Integration and Synthesis Summary for Plants, CONUS
Assessment Group 9: Dicots reliant on outcrossing by biotic pollination vectors

The tables below contain summaries of the information and data we used to determine the ranking (high, medium, low) for vulnerability, risk and usage indicators. Information in most of the columns was used directly in the ranking determination (green fill). Where indicated, information in other columns was not used directly in the ranking calculation, but provided additional information about the species that fed into one of the ranking metrics or was used to make the draft determination when relevant. The summary for this assessment group also includes new conservation 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 group 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. All plants in this group need to achieve outcrossing (pollen transfer between individuals) in order to reproduce successfully and maintain their populations over time. They utilize biotic vectors to accomplish outcrossing and pollination, such as insects, birds or mammals. 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
Abronia macrocarpa	Large-fruited sand-verbena	28	Endangered	Not Available	Stable (inferred from USFWS, 2010)	9 (USFWS, 2010)	Known from Leon, Robertson, and Freestone counties in eastern Texas (USFWS, 2010).	Approximately 90,000 individuals (USFWS, 2010)	No Mention	No Mention	High
Acanthomintha obovata ssp. duttonii	San Mateo thornmint	29	Endangered	Not Available	Declining (USFWS, 2010)	1 (USFWS, 2010)	In 1987, a second smaller population of less than 20 plants was found in an area called the “Triangle”, southwest of the intersection of Edgewood Road and the I-280 overpass and west of Redwood City. However, the species has not been seen at the Triangle since 2001 (USFWS, 2010).	250 (USFWS, 2010)	No Mention	No Mention	High
Acmispon dendroideus var. traskiae (=Lotus d. ssp. traskiae)	San Clemente Island lotus (=broom)	146	Threatened	Not Available	Increasing (USFWS, 2012)	29 (USFWS, 2012)	Since the 1970s, the distribution of *Lotus dendroideus var. traskiae* has been documented, and its range includes north-facing slopes over most of the eastern and western sides of the island (U. S. Fish and Wildlife Service 1984; U. S. Department of the Navy, Southwest Division 2002; Junak and Wilken 1998; Junak 2006) (USFWS, 2007).	Up to 7,900 (USFWS, 2007)	No Mention	No Mention	Medium
Aeschynomene virginica	Sensitive joint-vetch	30	Threatened	Decline of 50-70%	Decline of 10-30%	Approximately 20	Current range includes New Jersey, Maryland, Virginia, North Carolina. Delaware and Pennsylvania occurrences	Approximately 7000 individuals	No Mention	No Mention	High

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

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				(NatureServe, 2015)	(NatureServe, 2015)	(NatureServe, 2015)	have not been observed since the 1800s (USFWS, 2013).	(NatureServe, 2015)			
Agalinis acuta	Sandplain gerardia	20	Endangered	Not Available	Increase of > 10% (NatureServe, 2015)	22 - 23 (NatureServe, 2015)	Connecticut, Rhode Island, Massachusetts, Maryland, and New York (NatureServe, 2015).	100,000 - 1,000,000 individuals (NatureServe, 2015)	No Mention	No Mention	Low
Amorpha crenulata	Crenulate lead-plant	31	Endangered	Not Available	Not Available	1 - 5 (NatureServe, 2015)	The crenulate lead-plant was known from a 20-square-mile area from Coral Gables to Kendall, Miami-Dade County (DERM 1993). Its historic range was only slightly greater, extending south to Cutler (based on an entry of *Amorpha caroliniana* on an unpublished plant list by John Kunkol Small of Addison Hammock), and north to the Little River in northeast Miami-Dade County. This range encompasses an area 5 miles east to west and 12 miles north to south. The crenulate lead-plant is currently known from six sites, four of which contain natural populations and two contain re-introduced populations (Roncal et al. 2006). The two largest natural populations showed a slight increase in numbers of individuals in 2012, of which one site had particularly high seedling recruitment (Maschinski et al. 2012). However, within the last 10 years, four additional natural populations were lost to urban development, leaving the total population size at less than 2,000 individuals (Roncal et al. 2006).	1 - 1000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Amsinckia grandiflora	Large-flowered fiddleneck	32	Endangered	Decline of 70-90% (NatureServe, 2015)	Stable (NatureServe, 2015)	2 (USFWS, 2009)	Currently, *A. grandiflora* is only found in two reintroduced locations, one at Site 300 in southwestern San Joaquin County and the second at Lougher Ridge in Contra Costa County (USFWS, 2009).	~236 (USFWS, 2009)	No Mention	No Mention	High
Amsonia kearneyana	Kearney's blue-star	33	Endangered	Unknown (NatureServe, 2015)	Decline of 10-30% (NatureServe, 2015)	1 - 5 (NatureServe, 2015)	Known from the Baboquivan Mountains in Pima County, Arizona (USFWS, 1993).	1 - 1000 individuals (NatureServe, 2015)	No Mention	No Mention	High

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Apios priceana	Price's potato-bean	21	Threatened	Not Available	Stable (USFWS, 2016)	59 (USFWS, 2016)	Mississippi (Clay, Oktibbeha and Lee counties); Alabama (Madison, Autsuga and Marshall counties); Kentucky (Lyon, Livingston and Trigg counties); Tennessee (Marion, Montgomery and Williamson counties) (NatureServe, 2015). The species is considered extirpated from the State of Illinois (Ebinger et al. 2010) (USFWS, 2016).	Not Available	No Mention	No Mention	Low
Arabis georgiana	Georgia rockcress	34	Threatened	Unknown (NatureServe, 2015)	10 - 30% decline (NatureServe, 2015)	18 (USFWS, 2013)	Despite fairly extensive searches, this species is currently known from fewer than 25 populations in Alabama and western Georgia. (NatureServe, 2015)	~ 5,000 plants (USFWS, 2013)	No Mention	No Mention	High
Arabis serotina	Shale barren rock cress	147	Endangered	Decline of 50-70% (NatureServe, 2015)	Decline of 30-50% (NatureServe, 2015)	56 (NatureServe, 2015)	Ten counties in Virginia and West Virginia (USFWS, 1991).	Most recent survey: 3854 individuals (NatureServe, 2015)	Insects and insect-control measures (USFWS, 1991)	No Mention	Medium
Arctostaphylos confertiflora	Santa Rosa Island manzanita	35	Endangered	Unknown (USFWS, 2014)		3 (USFWS, 2014)	Known from three areas on Santa Rosa Island; the north-east side of Black Mountain (less than 300 plants) combined with the Torrey Pine vicinity (less than 100 plants), the canyons on the south-east side of the island (less than 1,000 plants), and in the vicinity of South Point (approximately 200 plants) (USFWS, 2000).	6,500 - 8,500 (USFWS, 2014)	No Mention	No Mention	High
Arctostaphylos glandulosa ssp. crassifolia	Del Mar manzanita	148	Endangered	Not Available		50 (USFWS, 2010)	Endemic to San Diego County, California and northwestern Baja California, Mexico (USFWS, 2010).		No Mention	No Mention	Medium
Arctostaphylos hookeri var. ravenii	Presidio Manzanita	36	Endangered	Not Available		1 (USFWS, 2012)	Single specimen persists at the Presidio, California (NatureServe, 2015).	1 (USFWS, 2012)	No Mention	Loss of pollinators (USFWS, 2012)	High
Arctostaphylos morroensis	Morro manzanita	37	Threatened	Not Available	Stable (inferred from USFWS, 2013)	18 (NatureServe, 2015); Unknown (USFWS, 2013)	*Arctostaphylos morroensis* ranges from the northeast side of Morro Bay to the southern end of Montaña de Oro State Park, a distance of less than 10 miles (16.1 kilometers) (USFWS, 2013).	Currently unknown; previously 86,500 - 153,000 (USFWS, 2013)	No Mention	No Mention	High

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Arctostaphylos myrtifolia	Ione manzanita	38	Threatened	Unknown	Declining	17	Ione manzanita occurs in about 100 individual stands, which cover a total of about 1,000 acres (4 square kilometers). It is narrowly endemic to a habitat found only in the central Sierra Nevada foothills of California. At the time of listing, Ione manzanita was known from 17 occurrences covering approximately 1,000 acres (4 square kilometers); currently, the Calflora Occurrence Database (Calflora 2014) contains 94 records for Ione manzanita from Amador and Calaveras Counties, and the CNDDB (2014) recognizes 15 occurrences for this species. Most of the occurrences are on private lands. One occurrence on U.S. Bureau of Land Management (BLM) land is within the Ione Manzanita Area of Critical Environmental Concern. Two additional occurrences are partially on BLM lands. Four small, pure (containing only Ione manzanita) populations and several smaller, mixed populations also occur on the State-owned Apricum Hill Ecological Reserve managed, by the California Department of Fish and Wildlife (USFWS 2010; CNDDB 2014; NatureServe 2014).	unknown, but likely greater than 100 individuals	No Mention	No Mention	High
Arctostaphylos pallida	Pallid manzanita	39	Threatened	some declining and some with unknown status	unknown	6 to 10	There are 13 documented occurrences where pallid Manzanita currently exists. All extant, naturally occurring populations are in two geographic regions: Huckleberry Ridge in Alameda County, and Sobrante Ridge in Contra Costa County. There are likely dormant seed banks of pallid manzanita in the range of the species, as indicated by the presence of germinated seeds at several sites in Joaquin Miller Park following soil disturbance and/or burning (USFWS 2014). The largest concentration of pallid manzanita occurs on Huckleberry Ridge, with many stands distributed across connected and adjacent ridge tops. The	unknown	Herbicide Use	No Mention	High

