothus ferrisae	Coyote ceanothus	64	Endangered	Declining (USFWS, 2011)	Not Available	4 (USFWS, 2011)	*Ceanothus ferrisae* are known from only three locations: Anderson Dam, Kirby Canyon, and Llagas Avenue north of Morgan Hill. All the locations are within 6 kilometers (4 miles) of each other in Santa Clara County (USFWS, 1998)	>100,000 (USFWS, 2011)	No Mention	No Mention	High
Ceanothus ophiochilus	Vail Lake ceanothus	65	Threatened	Not Available	Not Available	3 (USFWS, 2013)	*Ceanothus ophiochilus* is a narrow, edaphic endemic plant found only within 20 acres in Southwestern Riverside County, California (Fish and Wildlife Service 1998). (NatureServe, 2015)	~10,000	No Mention	No Mention	High
Ceanothus roderickii	Pine Hill ceanothus	66	Endangered	Not Available	Not Available	10 (USFWS, 2002)	Restricted to gabbroic soils in the Rescue Series in the Pine Hill and Cameron Park area, California. (NatureServe, 2015)	~1000 (USFWS, 2002)	No Mention	No Mention	High
Centaurium namophilum	Spring-loving centaury	15	Threatened	Increasing (USFWS, 2009)	Not Available	19 (NatureServe, 2015)	Ash Meadows in Nye Co., Nevada (NatureServe, 2015)	~4,468,571 (USFWS, 2009)	No Mention	No Mention	High
Cercocarpus traskiae	Catalina Island mountain-mahogany	67	Endangered	Stable (inferred from USFWS, 2007)	Not Available	1 (NatureServe, 2015)	*Cercocarpus traskiae* is still known to occur naturally only in Wild Boar Gully on the southwestern coast of	~100 (USFWS, 2007)	No Mention	No Mention	High

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							Santa Catalina Island off the coast of southern California. (USFWS, 2007)				
Chamaesyce deltoidea ssp. deltoidea	Deltoid spurge	68	Endangered	Unknown	Not Available	14	Deltoid spurge is a Miami-Dade County endemic that was historically known to occur in pine rocklands of the Miami rock ridge from the Goulds area north to the center of the city of Miami. The northern portion of its range has been completely modified by urban expansion. In 1992-93, deltoid spurge plants were known to occur on 18 sites, including the Richmond pine rocklands classified as one site where several thousand individuals were recorded (DERM 1993). Seven of these sites were owned by Miami-Dade County, and eight others were proposed for acquisition. According to recent updates, five sites located on private lands have been developed (Maschinski 2005 in litt.). Results of a project to map the remaining pine rockland habitat in 2006 reported deltoid spurge occurred on 11 public sites (Institute for Regional Conservation [IRC] 2006). Currently the species is known to remain on 14 public lands (12 county sites, 1 state site, 1 Federal site) and an undetermined number of private lands from southern Miami to Homestead (K. Bradley, IRC, pers. comm. 2010). Even though the majority of the populations occur on public lands, they are fragmented, and habitat degradation continues to affect the extant populations. Because of habitat modification due to urban expansion in the northern portion of the range, deltoid spurge is now known only from south of Miami to the Homestead area. Its limited distribution renders the spurge vulnerable to random natural or human induced events, such as hurricanes and encroachment of invasive exotic species (IRC 2006). The current number of individuals in wild populations is not known, therefore, trend analysis is not available. Although some demographic information is available for deltoid spurge, additional long-term research will be necessary to develop accurate population models.	Unknown	No Mention	No Mention	High
Chamaesyce garberi	Garber's spurge	69	Threatened	Declining (inferred from USFWS, 2007)	Unknown (USFWS, 2007)	17 (USFWS, 2007)	It is currently known from Miami-Dade county and 14 islands in the Keys in Monroe county (USFWS, 2007).	Unknown (NatureServe, 2015)	No Mention	No Mention	High
Chamaesyce hooveri	Hoover's spurge	16	Threatened	Not Available	Not Available	27 (USFWS, 2009)	Of the 26 occurrences presumed to be extant, only 3 have been observed within the past decade (California Natural Diversity Data Base 2003). The main remaining area of concentration for Chamaesyce hooveri is within the Northeastern Sacramento Valley Vernal Pool Region. The Vina Plains of Tehama and Butte Counties contain 14	100-2,500 (USFWS, 2009)	No Mention	No Mention	Low

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							(53.8 percent) of the 26 known extant occurrences for C. hooveri (California Natural Diversity Data Base 2003) in an area of about 91 square kilometers (35 square miles; Stone et al. 1988). One other site in the same region is near Chico in Butte County. Seven of the extant occurrences are in the Southern Sierra Foothills Vernal Pool Region, including five in the Visalia-Yettem area of Tulare County and two in the Hickman-La Grange area of Stanislaus County. Three other occurrences are on the Sacramento National Wildlife Refuge in Glenn County, which is in the Solano-Colusa Vernal Pool Region. The one other extant occurrence is on the Bert Crane Ranch in Merced County, which is within the San Joaquin Valley Vernal Pool Region (Keeler-Wolf et al. 1998, California Natural Diversity Data Base 2003). (USFWS, 2005)				
Chorizanthe howellii	Howell's spineflower	13	Endangered	Not Available	Not Available	8 occurrences (USFWS, 1998)	*Chorizanihe howellii* is known, both historically and currently, from coastal dunes north of Fort Bragg in Mendocino County, California. Three populations are known in the dune system south of Ten Mile River. One extended population is in MacKerricher State Park, with part of one occurrence extending beyond the State park into adjacent private property. Three additional populations are on private lands. (USFWS, 1998)	1,700,000 (USFWS, 2011)	No Mention	No Mention	High
Chorizanthe orcuttiana	Orcutt's spineflower	70	Endangered	Not Available	Not Available	4 (USFWS, 2007)	Known only from San Diego County, California. All of the known occurrences of this species are within 5 km of the Pacific Ocean at elevations below 100 m above mean sea level (Bauder 2000). (NatureServe, 2015)	470 to 3,000 (USFWS, 2007)	No Mention	No Mention	High
Chorizanthe pungens var. pungens	Monterey spineflower	5	Threatened	Declining	Not Available	~18 (NatureServe, 2015)	California, Monterey County, Monterey Peninsula northward to extreme southern Santa Cruz County, and inland into the Salinas Valley. (NatureServe, 2015)	200,000 to 2,000,000 (USFWS, 1998)	No Mention	No Mention	Medium
Chorizanthe robusta var. hartwegii	Scotts Valley spineflower	45	Endangered	Decreasing (USFWS, 2009)	Not Available	57 (USFWS, 2009)	*Chorizanthe robusta var. hartwegii* is restricted to Scotts Valley, Santa Cruz County, California. (NatureServe, 2015)	Not Available	No Mention	No Mention	Medium
Chorizanthe valida	Sonoma spineflower	71	Endangered	Not Available	Not Available	1 (USFWS, 2010)	Endemic to California, Point Reyes area in Marin County. (NatureServe, 2015)	30,000 (NatureServe, 2015)	No Mention	No Mention	High
Cirsium fontinale var. obispoense	Chorro Creek bog thistle	72	Endangered	Not Available	Not Available	19 (USFWS, 2014)	The known geographic range comprises 462 square km (178 square mi), extending from San Simeon Creek (35.630897°N, 121.060711°W) to the vicinity of the city of San Luis Obispo (a distance of 56 km (35 mi)). Because there are many locations with potentially suitable habitat on private properties and public lands that have not been surveyed, it is highly likely that additional occurrences	~10,000 (inferred from USFWS, 2014)	No Mention	No Mention	High

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							exist in San Luis Obispo County, and possibly also in Monterey and Santa Barbara Counties. All known occurrences of *Cirsium fontinale var. obispoense* are west of the outer coast ranges of the Central Coast Region in San Luis Obispo County, California. (USFWS, 2014)				
Cirsium hydrophilum var. hydrophilum	Suisun thistle	73	Endangered	Long-term decline of 50 - 70% (NatureServe, 2015)	Not Available	4 (USFWS, 2009)	*Cirsium hydrophilum var. hydrophilum* is only known from locations in Suisun Marsh.	22,300 to 873,200 individuals, with a best estimate of 137,500 individuals (LCLA 2003). (USFWS, 2013)	No Mention	No Mention	High
Cirsium loncholepis	La Graciosa thistle	7	Endangered	Decline of 80 - 90% (NatureServe, 2015)	Not Available	4 (USFWS, 2011)	Limited to San Luis Obispo and Santa Barbara counties, California. Most of the known occurrences are associated with mesic sites in two dune complexes (the Santa Maria Valley Dune Complex and the Santa Ynez Valley Dune Complex) and along the drainages and tributaries of four major watersheds in this area (from north to south: Arroyo Grande Creek, Santa Maria River, San Antonio Creek, and Santa Ynez River). (USFWS, 2011; NatureServe, 2015)	Not Available	No Mention	No Mention	High
Clarkia speciosa ssp. immaculata	Pismo clarkia	74	Endangered	Not Available	Not Available	14 (USFWS, 2009)	*C. speciosa subsp. immaculata* is known from a slightly larger range that is approximately 22 km (14 mi) long by 10 km (7 mi). (USFWS, 2009)	Not Available	No Mention	No Mention	High
Clarkia springvillensis	Springville clarkia	75	Threatened	Declining (USFWS, 2009)	Not Available	10 (NatureServe, 2015)	Endemic to the foothills of the Sierra Nevada in a small area of Tulare County, California along the Tule River drainage. (NatureServe, 2015)	Not Available	No Mention	No Mention	High
Clematis morefieldii	Morefield's leather flower	46	Endangered	Decline of 30-50% (NatureServe, 2015)	Stable (USFWS, 2010)	22 (USFWS, 2010)	Currently, Morefield's leather flower is known from Madison and Jackson Counties, Alabama and from Franklin and Grundy Counties, Tennessee (USFWS, 2010).	Unknown (NatureServe, 2015)	No Mention	No Mention	Medium
Conradina brevifolia	Short-leaved rosemary	1	Endangered	Decline of ~20% (2019 Lake Wales Ridge Plant Recovery Plan Amendment)	Not Available	28 occurrences (2019 Lake Wales Ridge Plant Recovery Plan Amendment)	The range of this species is restricted to approximately 30 sites in Polk and Highlands counties, Florida. Very little is known about the biology or ecology. The Florida Natural Areas Inventory 2015 Element Tracking Summary identifies 28 occurrences, 15 of which are on 7 different managed areas that are presumed or known to be extant. The other 13 occurrences were located on private lands. This represents roughly a 20% decline from the last 5-year status review in 2008, which reported 35 known	Highly variable; most recent count in 2008 ~7000 plants (2008 5-year review)	No Mention	No Mention	High

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							occurrences (2019 Lake Wales Ridge Plants Recovery Plan Amendment).				
Consolea corallicola	Florida semaphore Cactus	76	Endangered	50 - 70% decline (NatureServe, 2015)	Relatively stable (NatureServe, 2015)	6 (USFWS, 2013)	The current range of *Consolea corallicola* includes two naturally occurring populations, one on Swan Key in Biscayne National Park (BNP), Miami-Dade County, and one at the Nature Conservancy's (TNC) Torchwood Hammock Preserve on Little Torch Key, a small island in the Florida Keys, Monroe County (Bradley and Gann 1999, p. 77; Bradley and Woodmansee 2002, p. 810) (USFWS, 2013).	< 1,000 (USFWS, 2013)	No Mention	No Mention	High
Deeringothamnus rugelii	Rugel's pawpaw	47	Endangered	Not Available	Stable (USFWS, 2008)	~23 (NatureServe, 2015)	*D. rugelii* is known to occur at Tiger Bay State Forest, Port Orange City Forest, and Volusia County's LLP, which are all in Volusia County, FL (USFWS, 2008).	2500 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Delphinium luteum	Yellow larkspur	77	Endangered	Decline of 50-70% (NatureServe, 2015)	Decline of 30-50% (NatureServe, 2015)	5 (USFWS, 2011)	Historically occurred within northwestern Marin and southwestern Sonoma counties, California (USFWS, 2011).	Approx 200 individuals (USFWS, 2011)	No Mention	No Mention	High
Delphinium variegatum ssp. kinkiense	San Clemente Island larkspur	48	Endangered	Not Available	Not Available	24 (USFWS, 2008)	San Clemente Island, in Los Angeles County, California (USFWS, 2008).	~11,000 individuals (USFWS, 2008)	No Mention	No Mention	Medium
Dicerandra frutescens	Scrub mint	2	Endangered	Decreasing	Not Available	14 occurrences	The scrub mint is endemic to the Lake Wales Ridge in Highlands Cointy, Florida. In the most recent Florida Natural Areas Inventory Element Tracking Summary (2015), scrub mint was known from 14 occurrences, 7 of which were on managed areas. The other seven occurrences were located on private land and their status was unknown. Based on 2008 aerial images, it appeared that four occurrences are likely extirpated or heavily disturbed (2019 Lake Wales Ridge Plants Recovery Plan Amendment).	Recent estimates unavailable for most populations. ~1000, but declining, on Archbold Biological Station (USFWS 2019). .	No Mention	No Mention	High
Dudleya setchellii	Santa Clara Valley dudleya	49	Endangered	Long-term decline of 50-70%; short-term decline of 30-50% (NatureServe, 2015)	Not Available	207 (USFWS, 2013)	Two occurrences are located approximately 5 miles southwest of the previously known southernmost extent of the historic range. One of which is located within the Mount Madonna Santa Clara County Park. (USFWS, 2013)	10,000 - 100,000 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Dudleya traskiae	Santa Barbara Island liveforever	78	Endangered	Not Available	Not Available	11 (USFWS, 2012)	This species has always been restricted to Santa Barbara Island (USFWS, 2012)	1,000 (USFWS, 2012)	No Mention	No Mention	High

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Echinocereus triglochidiatus var. arizonicus	Arizona hedgehog cactus	17	Endangered	Not Available	Not Available	Not Available	So far as is known the present and historic range are the same (USFWS, 1984). It occurs in the mountainous area near the border of Gila and Pina counties in Arizona (NatureServe, 2015).	1,500 - 14,000+ (USFWS, 1984)	No Mention	No Mention	High
Erigeron decumbens var. decumbens	Willamette daisy	79	Endangered	Unknown (NatureServe, 2015; USFWS, 2016)	Not Available	17 (USFWS, 2016)	Occurs only in the southern end of the Willamette Valley, Oregon. Historically had ranged further north near Portland. Generalized range of 7400 sq. km.	1000 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Erigeron parishii	Parish's daisy	18	Threatened	Long-term trends indicate a decline of 50 to 70%, while a short-term trends suggest a decline of 10 to 30% (NatureServe, 2015)	Not Available	32 occurrences (NatureServe, 2015)	Range extent is about 155 sq mi in 2 main areas. The range is located in Riverside and San Bernardino counties, California, usually on carbonate soils. (NatureServe, 2015)	16,000 (NatureServe, 2015)	No Mention	No Mention	Medium
Eriodictyon capitatum	Lompoc yerba santa	80	Endangered	Declining by 8.5% since 2006 (USFWS, 2011)	Not Available	5 (USFWS, 2011)	*Eriodictyon capitatum* is endemic to southwestern Santa Barbara County, California. It is found in three areas of the county: on Vandenberg Air Force Base, on the west crest of the Santa Ynez Mountains on Hollister Ranch, and on Graciosa Ridge in the Solomon Hills southeast of Orcutt. The entire range extent covers about 365 sq mi. (NatureServe, 2015)	1,520 (USFWS, 2011)	No Mention	No Mention	High
Eriogonum apricum (incl. var. prostratum)	Ione (incl. Irish Hill) buckwheat	81	Endangered	Not Available	Not Available	6 - 20 (NatureServe, 2015)	Ione Formation, Amador Co, California. (NatureServe, 2015)	Not Available	No Mention	No Mention	High
Eryngium constancei	Loch Lomond coyote thistle	50	Endangered	Unknown; presumed decline of < 30% (NatureServe, 2015)	3 additional occurrences found since listing (USFWS, 2009); stable (NatureServe, 2015)	4 (USFWS, 2009)	Eryngium constancei has been reported in Lake and Sonoma Counties in California. Three occurrences have been reported to CNDDB and an additional locality is known in an unnamed pool near Cobb in Lake County (USFWS, 2009).	> 10,000 (USFWS, 2005); millions (NatureServe, 2015)	No Mention	No Mention	Medium
Euphorbia telephioides	Telephus spurge	51	Threatened	Not Available	Stable (USFWS, 2015)	41 (USFWS, 2015)	Currently known from Bay, Gulf, and Franklin counties from Panama City Beach to east of Apalachicola (NatureServe, 2015).	1000 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Galium californicum ssp. sierrae	El Dorado bedstraw	82	Endangered	Not Available	Not Available	10 (USFWS, 2002)	It is restricted to the Pine Hill formation in the north, central, and south areas. It occurs within black oak woodland on Pine Hill and Cameron Park and within live oak woodland in Shingle Springs and Salmon Falls (L.	Unknown (USFWS, 2002)	No Mention	No Mention	High