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							largest stands by number and size occur along the boundary between East Bay Regional Park District's (EBRPD) Huckleberry Botanic Regional Preserve, and private properties to the west, primarily on northeast-facing slopes and extending southwest over the top of the ridge into the urban development of Skyline Boulevard. The second-largest concentration of pallid manzanita occurs at Sobrante Ridge in EBRPD's Sobrante Ridge Ecological Preserve. A 2004 survey indicated the population existed within 1.33 acres at Sobrante Ridge. There also exists a small, naturalized population at Tilden Park that is divided into two stands. One is scattered along the roadside of Wildcat Canyon Road, and the other is along the Selby Trail north of Shasta Road (CNPS 2014, USFWS 2014).				
Arenaria ursina	Bear Valley sandwort	149	Threatened	Not Available	10 - 50% decline (NatureServe, 2015)	10 (NatureServe, 2015)	All currently known occurrences of *A. ursina* are within the same general geographical area as that known at the time of listing, and its current spatial distribution has not changed. Currently, *Arenaria ursina* is still known to occur in 10 pebble plain complexes, which include Arrastre/Union Flat, Big Bear Lake, Broom Flat, Fawnskin, Gold Mountain, Holcomb Valley, North Baldwin Lake, Sawmill, South Baldwin Ridge/Erwin Lake, and Sugarloaf Ridge (USFWS, 2015). Restricted to "Pebble Plains" and dry slopes in pinyon and juniper woodlands in the northeastern San Bernardino Mountains of San Bernardino County, California (NatureServe, 2015).	2500 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Argemone pleiacantha ssp. pinnatisecta	Sacramento prickly poppy	40	Endangered	Long-term trends suggest a decline of 30 to 50%		9 (NatureServe, 2015)	Endemic to 10 canyons on the western slope of the Sacramento Mountains in Otero County, central-southern New Mexico. (USFWS, 1994)	~1,000 (NatureServe, 2015)	Herbicide spraying (USFWS, 2013) and Mowing	No Mention	High

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				(NatureServe, 2015)					and herbicide application along roadways (USFWS, 2013)		
Argythamnia blodgettii	Blodgett's silverbush	41	Threatened			20 extant occurrences (USFWS, 2016)	U.S., Florida, Miami-Dade County. *Argythamnia blodgettii* is currently known from central Miami-Dade County from Coral Gables and southern MiamiDade County to Long Pine Key in Everglades National Park, and the Florida Keys from nine islands, from Windley Key (Bradley and Gann 1999, p. 3) southwest to Boca Chica Key (Hodges and Bradley 2006, pp. 10, 43) (USFWS, 2015).		Pesticide effects on pollinators (USFWS, 2016)	Pesticide effects on pollinators (USFWS, 2016)	High
Asimina tetramera	Four-petal pawpaw	150	Endangered			21	Historically, four-petal pawpaw occurred in sand pine scrub habitat on the coastal dune system in Martin and northern Palm Beach Counties in southeastern Florida (Kral 1960). Although the species occurs in disjunct locations within its historic range, most of the suitable habitat has been destroyed or converted for residential housing and commercial activities (Service 1999). Trends in spatial distribution show increasing fragmentation of four-petal pawpaw habitat as the coastal ridge has become developed and fire has been suppressed. Plants remain on sites in Martin and northern Palm Beach Counties along a 30-mile stretch of coastal sand pine scrub, but are highly fragmented on the landscape (Peterson et al. 2007). Loring et al. (2003) reported plants occur in three disjunct locations, northern Martin County near Jenson Beach, southern Martin County in Jonathan Dickson State Park, and northern Palm Beach County north of PGA Boulevard. A 13-mile gap separates the sites on the northern and southern ends of the range (Peterson et al. 2007). The remaining 21 sites are not equally	~ 1,800	No Mention	No Mention	Medium

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							distributed between the 2 counties; 9 occur in Martin County and 12 in Palm Beach County (Peterson 2008). Of the six historical sites presumed extirpated, three were in Martin County and three were in Palm Beach County (Peterson 2008).				
Astragalus albens	Cushenbury milk-vetch	42	Endangered	Declining (NatureServe, 2015)		16 (NatureServe, 2015); 33 (USFWS, 2009)	Restricted to a carbonate belt in the northeastern San Bernardino Mountains (east slope of the Transverse Range) extending from Dry Canyon southeastward to the head of Lone Valley (approximately 24 km) in and adjacent to San Bernardino National Forest; San Bernardino County, California. Using GIS tools, range extent was calculated to be approximately 82 square km (NatureServe, 2015). Cushenbury milk-vetch occurs from Furnace Canyon southeast to the head of Lone Valley (USFWS 1994, p. 43654) (USFWS, 2009).	7000 - 7500 (NatureServe, 2015)	No Mention	No Mention	High
Astragalus ampullarioides	Shivwits milk-vetch	43	Endangered	Unknown (USFWS, 2007)		6 (USFWS, 2007)	All known locations of *A. ampullarioides* occur within Washington County, Utah. Known populations of *A. holmgreniorum* occur within approximately 10 miles (mi) (16 kilometers (km)) of St. George in Washington County, Utah, and Mohave County, Arizona. (USFWS, 2006)	< 1000 (NatureServe, 2015)	No Mention	No Mention	High
Astragalus bibullatus	Guthrie's (=Pyne's) ground-plum	44	Endangered	Decline of 10-90% (NatureServe, 2015)	Stable (USFWS, 2011a)	3 (NatureServe, 2015)	Extant occurrences are located in the Stones River watershed in the vicinity of Murfreesboro, Rutherford County, Tennessee (USFWS, 2011a).	1000 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	High
Astragalus holmgreniorum	Holmgren milk-vetch	45	Endangered			6 populations within 3 major areas of concentration	Washington County, Utah (4 populations); and Mohave County, Arizona (1 population). These Astragalus populations are distributed across a limited range. Known populations of *A. holmgreniorum* occur within approximately 10 miles (mi) (16 kilometers (km)) of St. George in Washington County, Utah, and Mohave County, Arizona. The largest concentration of this species spans the Utah-Arizona		Herbicide use	Impacts on pollinators	High

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							border, extending from the Atkinville Wash area eastward across Interstate 15 (I-15) to the Arizona Strip Highway; this concentration comprises three populations--State Line, Gardner Well, and Central Valley. Two populations, South Hills and Stucki Spring, are found south of the City of Santa Clara. An isolated population called Purgatory Flat is associated with a limestone outcrop found east of St. George. About half of the areas occupied by *A. holmgreniorum* are on lands owned and managed by the State of Utah (Van Buren and Harper 2003a).				
Astragalus humillimus	Mancos milk-vetch	46	Endangered	Long-term trends are unknown, whereas short-term trends indicate a decline of >10% (NatureServe, 2015)		12 (USFWS, 2011)	The known geographic distribution of Mancos milkvetch extends from Mancos Canyon, Colorado, in the north, continuing southward for about 25 miles to just south of the San Juan River in San Juan County, New Mexico. The distribution closely follows a narrow band of Mesozoic sandstone (USFWS, 1989).	250 - 1000 individuals (NatureServe, 2015)	Pesticide use (USFWS, 2011)	No Mention	High
Astragalus jaegerianus	Lane Mountain milk-vetch	47	Endangered	Decline of <30% to increase of 25% (NatureServe, 2015)	Declining (USFWS, 2008)	4 (USFWS, 2008)	Known populations are arrayed more or less linearly along a 32 km long axis that trends in a northeasterly-to-southwesterly direction (USFWS 2004) (NatureServe, 2015). It is restricted in its range to a portion of the west Mojave Desert north of Barstow, in San Bernardino County, CA (USFWS, 2004).	~5,723 (USFWS, 2008)	No Mention	No Mention	High
Astragalus lentiginosus var. coachellae	Coachella Valley milk-vetch	151	Endangered	Unknown (USFWS, 2009)		~34 (NatureServe, 2015)	The spatial distribution of *Astragalus lentiginosus var. coachellae* has remained the same since the taxon was listed as endangered in 1998, and at that time the distribution was effectively the same as the known historical distribution of the taxon (USFWS, 2009). Occurs in the Coachella Valley from Cabazon to Salton Sea,	Unknown (USFWS, 2009)	No Mention	No Mention	Medium

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							Riverside County, California. Also known from one disjunct occurrence 50 miles east in the Chuckwalla Valley (USFWS 2005) (NatureServe, 2015).				
Astragalus lentiginosus var. piscinensis	Fish Slough milk-vetch	48	Threatened	Short-term trends suggest a relatively stable population (NatureServe, 2015)		8 (NatureServe, 2015)	Restricted to a 10-mile stretch of alkaline flats paralleling Fish Slough, Mono County, California. (NatureServe, 2015)	3,100 individuals (NatureServe, 2015)	No Mention	Lack of recruitment (USFWS, 2009)	High
Astragalus magdalenae var. peirsonii	Peirson's milk-vetch	49	Threatened	Unknown (NatureServe, 2015)		1 - 20 (NatureServe, 2015)	In the United States, restricted to specific habitats within about 21,500 ha, in a band running 64 km along the western portion of the Algodones Dunes (= Imperial Sand Dunes) of eastern Imperial County, California. Has also been documented from the Gran Desierto of Sonora, Mexico, from an area south and southeast of the Sierra Pinacate lava field. Other reports (from Arizona and Baja California) were based on misidentified specimens (USFWS 2008) (NatureServe, 2015). Currently, the only known population of *A. m. var. peirsonii* remaining in the United States is located in the Algodones Dunes of Imperial County, California (USFWS, 2003).	< 100,000 to > 1.5 million, depending on climatic conditions (NatureServe, 2015)	No Mention	No Mention	High
Astragalus montii	Heliotrope milk-vetch	50	Threatened	Not well known (USFWS, 1995)	Not well known (USFWS, 1995)	3 (NatureServe, 2015)	Occurs on the southern Wasatch Plateau on Ferron, Heliotrope and White mountains in Sanpete and Sevier counties (Franklin, 2005). (NatureServe, 2015)	~2,000,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Astragalus osterhoutii	Osterhout milkvetch	51	Endangered	Unknown (NatureServe, 2015)		5 (NatureServe, 2015)	Estimated range is 120 square kilometers. The Osterhout milkvetch occurs in scattered colonies over a 15-mile range, from 3 miles east of Troublesome Creek to a few miles west of Muddy Creek. Ninety percent of the population occurs along Muddy Creek (USFWS, 1992).	2,500 - 50,000 (NatureServe, 2015)	No Mention	No Mention	High