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							Eng in litt. 1999). The Bureau of Land Management manages at least one population. One occurrence is located on two parcels that are separately owned by the California Department of Forestry and Fire Protection and the California Department of Fish and Game but jointly managed by both agencies (USFWS, 2002). The Pine Hill area is located in western El Dorado County, California (USFWS, 1996).				
Geocarpon minimum	No common name	19	Threatened	Decline of <30% to increase of 25% (NatureServe, 2015)	Stable (USFWS, 2009)	40 (USFWS, 2016)	Found in southwestern Missouri (Dade, Polk, Greene, and Lawrence Counties). Found in three southeastern counties in Arkansas (Cleveland, Drew, and Bradley) and one Northwestern County (Franklin). Also found at two locations in Louisiana (Wynn Parish). This species was discovered in Texas in 2004 in Anderson County (Keith et al. 2004) (NatureServe, 2015). The range of Geocarpon has been extended farther west within the Arkansas River Valley and the habitat at this site appears similar to that described for the other known site within this region (Baker and Witsell 2015) (USFWS, 2016).	2500 - 100,000 individuals (NatureServe, 2015)	No Mention	No Mention	Low
Graptopetalum bartramii	Bartram stonecrop	52	Threatened	Not Available	Not Available	47	The current range of Bartram's stonecrop includes 9 mountain ranges with 47 populations in Cochise, Pima, and Santa Cruz Counties of southern Arizona, as well as 3 mountain ranges with one population each in Mexico. Most of the sky islands in the U.S. have been surveyed for this species, and it is unlikely that any large populations remain unaccounted for therein (Recovery Outline, 2021).	Total estimate of 4,628 adult individuals (USFWS 2021).	No Mention	No Mention	Medium
Grindelia fraxinipratensis	Ash Meadows gumplant	20	Threatened	Unknown (USFWS, 2008)	Not Available	~7 (USFWS, 2008)	Most of its distribution is within the Ash Meadows National Wildlife Refuge (Refuge). One population occurs outside the Refuge boundary in the Carson Slough, primarily within the Ash Meadows Area of Critical Environmental Concern (ACEC) managed by Bureau of Land Management (BLM) in Nevada. Based on anecdotal observations and assessments of biologists, it appears Ash Meadows gumplant distribution has likely increased since the species was listed (Service 2001) (USFWS, 2008).	Unknown (USFWS, 2008)	No Mention	No Mention	High
Helianthus paradoxus	Pecos (=puzzle, =paradox) sunflower	53	Threatened	Unknown (NatureServe, 2015)	Not Available	7 (USFWS, 2005)	At present puzzle sunflower occurs in two general areas in Pecos and Reeves Counties in west Texas and four general areas in New Mexico (NatureServe, 2015). Pecos sunflower populations occur at alkaline wetlands in the arid regions of west Texas, lower Pecos River of eastern New Mexico, and the Rio Grande and Rio San Jose of west-central New Mexico (USFWS, 2015).	< 100 to > 200,000 per site, fluctuates yearly (USFWS, 2015)	No Mention	No Mention	Medium

Scientific Name	Common Name	Number	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
Hexastylis naniflora	Dwarf-flowered heartleaf	21	Threatened	Not Available	Not Available	21 - 80 (NatureServe, 2015)	Reported from Cherokee, Greenville and Spartanburg counties, South Carolina; and Cleveland, Catawba, Burke, Rutherford and Lincoln counties, North Carolina. (NatureServe, 2015)	1000 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	Low
Hymenoxys texana	Texas prairie dawn-flower	6	Endangered	Not Available	Not Available	~40 - 50 populations; exact number unclear (USFWS, 2015)	This species is now confirmed in five counties in Texas: Fort Bend, Gregg, Harris, Trinity, and Waller. (USFWS, 2015)	~50,000 in one location surveyed in 2012; population unknown at other sites (USFWS, 2015)	No Mention	No Mention	Medium
Hypericum cumulicola	Highlands scrub hypericum	3	Endangered	Population sizes and trends vary considerably over time in relation to fire (2021 5-year Status Review)	Not Available	39 occurrences (2021 5-year Status Review)	Restricted to the Lake Wales Ridge in Polk and Highlands counties, Florida. The 2020 Florida Natural Areas Inventory Element Tracking Summary reported 39 occurrences, 17 of which are unprotected. Unprotected sites are in imminent danger of decline and extirpation due to continued development of suitable habitat (2021 5-year Status Review).	Vary greatly over time (2019 Lake Wales Ridge Plants Recovery Plan Amendment)	No Mention	No Mention	High
Ivesia kingii var. eremica	Ash Meadows ivesia	22	Threatened	Not Available	Not Available	9 (NatureServe, 2015)	Small, local populations are scattered throughout Ash Meadows in Nevada (USFWS, 1990).	Not Available	No Mention	No Mention	High
Jacquemontia reclinata	Beach jacquemontia	83	Endangered	Not Available	Not Available	Nine	Palm Beach, Broward, and Dade Counties., FL; reintroduction projects initiated. (NatureServe, 2015). Beach jacquemontia is a member of the morning glory family (Convolvulaceae) that is restricted to the southeastern coast of Florida. Much of the primary habitat of this species, beach coastal strand and maritime hammock, has been destroyed or altered for residential and commercial construction. Fewer than 1,000 individual plants exist. They are found in small, widely separated populations in Miami-Dade, Broward, and Palm Beach counties, where habitat loss and modification place this species at a high risk of extinction. Habitat conservation and management and reintroduction efforts are needed to make sure of the survival of this species. The information presented here is from the Multi-species Recovery Plan for South Florida (Service, 1999), which represents a revision of the existing recovery plan for the beach jacquemontia (Service, 1995).	~700	No Mention	No Mention	High

Scientific Name	Common Name	Number	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
Justicia cooleyi	Cooley's water-willow	84	Endangered	Decreasing (NatureServe, 2015)	Not Available	6 - 20 (NatureServe, 2015)	Hernando, Lake, and Sumter counties, Fla. (NatureServe, 2015)	1000 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	High
Leavenworthia exigua laciniata	Kentucky glade cress	54	Threatened	Short-term trends suggest declines of 10-50% (NatureServe, 2015)	Not Available	21 - 80 (NatureServe, 2015)	Kentucky: Bullitt and Jefferson counties. (NatureServe, 2015)	1000 - 100,000 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Lesquerella kingii ssp. bernardina	San Bernardino Mountains bladderpod	23	Endangered	Decline of 70-90% (NatureServe, 2015)	30 - 50% decline (NatureServe, 2015)	2 (USFWS, 1997)	Since listing, there have been no significant changes in the known range of the taxon. Recent assessments indicate that there is about 210 acres (85 hectares) of occupied habitat for San Bernardino Mountains bladderpod (USFS 2005a, p. 272) (USFWS, 2009).	Uncertain; ~25,000 known (NatureServe, 2015)	No Mention	No Mention	High
Lesquerella lyrata	Lyrate bladderpod	85	Threatened	Stable to increasing (USFWS, 2009)	Not Available	6 - 20 (NatureServe, 2015)	The current and historical distribution of *D. lyrata* is confined to parts of Franklin, Colbert, and Lawrence counties in Alabama. (USFWS, 1996)	Not Available	Herbicide Use (USFWS, 1996)	No Mention	High
Lesquerella pallida	White bladderpod	86	Endangered	Not Available	Not Available	Eight	White bladderpods are known to occur only on the Weches Outcrops of San Augustine County, Texas.	112 - 10,000	No Mention	No Mention	High
Lesquerella perforata	Spring Creek bladderpod	87	Endangered	Not Available	Not Available	1 - 5 (NatureServe, 2015)	Known only from Wilson County, Tennessee (USFWS, 2006).	Fluctuates widely from year to year (USFWS, 2006)	No Mention	No Mention	High
Lesquerella thamnophila	Zapata bladderpod	88	Endangered	Not Available	Not Available	11	Two counties in southern Texas.	Not Available	No Mention	No Mention	High
Lesquerella tumulosa	Kodachrome bladderpod	24	Endangered	Not Available	Not Available	1 (USFWS, 2009)	Kodachrome bladderpod is an endemic found only in Kane County, Utah (USFWS, 2009).	~20,000 (USFWS, 2009)	No Mention	No Mention	High
Limnanthes floccosa ssp. grandiflora	Large-flowered woolly Meadowfoam	89	Endangered	Unknown (USFWS, 2016)	Not Available	6 - 20 (NatureServe, 2015); 21 (USFWS, 2016)	Meadowfoam is endemic to the Middle Rogue River of Jackson County (USFWS, 2016).	10,000 - 100,000 individuals (NatureServe, 2015; USFWS, 2016))	Herbicide spraying (USFWS, 2016)	No Mention	High
Linum arenicola	Sand flax	90	Endangered	In the 5 populations where data are sufficient to assess trend, 3 appear stable	Not Available	12	The current range of *Linum arenicola* consists of eight extant populations in Miami-Dade County and four islands in the Florida Keys: Big Pine Key, Upper and Lower Sugarloaf Keys, and Big Torch Key (USFWS, 2015).	Not Available	No Mention	No Mention	High

Scientific Name	Common Name	Number	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
				and 2 appear declining							
Lomatium cookii	Cook's lomatium	25	Endangered	Unknown (USFWS, 2016)	Not Available	6 - 20 (NatureServe, 2015)	Currently, the distribution of desert parsley ranges from the Agate Desert area of the Rogue Valley in Jackson County to the Illinois Valley in Josephine County (USFWS, 2016).	10,000 - 1,000,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Lupinus tidestromii	Clover lupine	91	Endangered	Not Available	Not Available	6 - 20 (NatureServe, 2015)	This species is found in clustered colonies at 3 sites along the California coastal dunes: the southern most populations are found at various sites from Carmel Beach to Asilomar State Beach (ASB) on the northern tip of the Monterey Peninsula, the central populations are found in their highest numbers and concentration on Point Reyes National Seashore around Abbott's lagoon, and the northern most populations are found at Goat Rock Beach on the Sonoma Coast State Beach (SCSB). (USFWS, 2009)	1 - 1000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Malacothamnus clementinus	San Clemente Island bush-mallow	55	Endangered	Not Available	Not Available	21 - 80 (NatureServe, 2015)	This plant is only known from San Clemente Island, Los Angeles Co., California. Its range covers about 48 sq miles. (NatureServe, 2015)	50 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Malacothamnus fasciculatus var. nesioticus	Santa Cruz Island bush-mallow	26	Endangered	Not Available	Not Available	Not Available	Currently known from only four small populations on Santa Cruz Island. (USFWS, 2012)	Not Available	No Mention	No Mention	High
Mentzelia leucophylla	Ash Meadows blazingstar	27	Threatened	Not Available	Not Available	1 - 5 (NatureServe, 2015)	Western slope and bajadas of mountain range in Ash Meadows, south Nye County, Nevada. (NatureServe, 2015)	Not Available	No Mention	No Mention	High
Monolopia (=Lembertia) congdonii	San Joaquin wooly-threads	56	Endangered	Decline of >30% (NatureServe, 2015)	Not Available	66 (USFWS, 2010)	The Service states that Monolopia congdonii occur in Fresno, Kings, Kern, San Benito, San Luis Obispo, and Santa Barbara Counties. Nineteen populations of *Monolopia congdonii* were extant (55 FR 29361). Twelve populations remained in the San Joaquin Valley and adjoining foothills from the vicinity of Panoche Pass (San Benito County) southeasterly to Caliente Creek east of Bakersfield (Kern County). Another seven populations occurred to the southwest in the Cuyama Valley (San Luis Obispo and Santa Barbara Counties) and Carrizo Plain (San Luis Obispo County). Thirty-three of 52 historical populations had been lost (55 FR 29361), including a population from Tulare County (Taylor 1989). (USFWS, 2010)	Not Available	No Mention	No Mention	Medium

Scientific Name	Common Name	Number	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
Navarretia leucocephala ssp. pauciflora (=N. pauciflora)	Few-flowered navarretia	92	Endangered	Not Available	Not Available	1 - 5 (NatureServe, 2015)	Volcanic ash vernal pools in Lake County, California. (NatureServe, 2015)	1000 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	High
Navarretia leucocephala ssp. plieantha	Many-flowered navarretia	93	Endangered	Not Available	Not Available	5 (USFWS, 2005)	The five occurrences reported as extant in the final rule (U.S. Fish and Wildlife Service 1997b) were Boggs Lake, Loch Lomond, Mount Hannah Lodge, Siegler Springs Road, and Stienhart Lake, which are in the Lake-Napa Vernal Pool Region (Keeler-Wolf et al. 1998). These occurrences are still believed to be extant, although only three populations have been revisited since 1989 (California Natural Diversity Data Base 2005). (USFWS, 2005)	Not Available	No Mention	No Mention	High
Oxytheca parishii var. goodmaniana	Cushenbury oxytheca	94	Endangered	Not Available	Not Available	6 - 20 (NatureServe, 2015)	Restricted to a carbonate belt in the northeastern San Bernardino Mountains extending from White Mountain in the west to at least Terrace Springs in the east; from Terrace Springs to Rattlesnake Canyon, var. *goodmaniana* occurs with var. *cienengensis* and some morphological intermediates (potential hybrids) between the two (USFWS 2002). Distribution includes occurrences near Cushenbury Spring; Cushenbury, Marble, Arctic, Wild Rose, and Furnace Canyons; Blackhawk, Mineral, and Tip Top Mountains; Terrace Springs; Rose Mine and Green Lead gold mine (USFWS 2002). Range occurs in and adjacent to San Bernardino National Forest; San Bernardino County, California; using GIS tools, range extent was calculated to be approximately 165 square km. (NatureServe, 2015)	2500 - 100,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Paronychia chartacea	Papery whitlow-wort	95	Threatened	Not Available	Not Available	21 - 80 (NatureServe, 2015)	Papery whitlow-wort occurs on the Lake Wales and at least one smaller nearby ridge (Kral 1983), in Highlands, Polk, Osceola, Orange, and Lake Counties (Anderson 1991). This species consists of two geographically isolated subspecies, with papery whitlow-wort (*Paronychia chartacea ssp. chartacea*) in the Florida peninsula (Anderson 1991) and the similar Crystal Lake nailwort (*P. chartacea ssp. minima*) in the Florida panhandle. This discussion is limited to the peninsula subspecies.	2500 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	Low
Parvisedum leiocarpum	Lake County stonecrop	96	Endangered	Decreasing (NatureServe, 2015)	Not Available	Not Available	Known from only a small number of populations within a 10-square-mile area. This species occurs on more or less level sites in shallow depressions that retain water seasonally. Known microhabitats include Northern Basalt	Not Available	No Mention	No Mention	High