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Astragalus pycnostachyus var. lanosissimus	Ventura Marsh Milk-vetch	52	Endangered	Decline of 50-90% (NatureServe, 2015); believed extinct until 1997 (USFWS, 2010)	Declining (USFWS, 2010)	1 naturally occurring (USFWS, 2004); 4 introduced (NatureServe, 2015)	Currently known from one naturally-occurring site in Ventura County (U.S. Fish and Wildlife Service 2001). There are also four introduction sites, two in Ventura County and two in Santa Barbara County (which is outside the historic range of this taxon) (M. Meyer pers. comm. 2010) (NatureServe, 2015).	Natural site: 31 (USFWS, 2010); introduced sites: 801 (NatureServe, 2015)	No Mention	No Mention	High
Astragalus robbinsii var. jesupi	Jesup's milk-vetch	53	Endangered	Stable (inferred from USFWS, 2008)	Stable (USFWS, 2008)	3 (USFWS, 2008)	Known from three extant sites on the banks of the Connecticut River in New Hampshire and Vermont. Total range is restricted to approximately 16 miles along the river (USFWS, 1989).	Approx 590 plants (median 680 plants) (USFWS, 2008)	No Mention	No Mention	High
Astrophytum asterias	Star cactus	14	Endangered	Not Available		Individuals in Texas likely comprise one population (2019 Recovery Plan Amendment)	Star cactus sites are located in the U.S. and Mexico, occurring within at least three different geologic formations and/or soils. Since the publication of the Recovery Plan, research examining five subpopulations of star cactus in Texas found that four of the five were genetically diverse (high level of heterozygosity within the subpopulations), but not genetically distinct (low level of genetic differentiation between the subpopulations) (Terry et al. 2012, p. 182; South Texas Plant Recovery Team 2018, unpaginated). The low levels of genetic differentiation among the subpopulations sampled (Terry et al. 2012, p. 187) indicates that star cacti occurring in the border region of Texas are likely a single population. This is not surprising, given that almost all of the known star cactus locations in the U.S. are located within only about a 125-km^2 area (2019 Recovery Plan Amendment).	U.S.: 5,125; Mexico: 1,275 (USFWS, 2013)	No Mention	Yes (2019 Recovery Plan Amendment)	Medium
Ayenia limitaris	Texas ayenia	1	Endangered	7 populations extirpated (USFWS, 2014)		U.S.: 5 (USFWS, 2010); Mexico: 10 (USFWS, 2014)	Five extant populations in Cameron, Hidalgo, and Willacy counties, Texas, have been monitored since 2009. Thirteen sites were documented and mapped in 2005 in the municipio of Soto la Marina, Tamaulipas and an additional population	U.S.: 1,400 - 1,800; Mexico: 4,000+ (USFWS, 2010)	Pesticide drift and runoff (USFWS, 2016)	Loss of pollinators (USFWS, 2016)	High

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							has been reported from the municipio of González, Tamaulipas. Three pilot reintroductions were successfully established at LRGV NWR in 1999 (USFWS, 2014).				
Baptisia arachnifera	Hairy rattleweed	152	Endangered	Declining (inferred from NatureServe, 2015)	Declining (USFWS, 2011)	22 (EPA, 2016)	*Baptisia arachnifera* only occurs in a 50-square mile area in Brantley and Wayne counties in Southeast Georgia, on the Lower Coastal Plain (Georgia Department of Natural Resources 1995). (NatureServe, 2015)		No Mention	No Mention	Medium
Berberis nevinii	Nevin's barberry	54	Endangered	Declining (inferred from NatureServe, 2015)		14 native (USFWS, 2009)	Ranges from the foothills of the San Gabriel Mountains of Los Angeles County to near the foothills of the Peninsular Ranges of southwestern Riverside County, California (Fish and Wildlife Service 1998) (NatureServe, 2015).	< 370 (USFWS, 2009)	No Mention	No Mention	High
Blennosperma bakeri	Sonoma sunshine	55	Endangered	Unknown (USFWS, 2014)	Decreasing (USFWS, 2008)	18 (USFWS, 2014)	Sonoma - Santa Rosa area, Sonoma County, California (NatureServe, 2015).	Variable among years; < 100 to > 1.5 million (USFWS, 2014)	No Mention	No Mention	High
Boltonia decurrens	Decurrent false aster	153	Threatened	Unknown, periodic expansion and contraction (USFWS, 2012)	10 - 30% decline (NatureServe, 2015)	43 (USFWS, 2012)	The species is currently limited to disjunct populations from Woodford County, Illinois to Madison County, Illinois. In some years, ephemeral populations occur in St. Charles County, Missouri, in the area of confluence of the Mississippi and Illinois Rivers (NatureServe, 2015).	1000 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Brickellia mosieri	Florida brickell-bush	56	Endangered	50% decline (USFWS, 2013)	50 - 70% decline (NatureServe, 2015)	Unknown, presumed 17+ (USFWS, 2013)	*Brickellia mosieri* is currently distributed from central and southern Miami-Dade County from SW 120 St. to Florida City (Bradley and Gann 1999, p. 11), suggesting its historical range has contracted at least 13.6 km (8.5 mi), or more than 30 percent (USFWS, 2014).	2,150 - 3,700 (USFWS, 2013)	No Mention	No Mention	High
Callirhoe scabriuscula	Texas poppy-mallow	2	Endangered	Not Available	Not Available	Unknown - 10 element occurrences (within which an unknown	All known populations occur in Runnels, Coke, Mitchells, and Scurry counties, Texas along the Colorado River. These populations span a linear distance of about	<3000 individuals; no surveys conducted since 2001 (2019 5-year Review)	No Mention	No Mention	High

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						number of populations may occur) (2019 5-year Review)	96 miles from northwest to southeast (2019 5-year Review).				
Calochortus tiburonensis	Tiburon mariposa lily	57	Threatened	Not Available		1 (USFWS, 2011)	Only known from the open, rocky, serpentine derived soils of the serpentine bunchgrass community at Ring Mountain Preserve in Marin County, California (USFWS, 2011)	40,000 (USFWS 1995). (Nature Serve, 2015)	No Mention	No Mention	High
Calystegia stebbinsii	Stebbins' morning-glory	58	Endangered	Not Available		15 (USFWS, 2002)	Currently known from about 15 occurrences located in 2 localized areas in the foothills of the central Sierra Nevadas of California. Restricted to gabbro-derived and serpentine substrates. (NatureServe, 2015)		No Mention	No Mention	High
Castilleja affinis ssp. neglecta	Tiburon paintbrush	59	Endangered			7-10 (USFWS, 2012)	Known from Napa and Santa Clara counties in California (USFWS, 2012)		No Mention	No Mention	High
Castilleja cinerea	Ash-grey paintbrush	154	Threatened	Not Available		47 occurrences (USFWS, 2013)	Endemic to the San Bernardino Mountains, in San Bernardino County, California. (USFWS, 2013)		No Mention	No Mention	Medium
Castilleja levisecta	Golden Paintbrush	15	Threatened	Decreasing (USFWS, 2016)		6 - 20 (USFWS, 2016; NatureServe, 2015)	In Washington, the species occurs in the Puget Trough physiographic province, whereas in Oregon, the species occurs in the Willamette Valley physiographic province (Franklin and Dyrness 1988). As of 2014, there were 12 extant wild populations in Washington, totaling approximately 13,300 plants (T. Thomas, USFWS, pers. comm. 2015). In addition to the wild populations, 34 reintroductions were completed in Oregon and Washington. In 2005, small populations of *Castilleja levisecta* were planted in a common garden study plots at William L. Finley and Baskett Butte National Wildlife Refuges in the Willamette Valley. The propagules primarily came from Washington state populations, with a smaller contribution of seed from Canada.		No Mention	No Mention	Medium

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							These plants still persist at both refuges (USFWS, 2016).				
Cereus eriophorus var. fragrans	Fragrant prickly-apple	3	Endangered			10 sites	The species is now known to occur on only 10 confirmed sites in Volusia and St. Lucie Counties, primarily on or around Savannas Preserve State Park (SPSP) where the site covers an area approximately 10.0 mi long and 0.5 mi wide and is bisected by the Florida East Coast railway (Bradley et al. 2002; Bradley and Gann 2002; Woodmansee et al. 2007; Florida Natural Areas Inventory [FNAI] 2009). These cacti are often found to occur in distinct clusters (Bradley et al. 2002; Woodmansee et al. 2007). The occurrence of fragrant prickly-apple in Indian River County is yet unconfirmed because only a single sterile plant was observed on a coastal berm when surveys were conducted in 2006 (Woodmansee et al. 2007; FNAI 2009). Although only confirmed in Volusia and St. Lucie Counties, it is possible that the current range of the species includes Brevard and Indian River Counties, as these counties occur between confirmed locations and appropriate habitat is available (Woodmansee et al 2007).	Less than 3000 individuals (USFWS 2019)	No Mention	No Mention	High
Chamaecrista lineata keyensis	Big Pine partridge pea	60	Endangered	Declining (USFWS, 2013; USFWS, 2015)	Declining (USFWS, 2013; USFWS, 2015)	2 extant occurrences (USFWS, 2015)	Florida, Monroe County. The current range of *Chamaecrista lineata var. keyensis* is Big Pine Key and Cudjoe Key. In 2007, Bradley and Saha (2009, pp. 9–11) surveyed Big Pine Key, Cudjoe Key, Little Pine Key, No Name Key, and Sugarloaf Key (the five islands in the Florida Keys containing pine rocklands) and observed *C. lineata var. keyensis* only on Big Pine Key and Cudjoe Key. It has not been reported from other islands for some time (Ramrod Key in 1911, No Name Key in 1916 (Hodges and Bradley 2006, p. 45), and Lower Sugarloaf Key in 2005 (Hodges and Bradley 2006, p. 21)).	>300,000 individuals (USFWS, 2015)	Pesticide application (USFWS, 2015; USFWS, 2013)	No Mention	High