Scientific Name	Common Name	Number	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
							Flow and Northern Volcanic Ashflow vernal pools (Sawyer and Keeler-Wolf 1995), low areas in meadows and gravelly flats, and hollows in exposed rocks. A few plants were found on a man-made berm within a flat area that supported a large population. Substrates on which S. leiocarpa occur frequently are of volcanic origin and often are gravelly (Patterson 1986). The species occurs at elevations of 518 to 793 meters (1,700 to 2,600 feet). (USFWS, 2009)				
Pectis imberbis	Beardless chinch weed	97	Endangered	Not Available	Not Available	6 (USFWS 2021)	As of March, 2021, we are aware of 1,262 individuals in 6 populations across the range in the U.S. (southern Arizona) (Recovery Plan Outline 2021).	1,262 individuals (USFWS 2021)	No Mention	No Mention	High
Pediocactus (=Echinocactus,=Utahia) sileri	Siler pincushion cactus	28	Threatened	Not Available	Short-term trends indicate declines of 10-30% (NatureServe, 2015)	~ 25 NatureServe, 2015)	The geographic range of Siler pincushion cactus extends from southeast of Fredonia, extreme northwestern Coconino County, Arizona, west for about 70 air miles in north-central Mohave County, Arizona. It also includes about 3 miles of southern Utah in Washington and Kane Counties (USFWS, 2008).	~10,000 or more individuals (USFWS, 2008)	No Mention	No Mention	High
Pediocactus peeblesianus var. peeblesianus	Peebles Navajo cactus	29	Endangered	Unknown (NatureServe, 2015)	Not Available	6 (NatureServe, 2015)	Endemic to Navajo County, Arizona near Joseph City and Holbrook (USFWS 2008). Its range is very small, approximately 7 miles in length by 1 mile in width (USFWS 2008). (NatureServe, 2015)	<1000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Penstemon haydenii	Blowout penstemon	98	Endangered	Not Available	Not Available	Not Available	Blowout penstemon is a regional endemic of the Nebraska Sandhills, the largest sand dune system in North America, located in north central Nebraska (Stokes and Swinehart 1997, Forman et. al 2001). The Nebraska Sandhills is an area of stabilized sand dunes covering 5 million hectares (approximately 12.4 million acres). In 2008, 32 blowout penstemon subpopulations (10 native and 22 introduced) were known to occur in the Sandhills (Stubbendieck 2008). In Wyoming, 3 populations (in addition to 6 subpopulations) of blowout penstemon are located in the Ferris Dunes of northwestern Carbon County, separated from the Nebraska Sandhills by about 175 miles (282 km). The Ferris Dunes cover an area less than 124,000 hectares (50,000 acres). See Figure 1 Geography below.	Not Available	• Pesticide Use	No Mention	High
Phacelia insularis ssp. insularis	Island phacelia	30	Endangered	Not Available	Not Available	1 - 5 (NatureServe, 2015)	This variety occurred only in Santa Rosa and San Miguel Islands, Santa Barbara county, California. (NatureServe, 2015)	Not Available	No Mention	No Mention	High
Plagiobothrys strictus	Calistoga allocarya	99	Endangered	Decreasing (NatureServe, 2015)	Not Available	1 - 5 (NatureServe, 2015)	The range extent covers a small area in Napa County, near Calistoga. The total range is only about 14 sq mi. (NatureServe, 2015)	2500 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	High

Scientific Name	Common Name	Number	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
Polygala smallii	Tiny polygala	100	Endangered	Not Available	Not Available	Not Available	The species is currently known from eight sites within Miami-Dade, Palm Beach, St. Lucie, and Martin Counties, with the highest density of populations located in southern Miami-Dade County (Wendelberger and Frances 2004, Woodmansee et al. 2007, Maschinski 2010).	Not Available	No Mention	No Mention	High
Polygonum hickmanii	Scotts Valley Polygonum	101	Endangered	Not Available	Not Available	1 - 5 (NatureServe, 2015)	Endemic to Santa Cruz County, California (Fish and Wildlife Service 2000). (NatureServe, 2015)	Not Available	No Mention	No Mention	High
Ranunculus aestivalis (=acriformis)	Autumn Buttercup	102	Endangered	Unknown	Not Available	1 - 5 (NatureServe, 2015)	The autumn buttercup is probably the rarest and most restricted plant in Utah. Marcus E. Jones first collected it during 1894 in a wet meadow near Panguitch, 38 km northwest of Bryce Canyon National Park. Named for its late-summer flowering habit, the autumn buttercup was not formally described until 1948. It is among the most graceful and showy members of the genus in the western United States. (Spence, Van Pelt and Franklin 1991: 1). The General Federation of Womens Clubs Sevier River Valley Preserve was purchased in 1989 to protect the only known buttercup plants in the wild, chiefly through exclusion of livestock grazing. The Great Basin Field Office is responsible for stewardship of the 44-acre property. *R. acriformis var. aestivalis's* only known occurrence is in Garfield County, Utah. Due to the sensitivity of the site, directions may be obtained by contacting the Utah land steward of the Conservancy in Salt Lake City.	Not Available	No Mention	No Mention	High
Schoenocrambe argillacea	Clay reed-mustard	31	Threatened	Unknown (NatureServe, 2015)	Not Available	3 (USFWS, 2011)	Endemic to the Uinta Basin (Book Cliffs area) in Uintah County, northeast Utah. Known range is only about 24 km x 12 km, from the west side of the Green River to the east side of Willow Creek (USFWS 1994). Franklin (2005) describes the three population areas as follows: "along the east slopes of Big Pack Mountain and in Broome Canyon to the east; along the west slopes of Wild Horse Bench, from the vicinity of Kings Canyon and south nearly to The Wrinkles; and along the slopes of the canyons above Ray's Bottom, on the west side of the Green River." (NatureServe, 2015)	~6,000 (USFWS, 2011)	No Mention	Plant-pollinator interactions (USFWS, 2011)	High
Schoenocrambe suffrutescens	Shrubby reed-mustard	32	Endangered	Decline (NatureServe, 2015)	Decline (NatureServe, 2015)	8 (NatureServe, 2015)	Endemic to the Green River Formation, Uinta Basin of eastern Utah.	3,000 (NatureServe, 2015)	No Mention	Plant-pollinator interactions (USFWS, 2010)	High

Scientific Name	Common Name	Number	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
Scutellaria floridana	Florida skullcap	57	Threatened	Not Available	Not Available	21 - 80 (NatureServe, 2015)	Known from the Apalachicola region of the Florida panhandle from Liberty, Franklin and Gulf counties. (NatureServe, 2015)	1000 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Scutellaria montana	Large-flowered skullcap	33	Threatened	Short-term trend: Declining (NatureServe, 2015).	Not Available	21 - 300 (NatureServe, 2015)	Ridge and Valley and Cumberland Plateau physiographic provinces in Georgia and Tennessee. (NatureServe, 2015)	10,000 - 100,000 total individuals (NatureServe, 2015)	No Mention	No Mention	Low
Sidalcea keckii	Keck's Checker-mallow	103	Endangered	Decreasing (NatureServe, 2015)	Not Available	1 - 5 (NatureServe, 2015)	Tulare and Fresno counties (NatureServe, 2015)	1 - 1000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Sidalcea oregana ssp. valida	Kenwood Marsh checker-mallow	104	Endangered	Not Available	Not Available	1 - 5 (NatureServe, 2015)	Endemic to area around Kenwood Marsh, Sonoma Co., Calif. (NatureServe, 2015)	Not Available	No Mention	No Mention	High
Sideroxylon reclinatum ssp. austrofloridense	Everglades bully	34	Threatened	Not Available	Not Available	11 sites	U.S.: Florida, Miami-Dade and Monroe counties. Everglades bully is extant at eleven sites (Table 1). One population occurs locally at BCNP along the edges of Gum Slough within Lostmans Pines area (south of Loop Road), on the mainland portion of Monroe County (Bradley et al. 2013, p. 4). The largest population is at Long Pine Key within ENP in Miami-Dade County (Hodges and Bradley 2006, p. 42; Gann et al. 2006, p. 11). New occurrences within ENP are expected to be found as work continues to establish the limits of this species habitat requirements. Everglades bully appears to have a much wider range than previously thought (Gann et al. 2006, p. 9). One occurrence is located at Larry and Penny Thompson Park in the Richmond Pinelands adjacent to the Metrozoo in Miami-Dade County (Gann et al. 2002, p. 527; Possley and McSweeney 2005, p. 1). This plant occurs at the privately-owned Pine Ridge Sanctuary in Miami-Dade County and possibly at a few non-protected pinelands, such as Grant Hammock (Gann et al. 2002, p. 526). In 2007, Bradley (pers. comm. 2007) reported small occurrences in Miami-Dade County at the following locations: Lucille Hammock, South Dade Wetlands, NFC #P-300, and NFC #P-310. More recently, Possley (J. Possley, Fairchild Tropical Botanic Garden [FTBG], pers. comm. 2011a) found two plants at Quail Roost Pineland, an area that was formerly very overgrown, but was treated for manual hardwood reduction in 2007 and then burned in 2009. Possley (pers. comm. 2011b) reported	10,000 to 100,000 plants, mostly occurring at Long Pine Key	No Mention	No Mention	Low

Scientific Name	Common Name	Number	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
							populations from Navy Well Pineland Preserve (four plants) and Sunny Palms Pinelands (two plants), both areas are Miami-Dade County conservation lands.				
Sphaeralcea gierischii	Gierisch mallow	35	Endangered	Long-term trends are unknown but short-term trends indicate a decline of 10-30% (NatureServe, 2015)	Not Available	5 (NatureServe, 2015)	Endemic to a small area straddling the Utah-Arizona state line, in northwestern Mohave County, Arizona (vicinity of Black Rock Gulch, Black Knolls, and Pigeon Canyon) and closely adjacent Washington County, Utah (Little Round Valley). (USFWS 2010).	16,000 to 26,000 (NatureServe, 2015)	No Mention	No Mention	High
Spigelia gentianoides	Gentian pinkroot	105	Endangered	Not Available	Variety gentianoides: Not available. Variety alabamensis: Relatively Stable (<=10% change) (NatureServe, 2015b)	Var. gentianoides: 5; var. alabamensis: 4 (USFWS, 2012)	Var. *gentianoides* is known in Jackson and Calhoun Counties, Florida, and Geneva County, Alabama; var. *alabamensis* is restricted to Bibb County, Alabama (USFWS, 2012).	Var. gentianoides: ~2,500 individuals; var. alabamensis: ~3,600 individuals (USFWS, 2012)	No Mention	No Mention	High
Streptanthus bracteatus	Bracted twistflower	58	Proposed threatened	Not Available	Not Available	Not Available	An annual herbaceous plant in the mustard family that occurs only along the southeastern edge of the Edwards Plateau of Texas (SSA 2021).	Not Available	No Mention	No Mention	Medium
Styrax texanus	Texas snowbells	59	Endangered	Not Available	Not Available	22 (USFWS, 2008)	Edwards, Real, Kimble, (Val Verde) counties, Texas. (USFWS, 2008)	<1,000 (USFWS, 2008)	No Mention	Pollinator deficiency (USFWS, 2017)	Medium
Taraxacum californicum	California taraxacum	36	Endangered	Decreasing (NatureServe, 2015)	Not Available	20 (USFWS, 2013)	Endemic to the San Bernardino Mountains, ranging from the Holcomb and Bear Valleys to South Fork Meadows in the Santa Ana River watershed (USFWS, 2013)	2 to 300 indivduals/occurrence (USFWS, 2013)	No Mention	No Mention	High
Thalictrum cooleyi	Cooley's meadowrue	106	Endangered	Decreasing (NatureServe, 2015)	Stable (USFWS, 2009)	12 (USFWS, 2009)	All of the known *Thalictrum cooleyi* populations occur in the Coastal Plain Province in NC, GA, and FL (USFWS, 2009).	1 - 1000 total individuals (NatureServe, 2015)	No Mention	No Mention	High
Thelypodium howellii spectabilis	Howell's spectacular thelypody	4	Threatened	Trends for most populations unknown (USFWS 2010)	Not Available	6; ~15 occurrences (USFWS, 2010)	Endemic to the northeastern corner of Oregon, occurring in the Baker-Powder River valley in Baker and Union Counties (Fish and Wildlife Service 1999). Generalized current range of about 175 sq. km.	Most occurrences not monitored; number of individuals variable in 3	Herbicides (USFWS, 2010)	No Mention	High

Scientific Name	Common Name	Number	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
								monitored (> 20,000) (USFWS 2010)			
Thelypodium stenopetalum	Slender-petaled mustard	37	Endangered	Decreasing (NatureServe, 2015)	Not Available	6 - 20 (NatureServe, 2015)	California endemic, restricted to meadows of Big Bear Basin in San Bernardino County (Skinner, 1997). The full range extent covers no more than 49 sq mi. (NatureServe, 2015)	2500 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Thlaspi californicum	Kneeland Prairie penny-cress	38	Endangered	Decreasing (USFWS, 2011)	Not Available	1 - 5 (NatureServe, 2015)	Known global distribution of *Noccaea fendleri ssp. californica* is restricted to three small patches of serpentine outcrop (total 2.8 acres) located between 200 and 500 feet from each other within Kneeland Prairie, approximately 15 miles east of the Pacific Ocean, Humboldt County, California (USFWS 2011).	Not Available	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); R Plots Appendices; NA=Not Applicable

Risk to Individuals, Pollinators, and Seed dispersers 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.

Mortality is expected for insect pollinators and seed dispersers exposed to malathion on use sites, via spray drift, and from mosquito control applications. Because terrestrial invertebrates exhibit a range of sensitivities to malathion, insect abundance is expected to be reduced where exposure occurs, but not completely eliminated. However, some species are likely to incur greater levels of mortality than others based on their sensitivity. As plants often have unknown or specific pollinators and seed dispersers for which toxicity data is unavailable, we assume insects that pollinate or disperse the seeds of listed plants are sensitive to malathion, and that exposure will cause mortality. In field studies, reductions of common insect species following pesticide exposure are often temporary with recovery over a short period of time. However, since listed plants may be reliant on insect pollinators or seed dispersers that are limited in range or abundance, these insect species may be less likely to recover following pesticide exposure.

Some bird pollinators and 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 pollinators or seed dispersers. No effects (mortality or sublethal effects) are expected for mammalian pollinators or seed dispersers from malathion exposure either on use sites or from spray drift.

Scientific Name	Common Name	Number	Direct Effects to Mortality or Growth Expected (yes or no; reduction in dry weight when exposed in use areas that may have effects)	Effects to Pollinators, % insect pollinator mortality (% bird pollinator mortality)	Method of Reproduction (risk modifier)	Seed Dispersal Vector (risk modifier)	Obligate or Specific Pollinator (risk modifier)	Pollination Vector*	Risk Ranking
Arabis perstellata	Braun's rock-cress	39	Yes (12%)	85.03	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Arctomecon humilis	Dwarf Bear-poppy	60	Yes (12%)	76.38	Biotic - Unknown	Abiotic, Insect	No Mention	Insect	Medium
Arctostaphylos franciscana	Franciscan manzanita	61	Yes (12%)	101.80	Biotic - Unknown	Abiotic, Bird, Mammal	No	Insect	High
Asclepias meadii	Mead's milkweed	40	Yes (12%)	83.02	Biotic - Unknown	Abiotic, Bird, Mammal	No Mention	Insect	High
Astragalus clarianus	Clara Hunt's milk-vetch	62	Yes (12%)	140.75	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Astragalus cremnophylax var. cremnophylax	Sentry milk-vetch	9	Yes (12%)	6.45	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	Low
Astragalus tricarinatus	Triple-ribbed milk-vetch	10	Yes (12%)	3.65	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Low
Baccharis vanessae	Encinitas baccharis	42	Yes (12%)	163.49	Biotic - Unknown	Abiotic	Unknown	Abiotic, Insect	High
Calyptridium pulchellum	Mariposa pussypaws	11	Yes (12%)	14.33	Biotic - Unknown	Abiotic	No Mention	Insect	Low
Cardamine micranthera	Small-anthered bittercress	63	Yes (12%)	116.48	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Castilleja campestris ssp. succulenta	Fleshy owl's-clover	12	Yes (12%)	205.78	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Castilleja grisea	San Clemente Island indian paintbrush	43	Yes (12%)	72.92 (19.14)	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect, Bird	High
Castilleja mollis	Soft-leaved paintbrush	14	Yes (12%)	0	Biotic - Unknown	Abiotic	No Mention	Insect	Low
Caulanthus californicus	California jewelflower	44	Yes (12%)	150.38	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Ceanothus ferrisae	Coyote ceanothus	64	Yes (12%)	140.78	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Ceanothus ophiochilus	Vail Lake ceanothus	65	Yes (12%)	71.93	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Medium
Ceanothus roderickii	Pine Hill ceanothus	66	Yes (12%)	121.77	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Centaurium namophilum	Spring-loving centaury	15	Yes (12%)	0.37	Biotic - Unknown	Abiotic	Unknown	Insect	Low
Cercocarpus traskiae	Catalina Island mountain-mahogany	67	Yes (12%)	77.52	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Chamaesyce deltoidea ssp. deltoidea	Deltoid spurge	68	Yes (12%)	84.02	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Chamaesyce garberi	Garber's spurge	69	Yes (12%)	47.68	Biotic - Unknown	Abiotic, Biotic	No	Insect	Medium
Chamaesyce hooveri	Hoover's spurge	16	Yes (12%)	24.57	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	Medium
Chorizanthe howellii	Howell's spineflower	13	Yes (12%)	18.93	Biotic - Unknown	Bird, Mammal	No	Insect	Medium
Chorizanthe orcuttiana	Orcutt's spineflower	70	Yes (12%)	174.56	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Chorizanthe pungens var. pungens	Monterey spineflower	5	Yes (12%)	179.64	Biotic - Unknown	Bird, Mammal	Unknown	Insect	High
Chorizanthe robusta var. hartwegii	Scotts Valley spineflower	45	Yes (12%)	134.21	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Chorizanthe valida	Sonoma spineflower	71	Yes (12%)	133.29	Biotic - Unknown	Mammal	Unknown	Insect	High