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							Accordingly, *C. lineata var. keyensis* is considered extirpated from Ramrod Key, No Name Key, and Lower Sugarloaf Key—3 of 5 (60 percent) of the islands where it was historically recorded (Bradley and Gann 1999, p. 18; Hodges and Bradley 2006, p. 21). Big Pine Key, Cudjoe Key, Little Pine Key, No Name Key, and Sugarloaf Key presently contain pine rocklands habitat. No pine rocklands currently exist on Ramrod Key (USFWS, 2015).				
Chamaesyce deltoidea pinetorum	Pineland sandmat	61	Threatened			20 extant occurrences; 9 on public conservation lands owned by Miami-Dade County and the NPS.	U.S., Florida, Miami-Dade County. The current range is similar to the historical range, although most of the former habitat outside of ENP has been lost and only small remnants remain. The area outside of ENP represents nearly half of the range (Bradley and Gann 1999, p. 25). An April 2011 Florida Natural Areas Inventory (FNAI) survey of the privately-owned Pine Ridge Sanctuary confirmed the plant remains at this site (FNAI 2011, p. 5). However, in a recent survey of Larry and Penny Thompson Park, no individuals were found (J. Possley, FTBG, pers. comm. 2011). The species was also not found during a 2-year project intended to survey and map exotic and rare plants along Florida Department of Transportation (FDOT) right-of-ways within Miami-Dade County (Gordon et al. 2007, pp. 1, 36).	14,500 to 146,000 individuals	No Mention	No Mention	High
Chamaesyce deltoidea serpyllum	Wedge spurge	62	Endangered				Florida: Big Pine Key, Monroe County. The current range of *Chamaesyce deltoidea ssp. serpyllum* is on Big Pine Key. Small groups of plants are scattered widely across the island (Herndon 1993, in Bradley and Gann 1999, p. 31) (USFWS, 2015).	368,557 (USFWS, 2015)	No Mention	No Mention	High
Chorizanthe pungens var. hartwegiana	Ben Lomond spineflower	63	Endangered	Unknown (USFWS, 2012)		1 - 5 (NatureServe, 2015)	Monterey and San Luis Obispo counties, CA. (NatureServe, 2015)		No Mention	No Mention	High

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Chromolaena frustrata	Cape Sable Thoroughwort	64	Endangered	Decline of 70-90% (NatureServe, 2015)	30 - 50% decline (NatureServe, 2015)	8 (USFWS, 2013)	Endemic to south Florida and the Keys. Currently known from Boca Grande Key in the far west, Big Munson Island in the Newfound Harbor Keys, and a cluster of keys farther east: Long Key, Lignumvitae Key, Lower Matecumbe Key, and Upper Matecumbe Key. Also known from the Flamingo/Cape Sable region on the mainland. (NatureServe, 2015)	~5,000 (NatureServe, 2015)	No Mention	No Mention	High
Chrysopsis floridana	Florida golden aster	16	Proposed for delisting (USFWS 2021)	Not Available	Increasing (USFWS, 2009)	1 - 5 (NatureServe, 2015)	*C. floridana* is known to occur on land in Hillsborough, Manatee, Hardee, and Pinellas Counties (USFWS, 2009).	1 - 1000 individuals (NatureServe, 2015)	No Mention	No Mention	Low
Cirsium fontinale var. fontinale	Fountain thistle	65	Endangered	Not Available		3 (USFWS, 2010)	The species is now found in only three locations in San Mateo County (Figure 11-10). One population occurs east of Crystal Springs Reservoir, on both sides of Interstate 280. This location includes three of the five occurrences of *Cirsium fontinale var. fontinale* from the California Natural Diversity Data Base. (USFWS, 1998)	~25,000 (USFWS, 2010)	No Mention	Pollinators population decline (USFWS, 2010)	High
Cirsium pitcheri	Pitcher's thistle	22	Threatened	Not available		81 - 300 (NatureServe, 2015)	Michigan, Huron, and Superior (Figure 3). Most sites occur along Lake Michigan. The species ranges from the north shore of Lake Superior south to Indiana and northern Illinois, where it has been reintroduced. Distribution of the species extends along the Lake Michigan shoreline in Wisconsin. In the east, it ranges through northern Lake Huron to the Manitoulin Island archipelago and southern Georgian Bay in Ontario. Pitcher's thistle extends as far south as Lambton County, Ontario, Canada on Lake Huron, as indicated by pre-1964 collections for two localities (White et al. 1983). Within its U.S. range, there are 211 historic and extant element occurrences (MNFI 2009; USFWS 2002). Of these, 18 are extirpated (4 in Indiana and 14 in Illinois). Pitcher's thistle probably occurred more commonly along the Great Lakes shorelines	100,000 - 1,000,000 individuals (NatureServe, 2015)	No Mention	No Mention	Low

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							prior to European settlement, but it is unknown how many occurrences were lost due to settlement and shoreline development. Of the remaining 193 occurrences, 169 (88%) are within Michigan. Nonetheless, all occurrences are not considered priority occurrences. The recovery plan defines priority occurrences as element occurrences that have the following characteristics: (1) located on Federal or State-owned lands; (2) ranked excellent to fair; (3) located in southern Lower Michigan, Indiana, or Wisconsin; and (4) are part of complex perched dune systems. According to this definition, 139 priority occurrences are known range-wide in the U.S., with 118 in Michigan. The 21 remaining priority occurrences consist of nine in Wisconsin and 12 in Indiana. All naturally occurring Pitcher's thistle populations in Illinois are extirpated. Of all occurrences, including non-priority occurrences, the majority (77%) are located within the Lake Michigan basin. Twenty-two percent are found in the Lake Huron basin and one occurrence (<1%) in the Lake Superior basin. Of the priority occurrences, 83 (60%) are entirely in public ownership (MNFI 2009) and eight (6%) are under the ownership of land conservancies. The remaining 48 (35%) priority occurrences are on private lands. In Michigan, over two-thirds of occurrences are located in the Lower Peninsula, mostly along Lake Michigan. The Upper Peninsula supports 28 priority occurrences located along the northern shores of Lake Michigan. Most U.P. occurrences are found in Mackinac County. The one occurrence in Alger County is the only occurrence on the shore of Lake Superior.				

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Cirsium wrightii	Wright's marsh thistle	155	Proposed Threatened (85 FR 61460; Sept. 2020)			8 extant populations; 3 at risk of extirpation (2017 SSA)	Endemic to New Mexico, where there are eight general confirmed locations of *Cirsium wrightii* covering an area of approximately 43 hectares (ha) (106 acres (ac)): Santa Rosa, in Guadalupe County; Bitter Lake NWR, in Chaves County; Blue Spring, in Eddy County; La Luz Canyon, Karr/Haynes Canyons, Silver Springs, and Tularosa Creek, in Otero County; and Alamosa Creek, in Socorro County (2017 Species Status Assessment)	~9300 (2017 SSA)	No Mention	No Mention	Medium
Conradina etonia	Etonia rosemary	156	Endangered	Unknown (NatureServe, 2015)	Increasing (USFWS, 2007)	8 (USFWS, 2007)	Occurs at six sites near Etonia Creek, northeast of Florahome, Putnam County, northeastern Florida. (NatureServe, 2015)	1000 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Conradina glabra	Apalachicola rosemary	66	Endangered	30 - 50% decline (NatureServe, 2015)	Stable (USFWS, 2009)	6 - 20 (NatureServe, 2015)	Although reported from both Liberty and Franklin Counties, Florida, most botanists believe it is limited to Liberty County only. The USFWS also believes the taxon to be limited to "several square miles" in Liberty County. Plants collected in 1988 in Santa Rosa County were assigned to C. glabra by a genetic study (Martin 1992). (NatureServe, 2015)	700 - 2,000 (NatureServe, 2015)	Herbicides (USFWS, 2009)	No Mention	High
Conradina verticillata	Cumberland rosemary	157	Threatened	Not Available	Unknown (USFWS, 2011)	3 (USFWS, 2011)	At present, 91 occurrences (colonies) are thought to be extant. (Occurrences believed to be extant are those that have been observed in the recent past.) These are along nine major streams of the Cumberland Plateau--Big South Fork River, New River, Clear Fork River, White Oak Creek, Caney Fork River, Obed River, Daddys Creek, Clear Creek, and Emory River (USFWS, 1996).	Unknown (USFWS, 2011); < 4,000 (NatureServe, 2015)	No Mention	No Mention	Medium
Cordylanthus mollis ssp. mollis	Soft bird's-beak	67	Endangered	Not Available		11 (USFWS, 2009)	The species is currently restricted to widely scattered populations in Napa, Solano, and Contra Costa Counties, from Point Pinole and Fagan Slough marsh through the Carquinez Strait to Suisun Bay. (USFWS, 2009)		No Mention	No Mention	High

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Cordylanthus palmatus	Palmate-bracted bird's beak	68	Endangered	Declining (USFWS, 2009)		8 (USFWS, 2009)	The species ranges from the northern Sacramento Valley south to the San Joaquin Valley. (USFWS, 2009)		Pesticides (USFWS, 2009)	Decline of pollinators (USFWS, 2009)	High
Cordylanthus tenuis ssp. capillaris	Pennell's bird's-beak	69	Endangered	Not Available		5 (USFWS, 2011)	*Cordylanthus tenuis ssp. capillaris* is known solely from records in the Outer North Coast Ranges floristic province of Sonoma County, California (Chuang and Heckard 1986, Hickman 1993, CNDDB 2011). The species is recognized to occur in five separate locations. In addition to the two previously known locations, the California Natural Diversity Database (CNDDB) recognizes two other occurrences. CNDDB occurrence 4 is located in a roadside ditch along Bohemian Highway, close to CNDDB occurrence 1. Also, CNDDB occurrence 5 is located on the privately-owned Twin Valley Ranch near Porter Creek, about 11 km (6.8 miles) northeast of CNDDB occurrence 2. CNDDB occurrence 6 was recorded in 2004 on Bohemian Club land adjacent to Bohemian Highway, northwest of CNDDB occurrence 1. (USFWS, 2011)		No Mention	No Mention	High
Coryphantha minima	Nellie cory cactus	70	Endangered	Not Available		2 (NatureServe, 2015)	It occurs in Texas (near Marathon in Brewster Co.) (NatureServe, 2015).	> 1 million (USFWS, 2012)	No Mention	No Mention	High
Coryphantha ramillosa	Bunched cory cactus	71	Threatened	Not Available		7+ (NatureServe, 2015)	In Texas, it occurs near the Rio Grande in Brewster and southern Terrell counties. It extends south into central Coahuila, Mexico (Dicht and Lüthy 2005) (NatureServe, 2015).	TX: 5,000 - 10,000 (NatureServe, 2015)	No Mention	No Mention	High
Coryphantha robbinsiorum	Cochise pincushion cactus	72	Threatened	Not Available	Declining (USFWS, 2007)	2 (NatureServe, 2015)	It occurs in Cochise Co., Arizona and Sonora, Mexico (NatureServe, 2015). It is restricted to three small limestone hills in Cochise County, Arizona, along the U.S./Mexico border (USFWS, 2007).		Pesticides (USFWS, 2007)	No Mention	High
Crotalaria avonensis	Avon Park harebells	4	Endangered			2 (Recovery Plan	The species is a narrow endemic, occurring only in northern Highlands and southern Polk counties, Florida. Currently, the	Unknown (assumed to be in the thousands)	No Mention	No Mention	High

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						Amendment 2019)	species is known from just 2 populations. One population occurs partially in the unprotected Avon Park Lakes subdivision and continues to decline as vacant lots supporting the plant are developed. Part of this population is protected at the second site, The Nature Conservancy's Saddle Blanket Scrub Preserve. The second population is at the Florida Fish and Wildlife Conservation Commission's Carter Creek Unit of the Lake Wales Ridge Wildlife Management Area. The unprotected Avon Lakes site hosts the largest number of plants, likely consisting in the thousands (Recovery Plan Amendment 2019).	(2019 Recovery Plan Amendment			
Cryptantha crassipes	Terlingua Creek cat's-eye	73	Endangered	Not Available	Unknown (USFWS, 1993)	1 (inferred from USFWS, 1993)	Only occurs in in southern Brewster Co., Tex. in gypseous clays (NatureServe, 2015).	< 5,000 (USFWS, 1993)	No Mention	Loss of pollinators (USFWS, 1993)	High
Cucurbita okeechobeensis ssp. okeechobeensis	Okeechobee gourd	5	Endangered	> 95% decline (NatureServe, 2015)	Declining (USFWS, 2009)	2 (USFWS, 2009)	Currently persists at a few sites on the shore of Lake Okeechobee in south Florida. It has also been collected in Glades County on an island in Lake Okeechobee and in Broward and Dade counties where it was apparently ephemeral (NatureServe, 2015).	1 - 1000 individuals (NatureServe, 2015)	Herbicide usage (USFWS, 2009)	No Mention	High
Dalea carthagenensis floridana	Florida prairie-clover	74	Endangered	Declining; habitat loss continues to occure in the species' range.	Declining; may not be viable	9 extant occurrences	Florida: Collier, Miami-Dade, Monroe counties. *D. carthagenensis var. floridanais* extant at nine locations, seven of which are on conservation lands owned by Miami-Dade County and the National Park Service (NPS). Bradley (pers. comm. 2005a) indicated that he received a report for this species at the Florida Panther National Wildlife Refuge (next to BCNP), but confirmation is needed. The species was not found during a 2-year project intended to survey and map rare and exotic plants along Florida Department of Transportation (FDOT) right-of-ways within Miami-Dade	Extremely small and may not be viable.	No Mention	No Mention	High

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							and Monroe counties (Gordon et al. 2007, pp. 1, 37).				
Deeringothamnus pulchellus	Beautiful pawpaw	75	Endangered			Three	Surveys have indicated that the beautiful pawpaw occurs throughout its historic range, but the population is fragmented and occurs primarily in two disjunct areas in Lee and Charlotte counties and in Orange County (FNAI 2008). It occurs in the vicinity of Charlotte Harbor and the Caloosahatchee River from Punta Gorda to Fort Myers in southwestern Florida (Wunderlin and Richardson 1981) and in the suburbs of Orlando in eastern Orange County (Hilsenbeck 1992).	~5,000	No Mention	No Mention	High
Deinandra (=Hemizonia) conjugens	Otay tarplant	158	Threatened	Unknown		34 (USFWS, 2009)	Restricted to a limited portion of southwestern San Diego County from Otay, south of San Diego, to the La Presa-Sweetwater Reservoir area ca. 8 mi ESE of San Diego, at 50-500 ft. Also collected 3 km southwest of La Presa, southeast of Tijuana, Baja, Mexico. (NatureServe, 2015)	~300,000 (USFWS, 2009)	No Mention	Plant/pollinator interactions and ecology (USFWS, 2004)	Medium
Deinandra increscens ssp. villosa	Gaviota Tarplant	76	Endangered	Unknown		7 (USFWS, 2011)	Currently, it has a highly localized distribution in western Santa Barbara County, California with seven main populations that range from the vicinity of Point Sal in the north to Gaviota in the south. (USFWS, 2011)		No Mention	No Mention	High
Delphinium bakeri	Baker's larkspur	77	Endangered	Decline of >90% (NatureServe, 2015)	Decline of >70% (NatureServe, 2015)	4 (USFWS, 2015)	One natural site and three reintroduced sites in Marin County, California (USFWS, 2015b).	11 individuals (natural site); 40-80 individuals (reintroduction sites) (USFWS, 2015)	No Mention	No Mention	High
Dicerandra cornutissima	Longspurred mint	78	Endangered	Not Available	Unknown (USFWS, 2008)	4 (USFWS, 2008)	Currently known to occur at four sites in Marion County: CFG, along the l-7S right-of-way, Marion Oaks subdivision, and Ocala Waterways Estates subdivision (USFWS, 2008).	1 - 1000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Dicerandra immaculata	Lakela's mint	6	Endangered	Majority of populations		5 naturally occurring, 9	The geographic range of Lakela's mint runs in a 59-mile long area in southern Indian	9,804 (2021 5-year Status Review)	No Mention	No Mention	High

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				are stable or declining. PVA suggests for two largest populations, likelihood of extinction in 3-7 years with no habitat management, such as prescribed burns, efforts to control invasive species, removal of hardwood plants, among others (2021 5-year Status Review)		introduced (2021 5-year Status Review)	River County and northern St. Lucie County, Florida along the Atlantic Coastal Ridge (2021 5-year Status Review). There are currently five naturally occurring populations of Lakela's mint and nine introduced populations. These populations are distributed in sites across the species' range, with one introduced site in Hobe Sound National Wildlife Refuge existing just south of the species' historical range in Martin County, Florida. Nine sites were known when the species was listed as endangered in 1985 (2019 Recovery Plan Amendment).				
Dodecahema leptoceras	Slender-horned spineflower	159	Endangered	Decline of 70-90% (NatureServe, 2015)	Decline of >50% (NatureServe, 2015)	35 (NatureServe, 2015)	Southwestern California, in the foothills of the San Gabriel Mountains in Los Angeles County, the San Bernardino Mountains in San Bernardino County, and the San Jacinto Mountains in western Riverside County (USFWS, 2010).	2500 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Dudleya cymosa ssp. marcescens	Marcescent dudleya	79	Threatened	Not Available		13 (USFWS, 2009)	*Dudleya cymosa ssp. marcescens* is endemic to the Santa Monica Mountains in California and is known from a 24-km (15-mi) stretch between Hidden Valley and Malibu Creek State Park (Raven et al. 1986). The total area that encompasses all of the known *D. cymosa ssp. marcescens* occurrences is approximately 230 square km (88 square mi) (USFWS, 2009).	12,000 (USFWS, 2009)	No Mention	No Mention	High
Dudleya cymosa ssp. ovatifolia	Santa Monica Mountains dudleyea	80	Threatened	Not Available		4 (USFWS, 2009)	Currently, there are four populations of what the Service considered to be *Dudleya cymosa subsp. ovatifolia* at the time of listing in Los Angeles and Orange Counties.		No Mention	No Mention	High

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							This includes two in the Santa Monica Mountains, one in the Santa Ana Mountains, and one in Agoura Hills. (USFWS, 2009)				
Dudleya nesiotica	Santa Cruz Island dudleya	81	Threatened	Not Available	Slightly decreasing (USFWS, 2009)	1 (USFWS, 2009)	There is only one known occurrence of *D. nesiotica*, which constitutes a single population that is scattered in varying densities over approximately 13 hectares (32 acres) of land at Fraser Point in the western portion of Santa Cruz Island, California. (USFWS, 2009)	3,500 to 260,000 (USFWS, 2009)	No Mention	No Mention	High
Dudleya verityi	Verity's dudleya	82	Threatened	Long term trends indicate a decline of <50% to relatively stable, while short-term trends suggest declines of 10-30% (NatureServe, 2015)		9 (USFWS, 2009)	All known occurrences are within eastern Ventura County, California, along north-facing volcanic rock outcrops on the lower slopes of the west end of the Santa Monica Mountains in coastal sage scrub. The entire distribution of the species is scattered over a 6.4-km (4-mi) stretch of land along the northern slope of Conejo Mountain and on north-facing volcanic outcrops in the vicinity of the California State University Channel Islands campus. (USFWS, 2009)		No Mention	No Mention	High
Echinocactus horizonthaloniu s var. nicholii	Nichol's Turk's head cactus	83	Endangered	Unknown (NatureServe, 2015)		4 (USFWS, 2009)	Restricted to two adjacent counties in Arizona and immediately adjacent Sonora, Mexico (NatureServe, 2015). Populations occur in the Waterman Mountains and Koht Kohl Hills in Pima County, Arizona; the Vekol Mountains including those near the vicinity of the Vekol Mine in Pinal County, Arizona; and a population in the Sierra del Viejo Mountains in Sonora, Mexico (USFWS, 2009).	Unknown (NatureServe, 2015)	No Mention	No Mention	High
Echinocereus chisoensis var. chisoensis	Chisos Mountain hedgehog Cactus	84	Threatened	Declining (USFWS, 1993)		11 (USFWS, 1993)	This variety's range is limited to a very small area on the southeastern side of Big Bend National Park in extreme southwestern Texas (NatureServe, 2015).	< 1,000 (USFWS, 1993)	No Mention	No Mention	High

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Echinocereus fendleri var. kuenzleri	Kuenzler hedgehog cactus	85	Threatened	Decline of <50% to relatively stable (NatureServe, 2015)	Stable (USFWS, 2005)	11 (USFWS, 2005)	Inhabits the mountains of south-central New Mexico in Lincoln, Otero, and Eddy Counties. Its range extends approximately 100 miles (USFWS 2005) on the eastern slopes of the Sacramento, Capitan, and Guadalupe Mountains. Mellen (1991), however, reported it as far south as the state of Chihuahua, Mexico, in the Santa Clara Valley (NatureServe, 2015).	6,600 - 13,200 (NatureServe, 2015)	No Mention	No Mention	High
Echinocereus reichenbachii var. albertii	Black lace cactus	7	Endangered	Decline of 30-70% (NatureServe, 2015)	Decline of 30-70% (NatureServe, 2015)	1 - 5 (NatureServe, 2015)	Current range is Jim Wells, Kleberg and Refugio Counties in south Texas (USFWS, 2009).	Uncertain (USFWS, 2009)	Pesticide use to control insects (USFWS, 2009)	No Mention	High
Echinocereus viridiflorus var. davisii	Davis' green pitaya	86	Endangered	Not Available		2 (NatureServe, 2015)	In Texas, it is unique to the Marathon Basin in Brewster Co. (NatureServe, 2015).	~ 20,000 (USFWS, 2012)	No Mention	No Mention	High
Echinomastus erectocentrus var. acunensis	Acuna Cactus	87	Endangered	Unknown, but likely declining	Unknown, but likely declining	Five population areas have been identifed in the U.S.: Organ Pipe Cactus National Monument (OPCNM) land; Bureau of Land Management land (BLM); Private land; State land, Military land; and 1 population area in Sonora, Mexico.	U.S.: Maricopa, Pima, and Pinal counties, Arizona; Mexico: Sonora	Surveyed in 2011. OPCNM: ~2,000 individuals (58.9 percent of known individuals); BLM: 655 individuals (19.3 percent); Private land: 48 individuals (1.4 percent); State land: 32 individuals (0.9 percent); Military: 1 individual (0.1 percent). Mexico (Sonora): 659 individuals (19.4 percent).	No Mention	No Mention	High
Echinomastus mariposensis	Lloyd's Mariposa cactus	88	Threatened	Not Available		U.S.: 3 (USFWS, 1989)	It occurs in the Chihuahuan Desert in Texas (near Rio Grande in southwest Brewster		No Mention	No Mention	High