Scientific Name	Common Name	Number	Direct Effects to Mortality or Growth Expected (yes or no; reduction in dry weight when exposed in use areas that may have effects)	Effects to Pollinators, % insect pollinator mortality (% bird pollinator mortality)	Method of Reproduction (risk modifier)	Seed Dispersal Vector (risk modifier)	Obligate or Specific Pollinator (risk modifier)	Pollination Vector*	Risk Ranking
Cirsium fontinale var. obispoense	Chorro Creek bog thistle	72	Yes (12%)	115.29	Biotic - Unknown	Mammal	Unknown	Insect	High
Cirsium hydrophilum var. hydrophilum	Suisun thistle	73	Yes (12%)	170.58	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Cirsium loncholepis	La Graciosa thistle	7	Yes (12%)	110.83	Biotic - Unknown	Abiotic	No Mention	Insect	Medium
Clarkia speciosa ssp. immaculata	Pismo clarkia	74	Yes (12%)	100.56 (10.57)	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect, Bird	High
Clarkia springvillensis	Springville clarkia	75	Yes (12%)	33.85 (9.33)	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect, Bird	High
Clematis morefieldii	Morefield's leather flower	46	Yes (12%)	104.15	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Conradina brevifolia	Short-leaved rosemary	1	Yes (12%)	111.25	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Consolea corallicola	Florida semaphore Cactus	76	Yes (12%)	40.56	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Medium
Deeringothamnus rugelii	Rugel's pawpaw	47	Yes (12%)	114.76	Biotic - Unknown	Bird, Mammal	Unknown	Insect	High
Delphinium luteum	Yellow larkspur	77	Yes (12%)	147.03 (18.46)	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect, Bird	High
Delphinium variegatum ssp. kinkiense	San Clemente Island larkspur	48	Yes (12%)	72.92	Biotic - Unknown	Abiotic	No	Insect	Medium
Dicerandra frutescens	Scrub mint	2	Yes (12%)	111.25	Biotic - Unknown	Abiotic, Biotic	Yes	Insect	High
Dudleya setchellii	Santa Clara Valley dudleya	49	Yes (12%)	152.94	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Dudleya traskiae	Santa Barbara Island liveforever	78	Yes (12%)	81.55	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Echinocereus triglochidiatus var. arizonicus	Arizona hedgehog cactus	17	Yes (12%)	4.64 (0.31)	Biotic - Unknown	Abiotic	No	Insect, Bird	Low
Erigeron decumbens var. decumbens	Willamette daisy	79	Yes (12%)	113.74	Biotic - Unknown	Abiotic	No	Insect	High
Erigeron parishii	Parish's daisy	18	Yes (12%)	0.00118	Biotic - Unknown	Abiotic, Biotic	No	Insect	Low
Eriodictyon capitatum	Lompoc yerba santa	80	Yes (12%)	140.56	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Eriogonum apricum (incl. var. prostratum)	Ione (incl. Irish Hill) buckwheat	81	Yes (12%)	140.11	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Eryngium constancei	Loch Lomond coyote thistle	50	Yes (12%)	128.20	Biotic - Unknown	Abiotic	Unknown	Insect	High
Euphorbia telephioides	Telephus spurge	51	Yes (12%)	87.88	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Medium
Galium californicum ssp. sierrae	El Dorado bedstraw	82	Yes (12%)	126.01	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Geocarpon minimum	No common name	19	Yes (12%)	51.55	Biotic - Unknown	Abiotic, Bird, Mammal	Unknown	Insect	High
Graptopetalum bartramii	Bartram stonecrop	52	Yes (12%)	13.04	Biotic - Unknown	Abiotic	Unknown	Insect	Medium

Scientific Name	Common Name	Number	Direct Effects to Mortality or Growth Expected (yes or no; reduction in dry weight when exposed in use areas that may have effects)	Effects to Pollinators, % insect pollinator mortality (% bird pollinator mortality)	Method of Reproduction (risk modifier)	Seed Dispersal Vector (risk modifier)	Obligate or Specific Pollinator (risk modifier)	Pollination Vector*	Risk Ranking
Grindelia fraxinipratensis	Ash Meadows gumplant	20	Yes (12%)	0.04	Biotic - Unknown	Abiotic	unknown	Insect	Low
Helianthus paradoxus	Pecos (=puzzle, =paradox) sunflower	53	Yes (12%)	48.90	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	Medium
Hexastylis naniflora	Dwarf-flowered heartleaf	21	Yes (12%)	90.15	Biotic - Unknown	Abiotic, Insect	Unknown	Insect	High
Hymenoxys texana	Texas prairie dawn-flower	6	Yes (12%)	176.25	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Hypericum cumulicola	Highlands scrub hypericum	3	Yes (12%)	111.25	Biotic - Unknown	Abiotic, Biotic	No	Insect	High
Ivesia kingii var. eremica	Ash Meadows ivesia	22	Yes (12%)	0.37	Biotic - Unknown	Abiotic	Unknown	Insect	Low
Jacquemontia reclinata	Beach jacquemontia	83	Yes (12%)	131.66	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Justicia cooleyi	Cooley's water-willow	84	Yes (12%)	132.09 (16.25)	Biotic - Unknown	Abiotic	Unknown	Insect, Bird	High
Leavenworthia exigua laciniata	Kentucky glade cress	54	Yes (12%)	57.42	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Lesquerella kingii ssp. bernardina	San Bernardino Mountains bladderpod	23	Yes (12%)	0	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Low
Lesquerella lyrata	Lyrate bladderpod	85	Yes (12%)	97.25	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Lesquerella pallida	White bladderpod	86	Yes (12%)	7.43	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Medium
Lesquerella perforata	Spring Creek bladderpod	87	Yes (12%)	30.81	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Lesquerella thamnophila	Zapata bladderpod	88	Yes (12%)	40.62	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Lesquerella tumulosa	Kodachrome bladderpod	24	Yes (12%)	0.30	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Low
Limnanthes floccosa ssp. grandiflora	Large-flowered woolly Meadowfoam	89	Yes (12%)	149.16	Biotic - Unknown	Abiotic, Bird, Mammal	Unknown	Insect	High
Linum arenicola	Sand flax	90	Yes (12%)	40.56	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Medium
Lomatium cookii	Cook's lomatium	25	Yes (12%)	5.18	Biotic - Unknown	Abiotic	Unknown	Insect	Low
Lupinus tidestromii	Clover lupine	91	Yes (12%)	80.04	Biotic - Unknown	Abiotic	Unknown	Insect	High
Malacothamnus clementinus	San Clemente Island bush-mallow	55	Yes (12%)	72.92	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Malacothamnus fasciculatus var. nesioticus	Santa Cruz Island bush-mallow	26	Yes (12%)	0	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	Low
Mentzelia leucophylla	Ash Meadows blazingstar	27	Yes (12%)	0.04	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Low
Monolopia (=Lembertia) congdonii	San Joaquin wooly-threads	56	Yes (12%)	186.09	Biotic - Unknown	Abiotic, Biotic	Unknown	Abiotic, Insect	High
Navarretia leucocephala ssp. pauciflora (=N. pauciflora)	Few-flowered navarretia	92	Yes (12%)	116.79	Biotic - Unknown	Abiotic, Bird, Mammal	No Mention	Insect	High

Scientific Name	Common Name	Number	Direct Effects to Mortality or Growth Expected (yes or no; reduction in dry weight when exposed in use areas that may have effects)	Effects to Pollinators, % insect pollinator mortality (% bird pollinator mortality)	Method of Reproduction (risk modifier)	Seed Dispersal Vector (risk modifier)	Obligate or Specific Pollinator (risk modifier)	Pollination Vector*	Risk Ranking
Navarretia leucocephala ssp. plieantha	Many-flowered navarretia	93	Yes (12%)	135.68	Biotic - Unknown	Abiotic, Bird, Mammal	No Mention	Insect	High
Oxytheca parishii var. goodmaniana	Cushenbury oxytheca	94	Yes (12%)	0.35	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Low
Paronychia chartacea	Papery whitlow-wort	95	Yes (12%)	128.91	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Parvisedum leiocarpum	Lake County stonecrop	96	Yes (12%)	124.35	Biotic - Unknown	Abiotic	No Mention	Insect	Medium
Pectis imberbis	Beardless chinch weed	97	Yes (12%)	13.04	Biotic - Unknown	Unknown	Unknown	Insect	Medium
Pediocactus (=Echinocactus,=Utahia) sileri	Siler pincushion cactus	28	Yes (12%)	27.58	Biotic - Unknown	Insect, Bird, Mammal	unknown	Insect	Low
Pediocactus peeblesianus var. peeblesianus	Peebles Navajo cactus	29	Yes (12%)	2.62	Biotic - Unknown	Insect, Bird, Mammal	unknown	Insect	Low
Penstemon haydenii	Blowout penstemon	98	Yes (12%)	53.72	Biotic - Unknown	Abiotic, Biotic	No	Insect	High
Phacelia insularis ssp. insularis	Island phacelia	30	Yes (12%)	0	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	Low
Plagiobothrys strictus	Calistoga allocarya	99	Yes (12%)	137.47	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Polygala smallii	Tiny polygala	100	Yes (12%)	135.24	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Polygonum hickmanii	Scotts Valley Polygonum	101	Yes (12%)	27.93	Biotic - Unknown	Bird, Mammal	Unknown	Insect	Medium
Ranunculus aestivalis (=acriformis)	Autumn Buttercup	102	Yes (12%)	18.00	Biotic - Unknown	Abiotic, Biotic	No	Abiotic, Insect	Medium
Schoenocrambe argillacea	Clay reed-mustard	31	Yes (12%)	23.98	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	Low
Schoenocrambe suffrutescens	Shrubby reed-mustard	32	Yes (12%)	48.71	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	Low
Scutellaria floridana	Florida skullcap	57	Yes (12%)	83.82	Biotic - Unknown	Abiotic, Biotic	No	Insect	High
Scutellaria montana	Large-flowered skullcap	33	Yes (12%)	69.80 (13.08)	Biotic - Unknown	Abiotic	No	Insect, Bird	High
Sidalcea keckii	Keck's Checker-mallow	103	Yes (12%)	116.81	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Sidalcea oregana ssp. valida	Kenwood Marsh checker-mallow	104	Yes (12%)	**	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	High
Sideroxylon reclinatum ssp. austrofloridense	Everglades bully	34	Yes (12%)	40.56	Biotic - Unknown	Abiotic, Bird, Mammal	Unknown	Insect	Medium
Sphaeralcea gierischii	Gierisch mallow	35	Yes (12%)	7.79	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Low
Spigelia gentianoides	Gentian pinkroot	105	Yes (12%)	204.84	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Streptanthus bracteatus	Bracted twistflower	58	Yes (12%)	87.39	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Styrax texanus	Texas snowbells	59	Yes (12%)	50.36	Biotic - Unknown	Abiotic, Bird, Mammal	unknown	Insect	Medium
Taraxacum californicum	California taraxacum	36	Yes (12%)	0	Biotic - Unknown	Abiotic, Biotic	No Mention	Insect	Low

Scientific Name	Common Name	Number	Direct Effects to Mortality or Growth Expected (yes or no; reduction in dry weight when exposed in use areas that may have effects)	Effects to Pollinators, % insect pollinator mortality (% bird pollinator mortality)	Method of Reproduction (risk modifier)	Seed Dispersal Vector (risk modifier)	Obligate or Specific Pollinator (risk modifier)	Pollination Vector*	Risk Ranking
Thalictrum cooleyi	Cooley's meadowrue	106	Yes (12%)	172.20	Biotic - Unknown	Abiotic, Biotic	Unknown	Abiotic, Insect	High
Thelypodium howellii spectabilis	Howell's spectacular thelypody	4	Yes (12%)	159.66	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	High
Thelypodium stenopetalum	Slender-petaled mustard	37	Yes (12%)	0	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Low
Thlaspi californicum	Kneeland Prairie penny-cress	38	Yes (12%)	102.84	Biotic - Unknown	Abiotic, Biotic	Unknown	Insect	Low

* Information in this column was used to inform the ranking metrics or the draft determination when relevant
** Qualitative assessments necessary for this species, see individual rationale in the *Rationale for Species Conclusions* section below

Volatilization: We do not expect transport from volatilization to be an appreciable source of exposure for most or all species in this assessment group. For species that occur at high elevations, we expect additional exposure to malathion that may vaporize from application sites. However, the magnitude of increased exposure is uncertain due to the unpredictability of weather events, along with variability of the geographical features across the landscapes that influence transport and deposition, though the information available does not allow us to conclude that concentrations from this route alone will rise to the level where effects are expected.

Table 3: Summarizing Data and Information for Usage Ranking

Data Sources: R Plots Appendices for individual plant species; California (CA); NA=Not Applicable

Scientific Name	Common Name	Number	Acres in Species Range*	% Range Overlap with Federal Lands*	% Range in CA*	Comments for % Range in CA*	Total Overlap % (All Agricultural and Residential Uses)*	Total Overlap % Mosquito Adulticide*	Anticipated Usage within Range (agricultural data based on SUUM): total % of range for all uses	Anticipated Usage within Range (agricultural data based on CalPUR): total % of range for all uses	Ranking: Confidence Level	Usage Ranking
Arabis perstellata	Braun's rock-cress	39	1658001.52	0.05	0		19.20	44.02	1.33		Standard	Low
Arctomecon humilis	Dwarf Bear-poppy	60	50874.32	39.44	0		5.12	63.39	0.40		Standard	Low

Scientific Name	Common Name	Number	Acres in Species Range*	% Range Overlap with Federal Lands*	% Range in CA*	Comments for % Range in CA*	Total Overlap % (All Agricultural and Residential Uses)*	Total Overlap % Mosquito Adulticide*	Anticipated Usage within Range (agricultural data based on SUUM): total % of range for all uses	Anticipated Usage within Range (agricultural data based on CalPUR): total % of range for all uses	Ranking: Confidence Level	Usage Ranking
Arctostaphylos franciscana	Franciscan manzanita	61	75884.49	10.65	72	100% range is in CA.	58.98	29.56	3.18	2.937	CalPUR	Low
Asclepias meadii	Mead's milkweed	40	20970652.24	2.18	0		26.81	12.52	1.80		Standard	Low
Astragalus clarianus	Clara Hunt's milk-vetch	62	224293.28	4.42	100		21.21	95.77	8.76	0.675	CalPUR	Low
Astragalus cremnophylax var. cremnophylax	Sentry milk-vetch	9	424558.65	93.67	0		0.001649	6.44	8.25E-05		Standard	Low
Astragalus tricarinatus	Triple-ribbed milk-vetch	10	158410.17	96.64	100		0.11	3.39	0.01	0.005	CalPUR	Low
Baccharis vanessae	Encinitas baccharis	42	166220.37	7.09	100		50.56	93.36	2.77	2.517	CalPUR	Low
Calyptridium pulchellum	Mariposa pussypaws	11	228167.18	41.07	100		2.48	6.86	0.14	0.123	CalPUR	Low
Cardamine micranthera	Small-anthered bittercress	63	701248.65	0.00	0		20.98	37.71	1.63		Standard	Low
Castilleja campestris ssp. succulenta	Fleshy owl's-clover	12	1167472.30	1.59	100		41.60	83.34	19.90	1.315	CalPUR	Low
Castilleja grisea	San Clemente Island indian paintbrush	43	709782.90	54.32	100		19.15	45.96	1.01	0.962	CalPUR	Low
Castilleja mollis	Soft-leaved paintbrush	14	43469.78	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Caulanthus californicus	California jewelflower	44	3053538.13	17.20	100		24.25	80.99	8.62	1.066	CalPUR	Low
Ceanothus ferrisae	Coyote ceanothus	64	90666.10	100.00	100		15.03	100.24	2.07	1.046	CalPUR	Low
Ceanothus ophiochilus	Vail Lake ceanothus	65	39830.60	43.55	100		4.08	57.57	0.33	0.186	CalPUR	Low
Ceanothus roderickii	Pine Hill ceanothus	66	149057.76	8.88	100		15.04	91.15	0.83	0.751	CalPUR	Low
Centaurium namophilum	Spring-loving centaury	15	1434544.05	97.53	0		0.13	0	0.01		Standard	Low
Cercocarpus traskiae	Catalina Island mountain-mahogany	67	687832.45	50.78	100		19.81	49.53	1.04	0.995	CalPUR	Low
Chamaesyce deltoidea ssp. deltoidea	Deltoid spurge	68	1552659.59	46.08	0		19.38	47.36	1.76**		Standard	Low
Chamaesyce garberi	Garber's spurge	69	5423161.65	47.47	0		9.09	31.03	1.61		Standard	Low
Chamaesyce hooveri	Hoover's spurge	16	6119823.46	72.10	100		6.51	7.29	4.41	0.158	CalPUR	Low