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							County) and Mexico (Central Coahula) (NatureServe, 2015).				
Enceliopsis nudicaulis var. corrugata	Ash Meadows sunray	160	Threatened	Not Available		30 (USFWS, 2011)	*Enceliopsis nudicaulis var. corrugata* is endemic to the Ash Meadows area of Nye County, Nevada. The range of E. nudicaulis var. corrugata encompasses the Ash Meadows National Wildlife Refuge (Refuge) and adjacent Bureau of Land Management's (BLM) Ash Meadows Area of Critical Environmental Concern (ACEC) and private lands. (USFWS, 2011)	79,508 (USFWS, 2011)	No Mention	No Mention	Medium
Eremalche kernensis	Kern mallow	89	Endangered			6 - 20 (NatureServe, 2015)	California endemic, occurring only in Kern County (Skinner 1997). (NatureServe, 2015)		No Mention	Potential loss of pollinators (USFWS, 2013)	High
Eriastrum densifolium ssp. sanctorum	Santa Ana River woolly-star	161	Endangered	Long-term trends indicate a rapid decline of 70 to 90%, while short-term trends suggest a decline of 50 to 70% (NatureServe, 2015)		21 occurrences (USFWS, 2010)	*Eriastrum densifolium subsp. sanctorum* is endemic to the Santa Ana River drainage of southern California. Since listing, 12 new occurrences were detected, and Eriastrum densifolium subsp. sanctorum was also rediscovered within Riverside County just downstream of the border with San Bernardino County. (USFWS, 2010)	12,400 but this may easily be an overestimate (NatureServe, 2015)	No Mention	No Mention	Medium
Eriogonum codium	Umtanum Desert buckwheat	90	Threatened	Long-term trends suggest a decline of <30% to an increase to 25%, whereas short-term trends indicate declines of <30% to relatively stable populations		1 (NatureServe, 2015)	One ridgeline, Benton County, southeastern Washington. (NatureServe, 2015) Found only on the Hanford Reach of the Columbia River. The only known population of Umtanum desert buckwheat occurs along the top edges of the steep slopes on Umtanum Ridge (USFWS, 2013).	~5,000 (NatureServe, 2015)	No Mention	No Mention	High

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				(NatureServe, 2015)							
Eriogonum longifolium var. gnaphalifolium	Scrub buckwheat	17	Threatened	Not Available	Unknown (USFWS, 2008)	48 (USFWS, 2008)	Central Florida (Marion, Lake, Polk, Highlands, southwest Orange, and northwest Osceola counties) (NatureServe, 2015).		No Mention	No Mention	Medium
Eriogonum ovalifolium var. vineum	Cushenbury buckwheat	162	Endangered	Declining (NatureServe, 2015)		29 (NatureServe, 2015)	Cushenbury buckwheat occurs over about 25 miles (40 kilometers) along the northern edge of the San Bernardino Mountains from the White Knob area east to Rattlesnake Canyon, north and east of Big Bear Lake, San Bernardino County, California. There is currently about 1,213 acres (491 hectares) of occupied habitat for this species (USFWS, 2015).	13,000 (USFWS, 2009)	No Mention	No Mention	Medium
Eriophyllum latilobum	San Mateo woolly sunflower	163	Endangered	Decline of 30-50% (NatureServe, 2015)	Additional occurrences discovered since listing (inferred from USFWS, 2011)	4 (USFWS, 2011)	The range extent is extremely small, perhaps as small as 2-3 sq. mi. The plant is only known from a small area in San Mateo Co., California on the central coast (NatureServe, 2015).	250 - 1000 individuals (NatureServe, 2015); variable from year to year (USFWS, 2011)	No Mention	No Mention	Medium
Eryngium aristulatum var. parishii	San Diego button-celery	91	Endangered	95 - 97% decline in habitat (USFWS, 2010)			*Eryngium aristulatum var. parishii* currently occurs in 14 geographic areas in Riverside and San Diego Counties (USFWS, 2010). Occurs in the Santa Rosa Plateau in Riverside Co. and San Diego Co. California, and Baja California, Mexico. This species occurs in a small portion of the southwest portion of Riverside Co., and from San Diego Co. from Camp Pendelton Marine Base south into Baja California, Mexico to Ensenada (USFWS 1998) (NatureServe, 2015).		No Mention	Loss of pollinators (USFWS, 2010)	High
Eryngium sparganophyllum	Arizona eryngo	188	Proposed Endangered	Two of six populations extirpated (SSA 2020)	Two of six populations extirpated (SSA 2020)	2 extant wild populations in Arizona (plus 2 in Mexico). In addition, one	Arizona eryngo is an herbaceous perennial plant in the carrot family and occurs in spring-fed cienegas (wetlands) of the International Four Corners Region (Arizona and New Mexico in the US and Sonora and Chihuahua in Mexico). It is currently	56-30,422 individuals per population (SSA 2020)	No Mention	No Mention	High

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						reintroduced population of mixed success in AZ.	known from four sites (only two of which are in the US, in Arizona). The remaining populations are isolated from one another (Species Status Assessment 2020).				
Erysimum capitatum var. angustatum	Contra Costa wallflower	92	Endangered	Not Available	Stable (USFWS, 2008)	3 (NatureServe, 2015)	The distribution and range of the species has changed little since listing (USFWS, 2008). It is only known from the Antioch Dunes in Contra Costa County (Skinner 1997) (NatureServe, 2015).	> 4,000 (USFWS, 2008)	No Mention	Loss of pollinators (USFWS, 2019)	High
Erysimum teretifolium	Ben Lomond wallflower	93	Endangered	Unknown (USFWS, 2008)	Declining (USFWS, 2008)	17 (USFWS, 2008)	It is distributed over an area approximately 9 miles from east to west and 5 miles from north to south. Within this area, most of the populations occur in an area between the communities of Ben Lomond, Mount Hermon, and Glenwood, while outliers are located in the Bonny Doon area (approximately 5 miles to the west) and one is located in Beulah Park (approximately 3 miles to the south). It is likely that populations were once more widely scattered throughout the sandhills area prior to fragmentation of habitat and suppression of natural fire cycles (USFWS, 2008).	1,000 - 3,000 (USFWS, 2008)	No Mention	No Mention	High
Eutrema penlandii	Penland alpine fen mustard	94	Threatened	Unknown (NatureServe, 2015)		6 - 20 (NatureServe, 2015)	The Penland alpine fen mustard is known from Lake, Park, and Summit counties in Colorado. The plant is found only in the Mosquito Range at elevations ranging from 3,625 to 4,050 meters (11,900 to 13,280 feet). The species is known from an area measuring 11 miles from north to south as well as east to west. (USFWS, 2016)	Approximately 20,800 individuals in 12 of 13 occurrences (NatureServe, 2015)	No Mention	No Mention	High
Fremontodendron californicum ssp. decumbens	Pine Hill flannelbush	95	Endangered	Decline of 50-70% (NatureServe, 2015)	10 - 30% decline (NatureServe, 2015)	6 (NatureServe, 2015)	There are two centers of the distribution: one in Nevada County and the main one to the south in Eldorado County. The range extent adding up the 2 areas is about 18.5 sq. mi. (NatureServe, 2015). Presently, the majority of the *F. californicum ssp. decumbens* individuals are located on the parcel managed by the California Department of Forestry and Fire Protection on Pine Hill, and on a nearby private parcel	~500 (USFWS, 2002)	No Mention	No Mention	High

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							(L. Eng in litt. 1999). *Fremontodendron californicum ssp. decumbens* only occurs in the central part of the Pine Hill formation within 1.25 kilometers (2 miles) of Pine Hill (USFWS, 2002).				
Galactia smallii	Small's milkpea	96	Endangered			~10 sites	When this species was listed, it was known from two sites near Homestead in Miami-Dade County. In a study of distribution and habitat preference of two plant genera native to south Florida pine rocklands, Small's milkpea was found in the Redland region and a few sites at the southern end of the Biscayne region (O'Brien 1998). The distribution of this species is correlated with soil depth and color in Redland pine rocklands. Small's milkpea appears to prefer calcareous soils with less quartz sands, but not at low elevations, and does not occur in pine forests off of the limestone rock ridge (O'Brien 1998). As elevation decreases southward along the Miami Rock Ridge, so does quartz sand (Bradley and Possley 2002). Preferred soils are mapped as Cardsound Rock outcrop complex and are porous and well-drained (Bradley and Possley 2002). The elevation where the plants occur generally ranges from 7 to 10 feet (2 to 3 m) with a smooth slope from 0 to 2 percent (Bradley and Possley 2002).	<10,000	No Mention	No Mention	High
Galium buxifolium	Island bedstraw	164	Endangered	Not Available		27 (USFWS, 2009)	It is restricted to Santa Cruz and San Miguel Islands off the coast of southern California (USFWS, 2009).		No Mention	No Mention	Medium
Gilia tenuiflora ssp. hoffmannii	Hoffmann's slender-flowered gilia	97	Endangered	Not Available	Stable (USFWS, 2009)	2 (USFWS, 2009)	It is restricted to Santa Rosa Island off the coast of southern California. A third population was discovered in 1994 at Skunk Point (Rindlaub 1994) (USFWS, 2009).	Variable depending on year; East Point: 20,000 - 256,000; Skunk Point: 3,000 - 3,500 (USFWS, 2009)	No Mention	No Mention	High

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Hackelia venusta	Showy stickseed	98	Endangered	Short-term trends suggest declines of 10-30% (NatureServe, 2015)		1 (USFWS, 2011)	This species is known from one location only in Chelan County, Washington. (NatureServe, 2015)	~700 (USFWS, 2011)	Herbicides (USFWS, 2007)	Low seed production (USFWS, 2007)	High
Harrisia (=Cereus) aboriginum (=gracilis)	Aboriginal Prickly-apple	99	Endangered	Decline of <30% to increase of 25% (NatureServe, 2015)	Relatively stable (NatureServe, 2015)	12 (USFWS, 2013)	Currently occurs along the Gulf Coast of Florida, in Sarasota, Lee, and Charlotte Counties (NatureServe, 2015).	300 - 500 (USFWS, 2015)	No Mention	No Mention	High
Helenium virginicum	Virginia sneezeweed	165	Threatened	Unknown (NatureServe, 2015)		26 - 30 (USFWS, 2000)	As of 2000, 23 populations have been documented in Augusta county and 7 in Rockingham County. Recent studies from a sinkhole pond in southern Missouri suggest that it may represent a disjunct population, but further studies are needed to resolve this (USFWS, 2000).	10,000 - 100,000 individuals (NatureServe, 2015); 1 - 500,000 per occurrence (USFWS, 2000)	No Mention	No Mention	Medium
Helianthemum greenei	Island rush-rose	166	Threatened	Not Available	Increasing (USFWS, 2010)	87 (USFWS, 2010)	Currently known to occur on Santa Cruz Island, Santa Catalina Island, and Santa Rosa Island. The species is believed to be extirpated from San Miguel Island (USFWS, 2010).	~7,400 (USFWS, 2010)	No Mention	No Mention	Medium
Helianthus verticillatus	Whorled Sunflower	100	Endangered	Unknown (NatureServe, 2015)	Unknown (NatureServe, 2015)	4 (USFWS, 2014)	This species occurs in remnant prairie habitats found in uplands and swales of headwater streams in the Coosa River watershed in Georgia and Alabama and in the East Fork Forked Deer and Tuscumbia Rivers' watersheds in Tennessee (USFWS, 2014).	250 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Hesperolinon congestum	Marin dwarf-flax	167	Threatened	Decline of 50-70% (NatureServe, 2015)	10 - 30% decline (NatureServe, 2015)	23 (USFWS, 2011)	*Hesperolinon congestum* ranges from Marin Co. in the north to San Mateo Co. in the south, thus it spans a narrow band on serpentine soils in the S.F. Bay Area, in California. The estimated range extent is about 790 sq. mi. (NatureServe, 2015).	10,000 - 1,000,000 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Hibiscus dasycalyx	Neches River rose-mallow	168	Threatened	Decline of 30-70%	Decline of 10-30%	11 (USFWS, 2013)	Known from Trinity, Houston, Harrison, Cherokee, and Nacogdoches Counties in east Texas, in the Neches, Sabine, and	Approximately 2200 - 2500 individuals	No Mention	No Mention	Medium

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				(NatureServe, 2015)	(NatureServe, 2015)		Angelina River basins and the Mud and Tantabogue Creek basins (USFWS, 2013).	(NatureServe, 2015)			
Holocarpha macradenia	Santa Cruz tarplant	101	Threatened	Decline of 50-70% (NatureServe, 2015)	10 - 30% decline (NatureServe, 2015)	14 native, 4 - 8 experimental (USFWS, 2014)	*Holocarpha macradenia* occurs in coastal grasslands and prairies in Contra Costa, Santa Cruz, and Monterey Counties, California (Service 2000) (USFWS, 2014).	Uncertain, possibly ~25,000 (NatureServe, 2015)	No Mention	No Mention	High
Hymenoxys herbacea	Lakeside daisy	102	Threatened	Stable (USFWS, 2010)	Stable (USFWS, 2010)	6 - 20 (NatureServe, 2015)	The Lakeside daisy is extant on the Marblehead Peninsula of Ottawa Co., Ohio and in Ontario, Canada on Manitoulin Island and the Bruce Peninsula. The largest populations are in Ontario. Subsequent to listing, the species was also found in one location in Michigan (Oldham and Kraus 2002). (NatureServe, 2015) Additionally, three introduced populations have been transplanted into appropriate habitat in Erie County, Ohio and Will County, Illinois. (USFWS, 2010)	10,000 - 1,000,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Ipomopsis polyantha	Pagosa skyrocket	103	Endangered	Fluctuating (USFWS, 2011)	Stable (inferred from USFWS, 2011)	1 - 5 (NatureServe, 2015)	The two known occurrences of *Ipomopsis polyantha* are in Archuleta County, Colorado within about 13 miles (mi) (21 kilometers (km)) of each other, and collectively occupy about 388.4 acres (ac) (157.1 hectares (ha)) of habitat within a range that includes about 6.5 square mi (16.8 square km). (USFWS, 2011)	Estimated at 162,220 (USFWS, 2011)	No Mention	No Mention	High
Ipomopsis sancti-spiritus	Holy Ghost ipomopsis	104	Endangered	Not Available	Not Available	1 - 5 (NatureServe, 2015)	Endemic to a single canyon in the Sangre de Cristo Mountains, New Mexico (USFWS, 2002)	50 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	High
Ivesia webberi	Webber Ivesia	105	Threatened	Decline of 30-50% (NatureServe, 2015)	10 - 30% decline (NatureServe, 2015)	14 (NatureServe, 2015)	*Ivesia webberi* is currently known to occupy a total of approximately 165 acres (66.8 hectares) within five counties in California and Nevada along the transition zone between the eastern edge of the northern Sierra Nevada and the northwestern edge of the Great Basin (Service 2014, p. 8) (USFWS, 2014).	~ 4,855,200 (NatureServe, 2015); unknown (USFWS, 2014)	No Mention	No Mention	High

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Lasthenia burkei	Burke's goldfields	106	Endangered	Decline of >90% (NatureServe, 2015)	> 70% decline (NatureServe, 2015)	20 or less (NatureServe, 2015)	Both Lake County occurrences are presumed extant. Within Sonoma County, one occurrence is known from north of Healdsburg (Patterson et al. 1994) and the core of the current range of *L. burkei* is in the Santa Rosa Plain from the community of Windsor to east of the city of Sebastopol (USFWS, 2008). The range extent is estimated at about 1900 sq. mi, though there are large gaps in the distribution (NatureServe, 2015).	Variable depending on year; 24,860 - 8.1 million in most recently surveyed populations (USFWS, 2016)	No Mention	No Mention	High
Lasthenia conjugens	Contra Costa goldfields	107	Endangered	Not Available		19 - 23 (USFWS, 2013)	*L. conjugens* has been reported in ten counties within California: Alameda, Contra Costa, Marin, Mendocino, Monterey, Napa, Santa Barbara, Santa Clara, Solano, and Sonoma (CNDDB 2012; USFWS, 2013).		No Mention	No Mention	High
Layia carnosa	Beach layia	108	Endangered	Decline of 50-70% (NatureServe, 2015); stable distribution since listing (USFWS, 2012)		18 (NatureServe, 2015)	The current distribution includes occurrences spread across six very isolated dune systems (Freshwater Lagoon, Humboldt Bay, mouth of the Mattole River, Point Reyes, Monterey Peninsula, Vandenberg [a part of the Guadalupe-Nipomo Dunes), over about 500 miles of shoreline in northern and central California. Beginning at Freshwater Lagoon Spit in northern Humboldt County, Layia carnosa occurs intermittently over 70 miles of shoreline as far south as the mouth of the Mattole River. From there, it jumps some 170 miles to Point Reyes NS (Marin County), and then another 120 miles to the Monterey Peninsula (Monterey County). From Monterey, a gap of about 150 miles separates it from the southernmost site at Vandenberg AFB, in Santa Barbara County. Five historical occurrences located in San Francisco, Monterey and Humboldt counties are believed to have been extirpated (U.S. Department of the Interior 1998) (USFWS, 2012).	Unknown, > 10 million (USFWS, 2012)	No Mention	No Mention	High

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Leavenworthia crassa	Fleshy-fruit gladecress	109	Endangered	Decreasing (NatureServe, 2015)		1 - 5 (NatureServe, 2015)	Endemic to a 13-mile radius area in Lawrence and Morgan counties in northwest Alabama. (NatureServe, 2015)		No Mention	No Mention	High
Lepidium barnebyanum	Barneby ridge-cress	110	Endangered	Stable (USFWS, 2011)	Declining (USFWS, 1993)	1 (USFWS, 2011)	Barneby ridge-cress is known from one population with three separate stands endemic to thin limestone caps on ridge lines near Indian Canyon approximately 3 miles south and southwest of the town of Duchesne, Utah. It occurs entirely on Ute Indian reservations. (USFWS, 2011)	2500 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Lepidium papilliferum	Slickspot peppergrass	18	Threatened	Decline of 30 to 70 percent	Declining	21 to 80; ~45 extant occurrences	Idaho: *Lepidium papilliferum* is endemic to the Snake River Plain and its adjacent northern foothills (an area approximately 90 by 25 miles (mi) (145 by 40 kilometers (km)), or 2,250 square miles (mi^2) (5,800 square kilometers (km^2)), with a smaller disjunct population on the Owyhee Plateau (an area of approximately 11 by 12 mi (18 by 19 km), or 132 mi^2 (342 km^2). The restricted distribution is likely due to adaptation to specific conditions within these slickspot habitats.	45,569 (USFWS, 2016)	No Mention	No Mention	Medium
Lesquerella congesta	Dudley Bluffs bladderpod	111	Threatened	Unknown (NatureServe, 2015)		7 (USFWS, 2008)	It is found only along the Piceance and Yellow Creek drainages. Estimated range is 88 square kilometers (34 square miles).	550,576 - 602,576 (USFWS, 2008)	No Mention	Loss of pollinators (USFWS, 2008)	High
Lessingia germanorum (=L.g. var. germanorum)	San Francisco lessingia	112	Endangered	Not Available		8 (USFWS, 2012)	Currently the species is known to occur at seven locations in the Presidio (M. Chassé, National Park Service, in litt., October 26, 2011, p. 1; M. Chassé in litt., September 29, 2011) and at one occurrence near Hillside Park in Daly City (USFWS, 2012).	Variable depending on year; 500,000 - 2,000,000 overall range (USFWS, 2003)	No Mention	Loss of pollinators (USFWS, 2012)	High
Liatris helleri	Heller's blazingstar	169	Threatened	Decline of 10-50% (NatureServe, 2015)	Declining (USFWS 2013)	11 extant populations (USFWS, 2013)	Extant populations occur in the following North Carolina counties: Ashe, Avery, Burke, Caldwell, and Watauga (USFWS, 2013).	1000 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Liatris ohlingerae	Scrub blazingstar	8	Endangered	Varies by population: 6 populations stable, 7		45 (2021 5-year Status Review)	Extant on the Lake Wales Ridge (majority of occurrences) and Winter Haven Ridge (one occurrence) in Highlands and Polk counties, Florida. Its range extends from	Estimated at approximately 3,100 individuals	No Mention	No Mention	Medium