Scientific Name	Common Name	Number	Acres in Species Range*	% Range Overlap with Federal Lands*	% Range in CA*	Comments for % Range in CA*	Total Overlap % (All Agricultural and Residential Uses)*	Total Overlap % Mosquito Adulticide*	Anticipated Usage within Range (agricultural data based on SUUM): total % of range for all uses	Anticipated Usage within Range (agricultural data based on CalPUR): total % of range for all uses	Ranking: Confidence Level	Usage Ranking
Chorizanthe howellii	Howell's spineflower	13	66480.20	59.43	100		10.70	0.49	0.56	0.533	CalPUR	Low
Chorizanthe orcuttiana	Orcutt's spineflower	70	39449.36	16.63	100		70.64	84.53	3.98	3.517	CalPUR	Low
Chorizanthe pungens var. pungens	Monterey spineflower	5	407000.32	3.39	100		33.81	68.22	8.18	7.040	CalPUR	Medium
Chorizanthe robusta var. hartwegii	Scotts Valley spineflower	45	182676.94	0.03	100		18.91	100.35	1.11	1.048	CalPUR	Low
Chorizanthe valida	Sonoma spineflower	71	185307.47	12.54	100		18.13	87.82	7.50	0.592	CalPUR	Low
Cirsium fontinale var. obispoense	Chorro Creek bog thistle	72	827585.30	27.36	100		11.73	72.71	3.41	0.526	CalPUR	Low
Cirsium hydrophilum var. hydrophilum	Suisun thistle	73	75109.64	0.75	98	100% range is in CA.	13.34	96.57	4.00	0.415	CalPUR	Low
Cirsium loncholepis	La Graciosa thistle	7	624205.88	42.66	100		15.55	54.86	5.96	6.956	CalPUR	Medium
Clarkia speciosa ssp. immaculata	Pismo clarkia	74	510829.17	41.32	100		12.05	59.06	3.74	2.163	CalPUR	Low
Clarkia springvillensis	Springville clarkia	75	308425.41	49.20	100		11.11	2.18	7.14	0.404	CalPUR	Low
Clematis morefieldii	Morefield's leather flower	46	1097139.09	3.47	0		13.83	58.33	1.89		Standard	Low
Conradina brevifolia	Short-leaved rosemary	1	1995300.46	5.52	0		25.66	61.96	13.19		Standard	High
Consolea corallicola	Florida semaphore Cactus	76	3947860.80	48.40	0		8.16	25.22	0.72**		Standard	Low
Deeringothamnus rugelii	Rugel's pawpaw	47	916736.37	6.64	0		17.30	81.99	1.23		Standard	Low
Delphinium luteum	Yellow larkspur	77	216622.29	4.04	100		19.18	96.25	8.15	0.608	CalPUR	Low
Delphinium variegatum ssp. kinkiense	San Clemente Island larkspur	48	709782.90	54.32	100		19.15	45.96	1.01	0.962	CalPUR	Low
Dicerandra frutescens	Scrub mint	2	1995189.22	5.52	0		25.66	61.96	13.19		Standard	High
Dudleya setchellii	Santa Clara Valley dudleya	49	376535.19	0.01	100		25.96	100.09	2.40	1.493	CalPUR	Low
Dudleya traskiae	Santa Barbara Island liveforever	78	1754798.23	50.06	100		9.33	48.99	3.20	2.208	CalPUR	Low
Echinocereus triglochidiatus var. arizonicus	Arizona hedgehog cactus	17	318869.87	74.98	0		0.31	3.53	0.02		Standard	Low
Erigeron decumbens var. decumbens	Willamette daisy	79	6090109.94	17.74	0		14.65	48.22	2.78		Standard	Low

Scientific Name	Common Name	Number	Acres in Species Range*	% Range Overlap with Federal Lands*	% Range in CA*	Comments for % Range in CA*	Total Overlap % (All Agricultural and Residential Uses)*	Total Overlap % Mosquito Adulticide*	Anticipated Usage within Range (agricultural data based on SUUM): total % of range for all uses	Anticipated Usage within Range (agricultural data based on CalPUR): total % of range for all uses	Ranking: Confidence Level	Usage Ranking
Erigeron parishii	Parish's daisy	18	207294.68	100.00	100% range is in CA.		0	0.00118	0	0	CalPUR	Low
Eriodictyon capitatum	Lompoc yerba santa	80	295488.57	15.16	100		13.64	83.49	5.58	2.429	CalPUR	Low
Eriogonum apricum (incl. var. prostratum)	Ione (incl. Irish Hill) buckwheat	81	112361.13	0.02	100		8.96	100.17	2.01	0.368	CalPUR	Low
Eryngium constancei	Loch Lomond coyote thistle	50	111764.72	1.96	100		12.62	98.27	4.69	0.461	CalPUR	Low
Euphorbia telephioides	Telephus spurge	51	755850.99	5.35	0		8.20	71.72	0.42**		Standard	Low
Galium californicum ssp. sierrae	El Dorado bedstraw	82	111828.03	8.76	100		18.02	91.28	0.98	0.897	CalPUR	Low
Geocarpon minimum	No common name	19	10438360.06	4.36	0		9.66	20.89	1.06		Standard	Low
Graptopetalum bartramii	Bartram stonecrop	52	10652583.61	30.38	0		5.54	0.01	0.48		Standard	Low
Grindelia fraxinipratensis	Ash Meadows gumplant	20	38423.86	98.97	0		0.006653	0	0.000333		Standard	Low
Helianthus paradoxus	Pecos (=puzzle, =paradox) sunflower	53	18415431.73	23.48	0		2.28	40.70	0.32		Standard	Low
Hexastylis naniflora	Dwarf-flowered heartleaf	21	3979407.60	4.05	0		20.87	18.61	1.26		Standard	Low
Hymenoxys texana	Texas prairie dawn-flower	6	2161666.20	9.06	0		46.65	78.75	5.68**		Standard	Medium
Hypericum cumulicola	Highlands scrub hypericum	3	1995189.22	5.52	0		25.66	61.96	13.19		Standard	High
Ivesia kingii var. eremica	Ash Meadows ivesia	22	1434544.05	97.53	0		0.13	0	0.01		Standard	Low
Jacquemontia reclinata	Beach jacquemontia	83	4405996.58	16.32	0		31.50	76.57	2.43**		Standard	Low
Justicia cooleyi	Cooley's water-willow	84	748384.90	1.03	0		16.34	90.99	1.60		Standard	Low
Leavenworthia exigua laciniata	Kentucky glade cress	54	447769.35	7.95	0		35.06	0.40	2.44		Standard	Low
Lesquerella kingii ssp. bernardina	San Bernardino Mountains bladderpod	23	49343.11	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Lesquerella lyrata	Lyrate bladderpod	85	261751.60	3.09	0		16.60	37.68	2.54		Standard	Low
Lesquerella pallida	White bladderpod	86	379083.29	43.49	0		2.95	0	0.15		Standard	Low
Lesquerella perforata	Spring Creek bladderpod	87	373245.54	0.00	0		12.66	0.21	0.86		Standard	Low

Scientific Name	Common Name	Number	Acres in Species Range*	% Range Overlap with Federal Lands*	% Range in CA*	Comments for % Range in CA*	Total Overlap % (All Agricultural and Residential Uses)*	Total Overlap % Mosquito Adulticide*	Anticipated Usage within Range (agricultural data based on SUUM): total % of range for all uses	Anticipated Usage within Range (agricultural data based on CalPUR): total % of range for all uses	Ranking: Confidence Level	Usage Ranking
Lesquerella thamnophila	Zapata bladderpod	88	1462900.20	0.86	0		10.11	0.09	4.37		Standard	Low
Lesquerella tumulosa	Kodachrome bladderpod	24	180715.60	96.49	0		0.08	0	0.02		Standard	Low
Limnanthes floccosa ssp. grandiflora	Large-flowered woolly Meadowfoam	89	186291.58	8.30	0		20.13	92.21	1.98		Standard	Low
Linum arenicola	Sand flax	90	3947860.79	48.40	0		8.16	25.22	0.72**		Standard	Low
Lomatium cookii	Cook's lomatium	25	303131.01	34.65	0		0.94	2.77	0.09		Standard	Low
Lupinus tidestromii	Clover lupine	91	165878.79	19.60	100		14.82	50.03	0.85	0.734	CalPUR	Low
Malacothamnus clementinus	San Clemente Island bush-mallow	55	709782.90	54.32	100		19.15	45.96	1.01	0.962	CalPUR	Low
Malacothamnus fasciculatus var. nesioticus	Santa Cruz Island bush-mallow	26	18660.79	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Mentzelia leucophylla	Ash Meadows blazingstar	27	38423.86	98.97	0		0.006653	0	0.000333		Standard	Low
Monolopia (=Lembertia) congdonii	San Joaquin wooly-threads	56	2366677.85	19.82	100		43.39	80.09	15.02	0.892	CalPUR	Low
Navarretia leucocephala ssp. pauciflora (=N. pauciflora)	Few-flowered navarretia	92	258830.94	7.34	100		9.76	93.06	3.69	0.345	CalPUR	Low
Navarretia leucocephala ssp. plieantha	Many-flowered navarretia	93	223527.84	1.32	100		15.74	98.92	5.72	0.557	CalPUR	Low
Oxytheca parishii var. goodmaniana	Cushenbury oxytheca	94	118307.86	100.00	0	100% range is in CA.	0	0.35	0	0	CalPUR	Low
Paronychia chartacea	Papery whitlow-wort	95	4585316.83	4.49	0		22.86	81.38	6.74**		Standard	Medium
Parvisedum leiocarpum	Lake County stonecrop	96	111634.99	1.96	100		10.32	98.08	1.72	0.473	CalPUR	Low
Pectis imberbis	Beardless chinch weed	97	10652583.61	30.38	0		5.54	0.01	0.48		Standard	Low
Pediocactus (=Echinocactus,=Utahia) sileri	Siler pincushion cactus	28	1149288.80	73.22	0		0.18	27.09	0.01**		Standard	Low
Pediocactus peeblesianus var. peeblesianus	Peebles Navajo cactus	29	468905.27	4.35	0		1.00	0	0.05		Standard	Low
Penstemon haydenii	Blowout penstemon	98	17667209.85	3.13	0		11.72	14.17	0.57		Standard	Low

Scientific Name	Common Name	Number	Acres in Species Range*	% Range Overlap with Federal Lands*	% Range in CA*	Comments for % Range in CA*	Total Overlap % (All Agricultural and Residential Uses)*	Total Overlap % Mosquito Adulticide*	Anticipated Usage within Range (agricultural data based on SUUM): total % of range for all uses	Anticipated Usage within Range (agricultural data based on CalPUR): total % of range for all uses	Ranking: Confidence Level	Usage Ranking
Phacelia insularis ssp. insularis	Island phacelia	30	24269.76	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Plagiobothrys strictus	Calistoga allocarya	99	37362.38	0.01	100		15.25	100.66	10.11	0.341	CalPUR	Low
Polygala smallii	Tiny polygala	100	4846388.86	14.84	0		32.49	77.68	4.02**		Standard	Low
Polygonum hickmanii	Scotts Valley Polygonum	101	182671.95	0.03	100		3.94	20.90	0.23	0.309	CalPUR	Low
Ranunculus aestivalis (=acriformis)	Autumn Buttercup	102	34240.42	56.98	0		5.71	0	3.84		Standard	Low
Schoenocrambe argillacea	Clay reed-mustard	31	67413.14	78.96	0		0.25	21.94	0.13		Standard	Low
Schoenocrambe suffrutescens	Shrubby reed-mustard	32	169402.98	54.57	0		0.23	46.22	0.07		Standard	Low
Scutellaria floridana	Florida skullcap	57	2340876.00	14.81	0		5.06	63.47	0.32		Standard	Low
Scutellaria montana	Large-flowered skullcap	33	3099229.59	11.14	0		13.51	35.51	0.97		Standard	Low
Sidalcea keckii	Keck's Checker-mallow	103	584177.01	10.31	100		11.65	76.95	6.27**	0.236	CalPUR	Low
Sidalcea oregana ssp. valida	Kenwood Marsh checker-mallow	104	14576176.42	***	100		***	***		***	CalPUR	Low
Sideroxylon reclinatum ssp. austrofloridense	Everglades bully	34	3947860.80	48.40	0		8.16	25.22	0.72		Standard	Low
Sphaeralcea gierischii	Gierisch mallow	35	269792.35	92.58	0		0.05	7.59	0.002642**		Standard	Low
Spigelia gentianoides	Gentian pinkroot	105	1768770.07	0.23	0		25.90	87.48	2.74**		Standard	Low
Streptanthus bracteatus	Bracted twistflower	58	7585030.23	1.22	0		18.83	27.73	3.65		Standard	Low
Styrax texanus	Texas snowbells	59	6253693.70	0.83	0		4.11	32.24	1.59		Standard	Low
Taraxacum californicum	California taraxacum	36	157901.87	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Thalictrum cooleyi	Cooley's meadowrue	106	3677288.64	3.81	0		21.19	79.95	2.97**		Standard	Low
Thelypodium howellii spectabilis	Howell's spectacular thelypody	4	208111.88	6.23	0		22.55	74.25	15.47		Standard	High
Thelypodium stenopetalum	Slender-petaled mustard	37	49325.00	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Thlaspi californicum	Kneeland Prairie penny-cress	38	36251.64	1.65	100		1.70	98.82	0.09	0.085	CalPUR	Low

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

**Usage anticipated from mosquito control applications was not included as a data column in this table. The anticipated usage for mosquito control for these species is above 5.0%. Although the numbers are not all listed here, as described in the Analysis for Plants and Effects of the Action sections of this Opinion, we considered usage from mosquito control in our analysis of all species. We expect the effects to pollinators and seed dispersers of these species from mosquito control usage will be significantly reduced by the mosquito adulticide timing restriction conservation measure described below, thus significantly limiting reproductive effects to these species.
*** Qualitative assessments necessary for this species, see individual rationale in the *Rationale for Species Conclusions* section below

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, see Table 3). All measures are anticipated to limit the exposure of pollinators and 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.

Mosquito adulticide timing restrictions: Conservation measures 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 and seed dispersers are most active and would mostly likely be exposed to malathion applications. This measure is anticipated to limit the exposure of insect pollinators/seed dispersers present in and around the range of the species to malathion when used as a mosquito adulticide.

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 pollinators/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.

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 the species and its pollinators/seed dispersers, thus decreasing the risk of impacts to reproduction and direct impacts to the plant itself.

Reduced citrus application rate: For citrus applications outside of California, label restrictions will include a reduction in the maximum application rate , which is anticipated to reduce potential environmental concentrations to one-third of modeled values, reducing the effects to species and their seed dispersers on and adjacent to these use areas. For citrus applications in California, instead of reducing application rates, users can only apply once per year, and by ground application only.

Residential use label changes: New restrictions to the method and frequency of application for residential use of malathion are anticipated to substantially 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. We anticipate this measure will further reduce exposure to biotic pollinators and seed dispersers, thus decreasing the risk of impacts to reproduction and sub-lethal impacts to the plant itself.

Species-Specific Conservation Measures

The following species-specific measures are now part of the Action and will be included in *BulletinsLive! Two*.

In addition to the general conservation measures described above, three species (short-leaved rosemary, scrub mint, and highlands scrub hypericum) will also have a species-specific conservation measure that allows for a choice of application restrictions, described below.

For the conservation measures that include a choice of application restrictions, the measures direct agricultural applicators in the vicinity of suitable habitat for these species to choose one of three options when applying malathion, any one of which we anticipate would be protective of the species' insect pollinators and/or seed dispersers: 1. Apply malathion before dawn or after dusk, thus avoiding the active period of the species' pollinators OR 2. Apply malathion only when wind is blowing away from suitable habitat for the species, thus reducing exposure to pollinators OR 3. Use a 50-foot ground buffer from suitable habitat or an aerial buffer. For the third option, the aerial buffer is measured from suitable habitat (identified by species) according to application rate: (1) 50 feet for <0.5 lbs ai/A; (2) 75 feet for 0.5 - <1 lb ai/A; (3) 150 feet for 1-2.5 lbs ai/A; (4) 200 feet for >2.5 lbs ai/A. Buffer sizes may be reduced by 25 feet for application rates (1) and (2) if a full swath displacement upwind is used during aerial application. Buffer sizes may be reduced by 50 feet for application rates (3) and (4) if a full swath displacement upwind is used during aerial application.

Swath displacement is a typical practice in the aerial application of pesticides where applicators adjust the position of spray to account for pesticide that may drift into adjacent areas. For example, applicators may skip an outer row of trees or avoid spraying to the edge of the field. In our conservation measure for short-leaved rosemary, scrub mint, and highlands scrub hypericum we allow applicators to reduce the required buffer size by 50 feet if using a full swath displacement, which we anticipate will generally be roughly equivalent to this distance. The full swath displacement effectively acts as a buffer and the resultant distance from species habitat is expected to be the same size whether swath displacement is used or not.

Species-specific conservation measures are referenced, where applicable, in the Rationale for Species Conclusions section below Table 4.

Table 4: Summary of Conclusions

Number	Scientific Name	Common Name	Vulnerability Ranking	Risk Ranking	Usage Ranking	Species Conclusion (J, NJ)*
1	*Conradina brevifolia*	Short-leaved rosemary	High	High	High	NJ
2	*Dicerandra frutescens*	Scrub mint	High	High	High	NJ
3	*Hypericum cumulicola*	Highlands scrub hypericum	High	High	High	NJ
4	*Thelypodium howellii spectabilis*	Howell's spectacular thelypody	High	High	High	NJ
5	*Chorizanthe pungens var. pungens*	Monterey spineflower	Medium	High	Medium	NJ
6	*Hymenoxys texana*	Texas prairie dawn-flower	Medium	High	Medium	NJ
7	*Cirsium loncholepis*	La Graciosa thistle	High	Medium	Medium	NJ
9	*Astragalus cremnophylax var. cremnophylax*	Sentry milk-vetch	High	Low	Low	NJ
10	*Astragalus tricarinatus*	Triple-ribbed milk-vetch	Medium	Low	Low	NJ
11	*Calyptridium pulchellum*	Mariposa pussypaws	High	Low	Low	NJ
12	*Castilleja campestris ssp. succulenta*	Fleshy owl's-clover	Low	High	Low	NJ
13	*Chorizanthe howellii*	Howell's spineflower	High	Medium	Low	NJ
14	*Castilleja mollis*	Soft-leaved paintbrush	High	Low	Low	NJ
15	*Centaurium namophilum*	Spring-loving centaury	High	Low	Low	NJ
16	*Chamaesyce hooveri*	Hoover's spurge	Low	Medium	Low	NJ
17	*Echinocereus triglochidiatus var. arizonicus*	Arizona hedgehog cactus	High	Low	Low	NJ

18	*Erigeron parishii*	Parish's daisy	Medium	Low	Low	NJ
19	*Geocarpon minimum*	No common name	Low	High	Low	NJ
20	*Grindelia fraxinipratensis*	Ash Meadows gumplant	High	Low	Low	NJ
21	*Hexastylis naniflora*	Dwarf-flowered heartleaf	Low	High	Low	NJ
22	*Ivesia kingii var. eremica*	Ash Meadows ivesia	High	Low	Low	NJ
23	*Lesquerella kingii ssp. bernardina*	San Bernardino Mountains bladderpod	High	Low	Low	NJ
24	*Lesquerella tumulosa*	Kodachrome bladderpod	High	Low	Low	NJ
25	*Lomatium cookii*	Cook's lomatium	High	Low	Low	NJ
26	*Malacothamnus fasciculatus var. nesioticus*	Santa Cruz Island bush-mallow	High	Low	Low	NJ
27	*Mentzelia leucophylla*	Ash Meadows blazingstar	High	Low	Low	NJ
28	*Pediocactus (=Echinocactus,=Utahia) sileri*	Siler pincushion cactus	High	Low	Low	NJ
29	*Pediocactus peeblesianus var. peeblesianus*	Peebles Navajo cactus	High	Low	Low	NJ
30	*Phacelia insularis ssp. insularis*	Island phacelia	High	Low	Low	NJ
31	*Schoenocrambe argillacea*	Clay reed-mustard	High	Low	Low	NJ
32	*Schoenocrambe suffrutescens*	Shrubby reed-mustard	High	Low	Low	NJ
33	*Scutellaria montana*	Large-flowered skullcap	Low	High	Low	NJ
34	*Sideroxylon reclinatum ssp. austrofloridense*	Everglades bully	Low	Medium	Low	NJ
35	*Sphaeralcea gierischii*	Gierisch mallow	High	Low	Low	NJ
36	*Taraxacum californicum*	California taraxacum	High	Low	Low	NJ
37	*Thelypodium stenopetalum*	Slender-petaled mustard	High	Low	Low	NJ
38	*Thlaspi californicum*	Kneeland Prairie penny-cress	High	Low	Low	NJ
39	*Arabis perstellata*	Braun's rock-cress	Medium	High	Low	NJ
40	*Asclepias meadii*	Mead's milkweed	Medium	High	Low	NJ
42	*Baccharis vanessae*	Encinitas baccharis	Medium	High	Low	NJ
43	*Castilleja grisea*	San Clemente Island indian paintbrush	Medium	High	Low	NJ
44	*Caulanthus californicus*	California jewelflower	Medium	High	Low	NJ
45	*Chorizanthe robusta var. hartwegii*	Scotts Valley spineflower	Medium	High	Low	NJ
46	*Clematis morefieldii*	Morefield's leather flower	Medium	High	Low	NJ
47	*Deeringothamnus rugelii*	Rugel's pawpaw	Medium	High	Low	NJ
48	*Delphinium variegatum ssp. kinkiense*	San Clemente Island larkspur	Medium	Medium	Low	NJ
49	*Dudleya setchellii*	Santa Clara Valley dudleya	Medium	High	Low	NJ
50	*Eryngium constancei*	Loch Lomond coyote thistle	Medium	High	Low	NJ
51	*Euphorbia telephioides*	Telephus spurge	Medium	Medium	Low	NJ
52	*Graptopetalum bartramii*	Bartram stonecrop	Medium	Medium	Low	NJ

53	*Helianthus paradoxus*	Pecos (=puzzle, =paradox) sunflower	Medium	Medium	Low	NJ
54	*Leavenworthia exigua laciniata*	Kentucky glade cress	Medium	High	Low	NJ
55	*Malacothamnus clementinus*	San Clemente Island bush-mallow	Medium	High	Low	NJ
56	*Monolopia (=Lembertia) congdonii*	San Joaquin wooly-threads	Medium	High	Low	NJ
57	*Scutellaria floridana*	Florida skullcap	Medium	High	Low	NJ
58	*Streptanthus bracteatus*	Bracted twistflower	Medium	High	Low	NJ - conference
59	*Styrax texanus*	Texas snowbells	Medium	Medium	Low	NJ
60	*Arctomecon humilis*	Dwarf Bear-poppy	High	Medium	Low	NJ
61	*Arctostaphylos franciscana*	Franciscan manzanita	High	High	Low	NJ
62	*Astragalus clarianus*	Clara Hunt's milk-vetch	High	High	Low	NJ
63	*Cardamine micranthera*	Small-anthered bittercress	High	High	Low	NJ
64	*Ceanothus ferrisae*	Coyote ceanothus	High	High	Low	NJ
65	*Ceanothus ophiochilus*	Vail Lake ceanothus	High	Medium	Low	NJ
66	*Ceanothus roderickii*	Pine Hill ceanothus	High	High	Low	NJ
67	*Cercocarpus traskiae*	Catalina Island mountain-mahogany	High	High	Low	NJ
68	*Chamaesyce deltoidea ssp. deltoidea*	Deltoid spurge	High	High	Low	NJ
69	*Chamaesyce garberi*	Garber's spurge	High	Medium	Low	NJ
70	*Chorizanthe orcuttiana*	Orcutt's spineflower	High	High	Low	NJ
71	*Chorizanthe valida*	Sonoma spineflower	High	High	Low	NJ
72	*Cirsium fontinale var. obispoense*	Chorro Creek bog thistle	High	High	Low	NJ
73	*Cirsium hydrophilum var. hydrophilum*	Suisun thistle	High	High	Low	NJ
74	*Clarkia speciosa ssp. immaculata*	Pismo clarkia	High	High	Low	NJ
75	*Clarkia springvillensis*	Springville clarkia	High	High	Low	NJ
76	*Consolea corallicola*	Florida semaphore Cactus	High	Medium	Low	NJ
77	*Delphinium luteum*	Yellow larkspur	High	High	Low	NJ
78	*Dudleya traskiae*	Santa Barbara Island liveforever	High	High	Low	NJ
79	*Erigeron decumbens var. decumbens*	Willamette daisy	High	High	Low	NJ
80	*Eriodictyon capitatum*	Lompoc yerba santa	High	High	Low	NJ
81	*Eriogonum apricum (incl. var. prostratum)*	Ione (incl. Irish Hill) buckwheat	High	High	Low	NJ
82	*Galium californicum ssp. sierrae*	El Dorado bedstraw	High	High	Low	NJ
83	*Jacquemontia reclinata*	Beach jacquemontia	High	High	Low	NJ
84	*Justicia cooleyi*	Cooley's water-willow	High	High	Low	NJ
85	*Lesquerella lyrata*	Lyrate bladderpod	High	High	Low	NJ

86	*Lesquerella pallida*	White bladderpod	High	Medium	Low	NJ
87	*Lesquerella perforata*	Spring Creek bladderpod	High	High	Low	NJ
88	*Lesquerella thamnophila*	Zapata bladderpod	High	High	Low	NJ
89	*Limnanthes floccosa ssp. grandiflora*	Large-flowered woolly Meadowfoam	High	High	Low	NJ
90	*Linum arenicola*	Sand flax	High	Medium	Low	NJ
91	*Lupinus tidestromii*	Clover lupine	High	High	Low	NJ
92	*Navarretia leucocephala ssp. pauciflora (=N. pauciflora)*	Few-flowered navarretia	High	High	Low	NJ
93	*Navarretia leucocephala ssp. plieantha*	Many-flowered navarretia	High	High	Low	NJ
94	*Oxytheca parishii var. goodmaniana*	Cushenbury oxytheca	High	Low	Low	NJ
95	*Paronychia chartacea*	Papery whitlow-wort	Low	High	Medium	NJ
96	*Parvisedum leiocarpum*	Lake County stonecrop	High	Medium	Low	NJ
97	*Pectis imberbis*	Beardless chinch weed	High	Medium	Low	NJ
98	*Penstemon haydenii*	Blowout penstemon	High	High	Low	NJ
99	*Plagiobothrys strictus*	Calistoga allocarya	High	High	Low	NJ
100	*Polygala smallii*	Tiny polygala	High	High	Low	NJ
101	*Polygonum hickmanii*	Scotts Valley Polygonum	High	Medium	Low	NJ
102	*Ranunculus aestivalis (=acriformis)*	Autumn Buttercup	High	Medium	Low	NJ
103	*Sidalcea keckii*	Keck's Checker-mallow	High	High	Low	NJ
104	*Sidalcea oregana ssp. valida*	Kenwood Marsh checker-mallow	High	High	Low	NJ
105	*Spigelia gentianoides*	Gentian pinkroot	High	High	Low	NJ
106	*Thalictrum cooleyi*	Cooley's meadowrue	High	High	Low	NJ

*NJ = No Jeopardy; J = Jeopardy

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 (refer to Table 4 for species names). While we expect some individual plants in this assessment group will experience reduced growth due to direct exposure to malathion, we do not anticipate this reduction in growth would have species-level effects for any species in this group (numbers 1-106), although there are some differences among vulnerability, risk of exposure, and usage, particularly as it relates to their pollinators or seed dispersers. Our rationales related to these differences are described below, with the species discussions divided into various sections and subsections. Our first section addresses species 8 through 107 discussed in part by common points or assumptions of analyses within the identified subgroupings, followed by a section for species 1 through 7 discussed on a species-by-species basis.

SPECIES 9 THROUGH 106:

Species with No Anticipated Usage in Range

The following species occur entirely in California and have no malathion usage reported through the CalPUR system: 14, 18, 23, 26, 30, 36, 37, and 94 (refer to Table 4 for species names). Given that we do not expect malathion usage on any portion of the range of these species, we do not anticipate pollinator and seed disperser mortality to cause adverse reproductive effects to these species or for these adverse effects to rise to species-level effects. Therefore, we do not anticipate that the proposed action would appreciably reduce survival and recovery of these species in the wild.

Species Entirely on Federal Lands

Several **species (14, 18, 23, 26, 30, 36, 37, 64, and 94) occur entirely on Federal lands.** We anticipate usage within the range of these species will be low, based primarily on the usage data we acquired about malathion usage on Federal lands indicating that past malathion usage has occurred on public lands for a variety of uses, but usage has been minimal (see Usage section of Opinion), with only localized applications occurring on a rare basis. We expect any adverse effects to listed resources to 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. Therefore, we do not anticipate that the proposed action would appreciably reduce survival and recovery of these species in the wild.

Remaining Species

Species numbered 9, 10, 11, 15, 17, 20, 22, 24, 25, 27, 28, 29, 31, 32, 35, and 38 (refer to Table 4 for species names) all have high (or medium, for species 10) vulnerability based on their status, distribution and trends; low risk posed by labeled uses of malathion across the species ranges; and low estimated usage based on standard data within the species ranges, as shown above. **Species numbered 8, 16, 19, 21, 33, and 34** all have a low vulnerability based on their status, distribution and trends, medium or high risk posed by labeled uses across the range, and low estimated usage within the non-Federal portion of their ranges, as shown above. Given that anticipated usage within the non-Federal portion of these species' ranges is very low (all are 1.26% or less, with most well under 0.5%), we anticipate malathion to be applied on a very small portion of the ranges of these species, resulting in a level of pollinator and seed disperser mortality that is anticipated to cause minimal adverse reproductive effects to these plant species. Furthermore, we anticipate the conservation measures described above will further reduce the risk of exposure of both pollinators and seed dispersers in the very small portion of the range where we anticipate malathion to be applied. For example, the conservation measure limiting mosquito adulticide applications during most daytime hours, when many pollinators are active, is anticipated to aubstantially reduce exposure and therefore mortality of diurnal pollinators and seed dispersers, which are important for the reproductive success of the listed plants. Thus, we do not anticipate that the use of malathion is likely to cause species-level reproductive effects to the species indicated in this paragraph (numbers listed above). Therefore, we do not anticipate that the proposed action would appreciably reduce the survival and recovery of these species in the wild.

Species numbered 39-59 (except those species identified as having no malathion usage reported, as discussed above; refer to Table 4 for species names) all have a medium vulnerability based on their status, distribution and trends; medium or high risk posed by labeled uses of malathion across the species range; and low estimated usage based on standard data within the non-Federal portion of the species' ranges, as shown above. Texas snowbells (species number 59) is discussed in more detail in the following paragraph. Given that anticipated usage within the non-Federal portion of these species' ranges is low (all are 3.65% or less, with most below 2%), we expect malathion to be applied on a very small portion of the ranges of these species, resulting in a level of pollinator and seed disperser mortality that is anticipated to cause minimal adverse reproductive effects to these plant species. Furthermore, we anticipate the conservation measures described above will further reduce the risk of exposure of both pollinators and seed dispersers in the very small portion of the range where we anticipate malathion to be applied. For example, new restrictions prohibit application on crops in certain UDLs three days prior to bloom, during bloom, and until petal fall is complete. Given that most pollinating insects are likely to be attracted to crops in bloom and thus more likely to be present in agricultural areas during these times, avoiding application during bloom is anticipated to reduce exposure and resultant mortality of pollinators important for these plants. Thus, we do not anticipate that the use of malathion is likely to cause species-level effects to the species indicated in this paragraph (numbers listed above). Therefore, we do not anticipate that the proposed action would appreciably reduce the survival and recovery of these species in the wild.

Texas snowbells (species number 59) is noted to be threatened by a deficiency in pollinators. The species is pollinated by insects, and effective pollinators include the honey bee (*Apis mellifera*), American bumble bee (*Bombus pensylvanicus*), and California carpenter bee (*Xylocopa californica*). Texas snowbells populations occur in fairly remote areas where there has been little development or intensive agriculture, and bee populations are presently secure. Nevertheless, many native bee species have declined in recent decades, so pollinator conservation, monitoring, and awareness should be promoted within the range of Texas snowbells (and elsewhere). (USFWS 2019 – Recovery Plan) Because the Texas snowbell has a low (1.8%) anticipated usage of malathion within its range and occurs in fairly remote areas unaffected by development or intensive agriculture, we anticipate that any adverse effects from a reduction in insect pollinators that over the duration of the action would not result in species-level effects. Therefore, we do not anticipate that the proposed action would appreciably reduce the survival and recovery of Texas snowbells in the wild.

Species numbered 12, 13, and 60-106 (except those species identified as having no malathion usage reported, as discussed above, and species 104 Kenwood Marsh checker-mallow, discussed qualitatively below); refer to Table 4 for species names): The majority of the species in this subgroup have high vulnerability based on their status, distribution, and trends; medium or high risk posed by labeled uses of malathion across the species range; and low estimated usage based on standard data within the non-Federal portion of the species range, as shown above. We did not quantitatively evaluate use or usage on Federal lands that overlap with the species range, but we assume only low levels of usage for these species, per the rationale related to usage on Federal lands as described in the Biological Opinion. Information on the reproductive strategies for the species in Assessment Group 11 is incomplete; it is unknown whether the method of reproduction requires pollen transfer between individual plants in order to reproduce successfully, or if these species can reproduce successfully via self-fertilization or vegetative means. However, the majority of species in this sub- group have insects as pollination vectors, though a few also utilize birds or abiotic vectors. Insect pollinators and seed dispersers are expected to experience mortality within the non-Federal portions of the ranges of these species from exposure to malathion on use sites, spray drift from these sites, and from mosquito adulticide applications. Bird pollinators and seed dispersers will

experience some mortality from malathion exposure as indicated in Table 2 (Effects to Pollinators column). The anticipated usage of malathion within these species' ranges is very low. None of the species are anticipated to have more than 4.37% of their range treated and the majority will have less than 1% of their range treated. Thus, while we anticipate adverse reproductive effects to these listed plants from loss of insect and bird pollinators and seed dispersers where exposure occurs, we do not anticipate species-level effects because of the low anticipated usage. Additionally, the conservation measures to be implemented, as described above, will further reduce the risk of exposure of both pollinators and seed dispersers in the small portion of the range where we anticipate malathion to be applied. For example, residential uses of malathion are now limited to two applications per year (reduced from as many as necessary) and to spot treatments only, reducing the application footprint and likelihood of spray drift within developed and open space developed areas. The reduced application footprint and likelihood of spray drift are a result of the allowable application methods for spot treatment (such as the use of hand-pump sprayers, which are not capable of producing broadcast use) and low amounts of chemical used. Therefore, we do not anticipate that the proposed action would appreciably reduce survival and recovery of these species in the wild.

Kenwood Marsh checker-mallow (species 104)

This species is a perennial herb in the mallow family, a narrow endemic, originally reported from freshwater marshes and riparian areas in two valleys in Sonoma County, California. As reported in the 2018 5-year Status Review, this species is now only known to persist in one population at the Deerfield Ranch Winery in Sonoma County. While exclosures were constructed around this remaining population, they have not been reliably maintained, and invasive plants have taken over in some. Prior to finalizing this Biological Opinion, we discovered that the overlap of malathion use sites with the species range was calculated based on an inaccurate range map for this species. More specifically, the range for this species that was caluculated in the orginal overlap analysis included a large swath of coastal California north of San Luis Obispo and a large swath along the Nevada borther north and south of Carson City. Based on further review of Service documentation, the range should only include two small portions of Sonoma County, California. As a result, we did not carry forward the overlap values from the draft Opinion into this final Opinion. Instead, we qualitatively estimated the types and extent of malathion use sites occurring within the range by visually examining mapped crop data layers in proximity to the species range. Thus, the usage has changed from what was originally calculated based on the larger area previously considered. Using the corrected range, and based on the available usage data, we do not anticipate mosquito control usage will occur in Sonoma County. The numeric extent of overlap of agricultural and residential usage with the accurate range is not available; however, a visual inspection of Cropland Data Layers indicates crops within the grapes and developed use layers have the most overlap with the range. We estimate that up to 5% of developed use sites within the range could undergo some level of malathion application.

The Kenwood Marsh checker-mallow is thought to rely on insects for pollination and successful reproduction, though the insect pollinator species are unknown. We anticipate that pollinators will experience mortality if exposed to malathion within the range of this species. The checker-mallow is thought to rely on a variety of animal taxa for seed dispersal in addition to abiotic vectors such as wind. As a result, we do not anticipate adverse reproductive effects to this species from loss of seed dispersers due to the species ability to rely on multiple avenues for seed dispersal if insect or avian seed dispersers experience a temporary decline from malathion usage. However, new restrictions that will be implemented for residential and agricultural uses of malathion are anticipated to substantially reduce exposure to the pollinators and seed dispersers of this species, as described above in the *General Conservation Measures* section. For example, new restrictions to residential use label changes (including developed use layers) will reduce exposure of pollinators and biotic seed dispersers by liming applications to spot treatment to reduce drift and runoff, and will change the method and frequency of applications on this use types. These measures are anticipated to substantially reduce exposure to pollinators in or near developed areas, leading to reduced anticipated reproductive effects to the checker-mallow. While grapes are part of the orchards and vineyards use category, they are not included in the general conservation measure, *Reduced Application Number and Rate*, above, since the pre-existing application number and rate was already low. Grapes also have the longest reapplication interval of all crops within the orchards and vineyards layer. Thus we do not anticipate substantial exposure to pollinators in or around this use type. . As a result, while we anticipate a low level of adverse effects due to the loss of insect pollinators and seed dispersers and small reductions in reproductive success from malathion exposure, we do not expect that these adverse effects will result in species-level effects due to the diversity of seed dispersers available to this species, and the conservation measures that will be implemented. Therefore, we do not anticipate the action would appreciably reduce survival and recovery of the Kenwood Marsh checker-mallow in the wild.

SPECIES 1 - 7

Species numbered 1-7 all have high or medium vulnerabilities based on their status, distribution and trends, high or medium risk posed by labeled uses across their ranges, and high or medium estimated usage within the non-Federal portions of their ranges as shown above. A rationale for each species is outlined below.

Short–leaved rosemary (species 1)

Short-leaved rosemary has a high vulnerability based on its status as an endangered species and limited distribution, as described above. Short-leaved rosemary is a Florida endemic restricted to xeric scrub habitats of the Lake Wales Ridge in central Highlands and Polk counties where habitat destruction from development continues to occur and development pressure remains high (2019 Lake Wales Ridge Plants Recovery Plan Amendment). It occurs at approximately 28 sites whose total area is less than 2,400 hectares (6,000 acres) in the Sebring-Avon Park area of Highlands and Polk Counties (Christman 1988, Christman and Judd 1990 *in* USFWS 1999 Recovery Plan). The limited geographic range of this species in combination with the continuing loss of habitat has resulted in a highly fragmented landscape where the remaining scrub areas have become more and more isolated from each other, thereby decreasing the overall resiliency, redundancy, and representation of this, and other, Lake Wales Ridge species (2019 Lake Wales Ridge Plants Recovery Plan Amendment). Furthermore, it

has been shown that rare plants in fragmented landscapes are likely to experience decreased pollinator services leading to reduced reproductive success and lower population viability (Lienert, T. 2004; Spira, t. 2001; Lennartson, T. 2002, Setsuko, S. et al 2013).

The risk to the species posed by labeled uses across the range is anticipated to be high, as described above. As discussed in the 2019 Lake Wales Ridge Plants Recovery Plan amendments, very little is known about the biology or ecology of short-leaved rosemary. Anecdotal information presented in the 1999 Recovery Plan suggests that asexual reproduction is unlikely for this species, meaning it would rely on outcrossing by pollinators to reproduce successfully. Insects, the pollination vector for this species as described above, are expected to experience mortality (100%) within the range of this species from exposure to malathion from application on agricultural and non-agricultural use sites, spray drift from these sites, and from mosquito adulticide use. We anticipate adverse effects to the species due to the reduction in pollinating insects that would result in reduced reproductive success. However, in addition to the conservation measures to be implemented as outlined above, label restrictions as described in the species-specific conservation measures will also be implemented for this species. These measures direct agricultural applicators in the vicinity of suitable habitat for this species to choose one of three options when applying malathion: 1. Apply malathion before dawn or after dusk, thus avoiding the active period of this species' pollinators OR 2. Apply malathion only when wind is blowing away from suitable habitat for this species, thus reducing exposure to pollinators OR 3. Use a 50-foot ground buffer from suitable habitat or an aerial buffer according to application rate (see rates outlined at the end of this I&S Summary for Group 11). While the exact amount of spray drift reduction from these buffers will vary depending on the traits of the ecosystem as well as the application method, based on AgDRIFT modeling, we anticipate spray drift reductions ranging from 82 to 90%. Together, these measures are anticipated to substantially reduce the anticipated pollinator and seed disperser exposure and thus mortality of these taxa from malathion application within the range of this species, substantially reducing the reproductive effects to the short-leaved rosemary.

Short-leaved rosemary relies on a variety of seed dispersers to maintain populations and colonize new sites in its range. It can disperse seeds using biotic vectors such as birds, insects, and mammals in addition to abiotic vectors such as wind and water. No mortality or sublethal effects are expected for mammalian seed dispersers, however insect and bird seed dispersal species are expected to experience losses due to malathion exposure. Given that this species can rely on a variety of seed dispersal vectors, we do not anticipate effects to its insect or bird seed dispersers to cause significant adverse effects to the reproductive capacity of this species.

We anticipate a high level of malathion usage (13.19%) within the non-Federal portion of the species range based on standard usage data as shown above. We did not quantitatively evaluate use or usage on Federal lands that overlap with the species range, but we assume only low levels of usage for this species, per the rationale related to usage on Federal lands as described in the Biological Opinion. Half of the known populations of this species occur on private lands, are unprotected, and their status and trends are unknown (2019 Lake Wales Ridge Plants Recovery Plan Amendment). The other half of the extant populations occur on lands owned by the State and are, therefore, covered by the "Preservation of Native Flora of Florida" law. (5-Year Review, 2008). This species is a highly vulnerable narrow endemic existing in an increasingly fragmented landscape, whose reproductive success is dependent upon the presence of insects for pollination. We anticipate adverse effects from loss of insect pollinators due to malathion exposure that would be expected to occur over the duration of the action. However, we do not anticipate that these adverse effects would result in species-level effects because of the conservation measures that will be implemented for this species. Therefore, we do not anticipate that the proposed action would appreciably reduce survival and recovery of short-leaved rosemary in the wild.

Scrub mint (species 2)

Scrub mint has a high vulnerability based on its status as an endangered species and limited number of occurrences (14), as shown above. The species is endemic to yellow sand scrub habitat of the Lake Wales Ridge in Highlands County, Florida, and is found at four localities including the: 1) Archbold Biological Station; 2) Sun 'n' Lakes Estates subdivision east of US highway 27 and southeast of the town of Lake Placid; 3) YMCA Camp Florida on the west side of Grassy Lake southeast of the town of Lake Placid; and 4) sand ridge along the northwest shore of Lake Placid. All four of these areas where the species occurs are native vegetation surrounded by agricultural and residential areas (NatureServe, 2015). Habitat destruction from development continues to occur and development pressure remains high in Highlands County. Additionally, the limited geographic range of this species in combination with the continuing loss of habitat has resulted in a highly fragmented landscape where the remaining scrub areas have become more and more isolated from each other, thereby decreasing the overall resiliency, redundancy, and representation of this species (2019 Lake Wales Ridge Plants Recovery Plan Amendment). Furthermore, it has been shown that rare plants in fragmented landscapes are likely to experience decreased pollinator services leading to reduced reproductive success and lower population viability (Lienert, T. 2004; Spira, t. 2001; Lennartson, T. 2002, Setsuko, S. et al 2013).

The risk to scrub mint posed by labeled uses across the range is also anticipated to be high based on the species' method of reproduction and seed dispersal, and estimated effects of malathion to pollinators and seed dispersers, as shown above. Scrub mint is not an obligate out-crosser; it is self-compatible and insect pollinated. However, the species requires insect visits for seed production (5-year Review, 2009). *Exprosopa fasciata*, a common and generalist bee-fly, is the dominant pollinator for this species, accounting for 95 percent of all visits. Additional pollinators may be important at other sites that support the scrub mint (5-year Review, 2009). Insects are expected to experience mortality (100%) within the range of this species from exposure to malathion from application on agricultural and non-agricultural use sites, spray drift from these sites, and from mosquito adulticide use. Ultimately, we anticipate adverse effects to the species would occur through the reduction of pollinating insects that would result in scrub mint's reduced reproductive success.

We also considered method of seed dispersal as a contributor to the risk ranking (Table 2). Fruit and seed dispersal is limited to a few meters from the parent plant and no specialized mechanism for animal mediated dispersal has been identified (Menges et al. 2001 in 5-Year Review, 2009). In fact, limited dispersal capability of scrub mint is noted as one of the primary threats to the species (5-Year Review, 2009). However, because dispersal of this species is limited to a few meters and can occur by abiotic means, we do not anticipate effects to biotic seed dispersers from malathion would cause significant adverse effects to the reproductive capacity of this species.

The high level of risk for this species is, therefore, mostly attributed to the anticipated reduction of pollinating insects necessary for successful reproduction. However, in addition to the conservation measures to be implemented as outlined above, label restrictions will also be implemented for this species. These measures direct agricultural applicators in the vicinity of suitable habitat for this species to choose one of three options when applying malathion: 1. Apply malathion before dawn or after dusk, thus avoiding the active period of this species' pollinators OR 2. Apply malathion only when wind is blowing away from suitable habitat for this species, thus reducing exposure to pollinators OR 3. Use a 50-foot ground buffer from suitable habitat or an aerial buffer according to application rate (see rates outlined at the end of this I&S Summary for Group 11). While the exact amount of spray drift reduction from these buffers will vary depending on the traits of the ecosystem as well as the application method, based on AgDRIFT modeling, we anticipate spray drift reductions ranging from 82 to 90%. Together, these measures are anticipated to significantly reduce the anticipated pollinator exposure and thus mortality to these taxa from malathion application within the range of this species, substantially reducing reproductive effects to scrub mint.

We anticipate a high level of malathion usage (13.19%) within the species range, as shown above. Five of 14 scrub mint occurrences are protected on private or state-owned conservation lands, while the remaining nine populations are located on unprotected private land and their present status is unknown. For the nine populations where status is unknown, these populations are either already destroyed or could be destroyed at any time because no State or Federal laws prohibit private property owners from destroying populations of listed plants on their property, nor are private property owners required to maintain habitat (5-year Review, 2009). While this species has a high vulnerability, including the pre-existing reduction in reproductive success, anticipated pollinator mortality, and high anticipated malathion usage in its range, we do not expect the level of pollinator mortality to result in species-level effects due to the conservation measures to be implemented for this species. Therefore, we do not anticipate that the proposed action would appreciably reduce survival and recovery of scrub mint in the wild.

Highlands scrub hypericum (species 3)

Highlands scrub hypericum has a high vulnerability based on its status as an endangered species and limited distribution, as described above. Highlands scrub hypericum is a small, short-lived perennial herb reaching 20-70 cm (0.7-2.3 ft) in height. With the exception of one site on the Winter Haven Ridge at Lizzie Lake (Archbold Biological Station pers. Comm. 1998 *in* USFWS Recovery Plan Amendment 2019), the species is restricted to scrub on the Lake Wales Ridge in Polk and Highlands counties, from just north of Sunray, Polk County (Service 1996 *in* USFWS Recovery Plan Amendment 2019) to the south end of the Lake Wales Ridge in Highlands County (Judd 1980 *in* USFWS Recovery Plan Amendment 2019). The 2015 Florida Natural Areas Inventory Element Tracking Summary reported 60 occurrences of this species, 28 of which were within managed areas. This was a 9% decline from the occurrences reported in the 2008 5-Year Status Review. Additionally, habitat destruction from development continues to occur and development pressure remains high in Highlands County. Additionally, the limited geographic range of this species in combination with the continuing loss of habitat has resulted in a highly fragmented landscape where the remaining scrub areas have become more and more isolated from each other, thereby decreasing the overall resiliency, redundancy, and representation of this species (2019 Lake Wales Ridge Plants Recovery Plan Amendment). Furthermore, it has been shown that rare plants in fragmented landscapes are likely to experience decreased pollinator services leading to reduced reproductive success and lower population viability (Lienert, T. 2004; Spira, t. 2001; Lennartson, T. 2002, Setsuko, S. et al 2013).The risk to the species posed by labeled uses across the range is anticipated to be high, as described above. Native solitary bees (*Dialictus* spp. And *Augochloropsis* spp.) appear to be the primary pollinators (M. Evans, Archbold Biological Station, personal communication 1995 *in* USFWS Recovery Plan 1999). Other visitors include *Geron* sp., *Copestilium nigrum*, and *Bombus* spp. The species is likely not capable of self-pollination, and studies suggest that pollinators play an important role for pollen transfer for this species (M. Evans, Archbold Biological Station, personal communication 1995 *in* USFWS Recovery Plan 1999). Insects, the pollination vector for this species as described above, are expected to experience mortality (100%) within the range of this species from exposure to malathion from application on agricultural and non-agricultural use sites, spray drift from these sites, and from mosquito adulticide use. We anticipate adverse effects to the species due to the reduction in pollinating insects that would result in reduced reproductive success. However, in addition to the conservation measures to be implemented as described above, label restrictions specific to this species will also be implemented. These measures direct agricultural applicators in the vicinity of suitable habitat for this species to choose one of three options when applying malathion: 1. Apply malathion before dawn or after dusk, thus avoiding the active period of this species' pollinators OR 2. Apply malathion only when wind is blowing away from suitable habitat for this species, thus reducing exposure to pollinators OR 3. Use a 50-foot ground buffer from suitable habitat or an aerial buffer according to application rate (see rates outlined at the end of this I&S Summary for Group 11). While the exact amount of spray drift reduction from these buffers will vary depending on the traits of the ecosystem as well as the application method, based on AgDRIFT modeling, we anticipate spray drift reductions ranging from 82 to 90%. Together, these measures are anticipated to significantly reduce the anticipated pollinator exposure and thus mortality of these taxa from malathion application within the range of this species, substantially reducing reproductive effects to this species.

Highlands scrub hypericum relies on a variety of seed dispersers to maintain populations and colonize new sites in its range. It can disperse seeds using biotic vectors such as birds, insects, and mammals in addition to abiotic vectors such as wind and water. No mortality or sublethal effects are expected for mammalian seed dispersers, however insect and bird seed dispersal species are expected to experience losses due to malathion exposure. Given that this species can rely on a variety of seed dispersal vectors, we do not anticipate effects to its insect or bird seed dispersers to cause significant adverse effects to the reproductive capacity of this species.

We anticipate a high level of malathion usage (13.19%) within the non-Federal portion of the species range based on standard usage data as shown above. We did not quantitatively evaluate use or usage on Federal lands that overlap with the species range, but we assume only low levels of usage for this species, per the rationale related to usage on Federal lands as described in the Biological Opinion. Highlands scrub hypericum is protected in less than half of the areas in which it occurs, and remaining unprotected populations are in imminent danger of decline and extirpation. Unprotected habitat continues to be developed for agriculture, housing, and other uses.

(USFWS 5-year Review, 2009). This species is a highly vulnerable narrow endemic whose reproductive success is dependent upon the presence of insects for pollination. We anticipate adverse effects from loss of insect pollinators (100%) from exposure to malathion that would be expected to occur over the duration of the action. However, we expect that these adverse effects will not result in species-level effects because of theconservation measures to be implemented for this species. Therefore, we do not anticipate that the proposed action would appreciably reduce survival and recovery of highlands scrub hypericum in the wild.

Howell's spectacular thelypody (species 4)

Howell's spectacular thelypody has a high vulnerability based on its limited distribution and low number of populations, as shown above. The species is a herbaceous biennial endemic to mesic, alkaline habitats in the Baker-Powder River Valley region of northeast Oregon. The current range is restricted to about 175 sq. km. and includes 15 occurrences loosely comprising six populations (USFWS 5-Year Review 2010). At listing, the species was threatened by a variety of factors including habitat destruction and fragmentation from agricultural and urban development, seasonal grazing by domestic livestock, competition from non-native vegetation, and alterations of wetland hydrology (USFWS Recovery Plan 2002). However, the most recent 5-year Status Review in 2018 indicates there has been very little permanent habitat loss resulting from development or land use conversions. Chronic habitat degradation does continue, primarily as a result of livestock grazing during the plant's growing season.

The risk to the species posed by labeled uses across the range is anticipated to be high, as described above. This species reproduces entirely by seed, which is dispersed by the splitting open of the pods to discharge the seeds. Although this taxon is self-compatible, successful reproduction occurs primarily by outcrossing facilitated by insect vectors such as bumblebees (*Bombus* spp.) (Gisler and Meinke 2000 *in* USFWS Recovery Plan 2002). Insects, the pollination vector for this species as described above, are expected to experience mortality (100%) within the range of this species from exposure to malathion from application on agricultural and non-agricultural use sites, spray drift from these sites, and from mosquito adulticide use. We anticipate adverse effects to the species due to the reduction in pollinating insects that would result in reduced reproductive success. However, conservation measures will be implemented that are anticipated to reduce the risk of exposure to pollinators and resultant reproductive effects to this species, as outlined above. For example, Howell's spectacular thelypody occurs in or near pasture in Oregon. New restrictions on the pasture UDL will prohibit application of malathion within three days prior to bloom of alfalfa (the primary constituent of the pasture UDL), during bloom, and until petal fall is complete, thus reducing mortality of pollinators attracted to the alfalfa flowers. In addition, a reduction to two applications per year will be implemented for pasture.
Howell's spectacular thelypody relies on a variety of seed dispersers to maintain populations and colonize new sites in its range. It can disperse seeds using biotic vectors such as birds, insects, and mammals in addition to abiotic vectors such as wind and water. No mortality or sublethal effects are expected for mammalian seed dispersers, however insect and bird seed dispersal species are expected to experience losses due to malathion exposure. Given that this species can rely on a variety of seed dispersal vectors, we do not anticipate effects to its insect or bird seed dispersers to cause significant adverse effects to the reproductive capacity of this species.

We anticipate a high level of malathion usage (15.47%) within the non-Federal portion of the species range based on standard usage data as shown above. We did not quantitatively evaluate use or usage on Federal lands that overlap with the species range, but we assume only low levels of usage for this species, per the rationale related to usage on Federal lands as described in the Biological Opinion. However, three of the known populations have some type of formalized habitat protection in place, including fencing and prohibition of most land use activities. Two of these populations (Hanes Rodeo grounds and Miles Ranch) support the largest known occurrences of individuals and likely comprise the majority of individuals of this species (2010 5-year Status Review). We anticipate low levels of malathion use within these protected areas (one is a conservation easement and another is a designated mitigation site managed for this species), thus decreasing the exposure of individual plants and their pollinators to the effects described above. In addition, conservation measures that will be implemented will further reduce the exposure of pollinators where malathion is applied. Thus, we do not anticipate species level effects to Howell's spectacular thelypody and do not anticipate that the proposed action would appreciably reduce survival and recovery of this species in the wild.

Monterey spineflower (species 5)

Monterey spineflower has a medium vulnerability based on its status as an endangered species and limited distribution, as described above. The species occurs from the Monterey Peninsula (Monterey County) northward along the coast to southern Santa Cruz County, and inland to the Salinas Valley (Reveal and Hardham 1989, Ertter 1990 *in* USFWS Recovery Plan). Of the 51 known occurrences, 21 (41 percent) occur on land that is owned and managed by an entity with conservation objectives (e.g. California State Parks, Elkhorn Slough Foundation, The Nature Conservancy, federal lands (5.52%), and others). The remaining 30 occurrences (59 percent) occur on mostly private land. (USFWS 5-year Review, 2020)

The risk to the species posed by labeled uses across the range is anticipated to be high, as described above. No studies of the breeding system of the species have been conducted; however, a pollination ecology study was conducted on the closely related robust spineflower (Chorizanthe robusta var. robusta). It found that, although the robust spineflower may self-pollinate, pollinator access to flowers significantly increased seed set. A high diversity of potential pollinators, including sweat bees (*Halictidae*), bumblebees (*Bombus sp*), wasps (*Sphecidae*), honeybees (*Apis mellifera*), and soft-winged flower beetles (*Dasytidae*) were found to transport pollen of this taxon. These results suggest that protecting pollinator habitat and diversity is important to the recovery of the Chorizanthe taxa. (USFWS, 5-year Review, 2009). Insects, the pollination vector for this species as described above, are expected to experience mortality (100%) within the non-Federal portion of the range of this species from exposure to malathion from application on agricultural and non-agricultural use sites, spray drift from these sites, and from mosquito adulticide use. We anticipate adverse effects to the species due to the reduction in pollinating insects that would result in reduced reproductive success. Monterey spineflower relies on birds and mammals as seed dispersers to maintain populations and colonize new sites in its range. No mortality or sublethal effects are expected for mammalian seed dispersers, however we expect adverse effects to birds due to malathion exposure. Given that this species relies on biotic seed dispersal vectors, we anticipate a decline in avian seed dispersers will cause adverse effects to the reproductive capacity of this species. However, conservation

measures will be implemented that are anticipated to reduce the risk of exposure to pollinators and resultant reproductive effects to this species, as outlined above. For example, the Monterey spineflower exists in the vicinity of crops belonging to the vegetable and groundfruit and orchards and vineyards use types. New restrictions on crops in these use types will 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.

We anticipate a medium level of malathion usage (7.040%) within the non-Federal portion of the species range based on CalPUR data as shown above. In addition, we anticipate very low levels of malathion usage within the protected portions of this species range, that harbor approximately 41% of the species' occurrances. Furthermore, this species may be able to depend on a variety of insect species for pollination, decreasing its dependence on a specific species and allowing successful reproduction even if some pollinator species see temporary declines due to malathion exposure. The conservation measures to be implemented that will reduce the risk to pollinators and resultant reproductive effects to the species even further. As a result, we do not anticipate adverse effects from malathion exposure to rise to the level of species-level effects. Therefore, we do not anticipate that the proposed action would appreciably reduce the survival and recovery of Monterey spineflower in the wild.

Texas prairie dawn-flower (species 6)

Texas prairie dawn-flower has a medium vulnerability based on its status as an endangered species and distribution among 40 to 50 populations across five counties in Texas, as shown above. The species has been identified in five counties, with increased species presence in those five counties. All but three known populations occur on privately owned land; therefore, few regulatory protections currently exist for this species. However, conservation protection mechanisms cover 12 of the 13 confirmed sites of over 1,000 ac (404.7 ha) that support the species. (5-year Review, 2015)

The risk to the species posed by labeled uses across the range is anticipated to be high, as described above. Little is known about how the plant is pollinated. Researchers believe there may be some correlation between the carpenter ant *Camponotus* spp. and the continued existence of the species. The ant tends to be found within close proximity to many of the populations. While this remains a strong hypothesis, there is no data to support that the ants are pollinators of the species. (5-year Review, 2015) Insects, the pollination vector identified for this species as described above, are expected to experience mortality (100%) within the non-Federal portion of the range of this species from exposure to malathion from application on agricultural and non-agricultural use sites, spray drift from these sites, and from mosquito adulticide use. We anticipate adverse effects to the species due to the reduction in pollinating insects that would result in reduced reproductive success. However, conservation measures that will be implemented are anticipated to reduce the risk of exposure to pollinators and resultant reproductive effects to this species, as described above. For example, residential uses of malathion are now limited to two applications per year (reduced from as many as necessary) and to spot treatments only, reducing the application footprint and likelihood of spray drift within developed and open space developed areas. The reduced application footprint and likelihood of spray drift are a result of the allowable application methods for spot treatment (such as the use of hand-pump sprayers, which are not capable of producing broadcast use) and low amounts of chemical used.

The species relies on a variety of seed dispersers to maintain populations and colonize new sites in its range. It can disperse seeds using biotic vectors such as birds, insects, and mammals in addition to abiotic vectors such as wind and water. No mortality or sublethal effects are expected for mammalian seed dispersers, however insect and bird seed dispersal species are expected to experience losses due to malathion exposure. Given that this species can rely on a variety of seed dispersal vectors, we do not anticipate effects to its insect or bird seed dispersers to cause significant adverse effects to the reproductive capacity of this species.

We anticipate a medium level of malathion usage (5.68%) within the non-Federal portion of the species range based on standard data as shown above. This level of usage is within one percentage point of the threshold for an indicator of a low level of usage. We did not quantitatively evaluate use or usage on Federal lands that overlap with the species range, but we assume only low levels of usage for this species, per the rationale related to usage on Federal lands as described in the Biological Opinion. This species has to its benefit many populations that are increasing across its range covering five counties in Texas. Slightly over nine percent of its range overlaps with Federal lands, where we assume low levels of malathion usage. Nearly half of occurrences are currently protected. We anticipate adverse effects in the form of loss of insect pollinators and declines in avian seed dispersers from exposure to malathion that would be expected to occur over the duration of the action. However, because of the number of populations and their ability to increase given current levels of malathion usage, the proportion of area that is currently protected, and the conservation measures that will be implemented , we do not expect that these adverse effects will rise to the level of species-level effects. Therefore, we do not anticipate that the proposed action would appreciably reduce survival and recovery of Texas prairie dawn-flower in the wild.

La Graciosa thistle (species 7)

La Graciosa thistle has a high vulnerability based on its status as an endangered species and limited distribution, as described above. The species is limited to San Luis Obispo and Santa Barbara counties, California. Most of the known occurrences are associated with mesic sites in two dune complexes (the Santa Maria Valley Dune Complex and the Santa Ynez Valley Dune Complex) and along the drainages and tributaries of four major watersheds in this area. (USFWS, 2011; NatureServe, 2015). Of the 21 known occurrences, 16 are likely extirpated, four are currently extant, and one has unknown status. The four extant occurrences are on lands of various ownership: one occurrence on private property of Chevron Corporation (currently protected by a biological opinion), one occurrence on private properties of Chevron Corporation and another landowner (with current

protection on one by a biological opinion), one occurrence on private property with a conservation easement to the Land Conservancy of San Luis Obispo County, and one occurrence on Guadalupe-Nipomo Dunes National Wildlife Refuge. (SSA, 2018)

The risk to the species posed by labeled uses across the range is anticipated to be medium, as described above. Anticipated pollinators of this species include ants, beetles, bees, butterflies and flies (Keil 2001, p.1; Lea 2002, p. 80 *in* SSA, 2018). Insects, the pollination vector for this species as described above, are expected to experience mortality (100%) within the non-Federal portion of the range of this species from exposure to malathion from application on agricultural and non-agricultural use sites, spray drift from these sites, and from mosquito adulticide use. We anticipate adverse effects to the species due to the reduction in pollinating insects that would result in reduced reproductive success. However, conservation measures will be implemented that are anticipated to reduce the risk of exposure to pollinators and resultant reproductive effects to this species, as outlined above. For example, La Graciosa thistle exists in the vicinity of crops belonging to the vegetable and groundfruit and orchards and vineyards use types. New restrictions on crops in these use types will 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.

The species relies on abiotic vectors such as wind and water for seed dispersal to maintain populations and colonize new sites within its range. No mortality or sublethal effects are expected for mammalian seed dispersers, however we expect adverse effects to birds due to malathion exposure. Given that this species relies on abiotic seed dispersal vectors, we do not anticipate adverse effects to seed dispersal affecting the reproductive capacity of this species.

We anticipate a medium level of malathion usage (6.956%) within the non-Federal portion of the species range based on CalPUR data as shown above. We did not quantitatively evaluate use or usage on Federal lands that overlap with the species range, but we assume only low levels of usage for this species, per the rationale related to usage on Federal lands as described in the Biological Opinion. The range of the species overlaps 42.66% with Federal lands. We anticipate adverse effects from loss of insect pollinators from exposure to malathion that would be expected to occur over the duration of the action. However, a large proportion of the species range overlaps with Federal lands, the remaining populations have some protections, and conservation measures that will be implemented . Thus, we anticipate the adverse effects will not result in species-level effects. Therefore, we do not anticipate that the proposed action would appreciably reduce survival and recovery of La Graciosa thistle in the wild.

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