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				declining, 32 unknown status due to lack of recent survey data or recently discovered (2021 5-year Status Review)			Lake Blue in Polk County south along the Lake Wales Ridge to ABS at the south end of the Ridge in Highlands County. One occurrence on Winter Haven Ridge in Polk County. 45 known populations, 32 of unknown status. . All populations on private lands or private conservation lands are of unknown status due to lack of recent surveys, with the majority of populations entirely on private lands either known or presumed extirpated (25 populations) (2021 5-year Status Review).	(2021 5-year Status Review)			
Limnanthes vinculans	Sebastopol meadowfoam	113	Endangered	90% of vernal pool habitat destroyed (NatureServe, 2015)	Primarily unknown or decreasing (USFWS, 2008)	10 hydrologically separate (USFWS, 2008); 37 occurrences (USFWS, 2016)	This species is endemic to Sonoma county, CA along the Laguna de San Rosa. The range of this species is approximately 107 sq. km (CNDDB 2008) (NatureServe, 2015). The range of *Limnanthes vinculans* has not increased since the time of listing. The current known range of the species includes Knights Valley to the north, the Napa River Ecological Reserve near Yountville to the east, an occurrence near Sonoma to the south, and an occurrence near Sebastopol to the west (USFWS, 2016).	1 - 1000 individuals (NatureServe, 2015); variable from year to year (USFWS, 2008)	No Mention	No Mention	High
Lindera melissifolia	Pondberry	170	Endangered	Decline of 30 - 70% (NatureServe, 2015a)	Stable to declining (USFWS, 2014)	61 (USFWS, 2014)	Alabama, Arkansas, Georgia, Mississippi, Missouri, North Carolina, and South Carolina (USFWS, 2014).	10,000 - 1,000,000 individuals (NatureServe, 2015b)	No Mention	No Mention	Medium
Linum carteri carteri	Carter's small-flowered flax	114	Endangered	Not Available	Declining (USFWS, 2014)	7 (USFWS, 2014)	Currently found in eastern Miami-Dade County, Florida, from R. Hardy Matheson Preserve (near Pinecrest) southwest to Naranja/Modello, with a distance of approximately 27.3 km (17 mi) between the farthest locations (USFWS, 2013).	250 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	High
Lithophragma maximum	San Clemente Island woodland-star	115	Endangered	Decline of 30-50% (NatureServe, 2015); presumed extinct until	Stable (NatureServe, 2015)	11 - 17 (USFWS, 2007)	Without further discoveries, *L. maximum* was thought to be extinct until two small populations were found in 1979 at the bottom of Bryce Canyon (ca. 9 plants) and at the bottom of Eagle Canyon (ca. 3 plants) on the southeastern side of San Clemente	~641 (USFWS, 2007)	No Mention	No Mention	High

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				1979 (USFWS, 2007)			Island (Bacigalupi 1979; Ferguson and Beauchamp 1981). Since that time, a number of small populations have been discovered in precipitous canyons along the eastern escarpment of the island between Eagle Canyon and the south fork of Matriarch Canyon (M. Elvin in litt. 1996; Helenurm 1997; Junak & Wilken 1998; U. S. Department of the Navy, Southwest Division, 2001; Junak 2006; Consortium of California Herbaria- Smasch Accession Results, http://ucjeps.berkeley.edu/cgi_bin/get_consort.pl). *L. maximum* has an extremely restricted and dissected distribution with one major concentration of plants in the branched canyons north of Mosquito Cove Canyon, a small to moderate sized population in Mosquito Cove Canyon, and three very small peripheral populations in the canyons at the southern and northern limits of its range (USFWS, 2007). The total range extent adds up to only about 7 sq mi. The linear distance is about 7 mi long (NatureServe, 2015).				
Lupinus aridorum	Scrub lupine	9	Endangered	Declining (USFWS, 2016)	3 - 4 populations extirpated since 2003 (USFWS, 2007)	9 (USFWS, 2016)	Only found on two interior ridges in central Florida. These are two disjunct distributions. The southern distribution occurs on the Winter Haven Ridge in Polk County and the more northern distribution is found on the Mount Dora Ridge in Orange and Osceola Counties. There are currently 9 populations remaining, of which three occur on public lands with management benefitting the species. Five population introductions have occurred since 2008, of which three remain. The three remaining introduced populations appear to be declining (2016 5-Year Review).	1 - 1000 individuals (NatureServe, 2015)	No Mention	No Mention	High

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Lupinus nipomensis	Nipomo Mesa lupine	116	Endangered	Not Available		1 population; 10 occurrences (USFWS, 2009)	It is currently extant at Nipomo Mesa, San Luis Obispo County, California (NatureServe, 2015). Colonies are scattered across a 2-mile (3.2-km) stretch of backdune habitat west of Highway 1 and between Black Lake Canyon to the north and Oso Flaco Lake to the south (USFWS, 2009).	Variable; 139 - 771 (USFWS, 2009)	No Mention	No Mention	High
Lupinus sulphureus ssp. kincaidii	Kincaid's Lupine	23	Threatened	Unknown (USFWS, 2016)		21 - 80 (NatureServe, 2015)	Douglas County, Oregon to Lewis County, Washington, and into southern British Columbia. Considered extirpated in British Columbia. In Oregon, in the Willamette and Umpqua Valleys.		No Mention	No Mention	Low
Lysimachia asperulaefolia	Rough-leaved loosestrife	172	Endangered	Decreasing (USFWS, 2014)		21 - 80 (NatureServe, 2015)	*Lysimachia asperulifolia* is endemic to the Coastal Plain and Sandhill regions of southeastern North Carolina and northern South Carolina. The current extant occurrences in North Carolina are located in (number of occurrences in parentheses): Beaufort (1), Bladen (1), Brunswick (9), Carteret (9), Cumberland (11.5*), Harnett (1), Hoke (15.5*), Onslow (3), Pamlico (1), Pender (1), and Scotland (4) counties (*one occurrence with 22 sites straddles the Hoke/Cumberland county line) (NCNHP 1993). One extant population located in Richland County in the Inner Coastal Plain of South Carolina is the first verified report for South Carolina in this century (SCHT 1992). For purposes of recovery planning, the Technical Draft Recovery Plan identifies nine population centers based on the grouping of sites by geographic center. Each population center is isolated from other centers by loss of habitat between. Preserving each population center is important for maintaining genetic variation within the species. The nine population centers are: (1) Pamlico/Beaufort counties (2 sites), (2) Croatan National Forest (9 sites), (3) Camp Lejeune (3 sites), (4) Holly	1 - 1000 individuals (NatureServe, 2015)	Herbicide use (USFWS, 2014)	No Mention	Medium

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							Shelter area (1 site), (5) Brunswick County (10 sites), (6) Bladen Lakes area (3 sites), (7) Fort Bragg (73 sites), (8) Sandhills Game Land/Camp MacKall (5 sites), and (9) South Carolina Sandhills (1 site) (USFWS 1993). (NatureServe, 2015)				
Macbridea alba	White birds-in-a-nest	24	Threatened	Decreasing (NatureServe, 2015)		21 - 80 (NatureServe, 2015)	Endemic to Liberty, Bay, Gulf, and Franklin counties, Florida (Chafin 2000). Alabama reports are erroneous. (NatureServe, 2015)	1000 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	Low
Malacothrix indecora	Santa Cruz Island malacothrix	117	Endangered	Not Available			Known from three of the northern Channel Islands (Santa Cruz Island, San Miguel Island, and Prince Island) in Santa Barbara County, California. (NatureServe, 2015)		No Mention	No Mention	High
Manihot walkerae	Walker's manioc	10	Endangered	Not Available		3 (USFWS, 2009)	Walker's manioc is known only from the Lower Rio Grande Valley of Texas (Hidalgo and Starr counties) and northern Tamaulipas, Mexico. (USFWS, 1993)	<1,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Marshallia mohrii	Mohr's Barbara button	173	Threatened	Not Available	Decline of 10-30% (NatureServe, 2015b)	21 - 80 (NatureServe, 2015a)	Currently known from Bibb, Cherokee, and Etowah Counties, Alabama, and Floyd County, Georgia (USFWS, 1991)	1 - 1000 individuals (NatureServe, 2015a)	No Mention	No Mention	Medium
Mimulus fremontii var. vandenbergensis	Vandenberg monkeyflower	118	Endangered	Declining (NatureServe, 2015)	Not Available	7 (NatureServe, 2015)	Endemic to the eastern portion of Burton Mesa (Wilken 2010 in Elvin 2010) in Santa Barbara County, California. *Mimulus fremontii var. vandenbergensis* is bounded by Purisima Hills to the north and east, Santa Ynez River to the south, and the mesa edge on the west side of Santa Lucia Canyon, including the tributary canyons to the west (e.g., Lakes, Oak, and Pine Canyons). The habitat and soils that it grows on are only found in a crescent-shaped area approximately 10.7 km long by 3.0 km wide that comprises less than 6,070 ha or 60.7 square km (Elvin 2010). (NatureServe, 2015)	2,000 total individuals observed in 2006; size may vary considerably year to year (NatureServe, 2015)	No Mention	No Mention	High
Mirabilis macfarlanei	MacFarlane's four-o'clock	119	Threatened	Stable (USFWS, 2016)		13 (USFWS, 2016)	*Mirabilis macfarlanei* is a narrow endemic, occurring in portions of the Snake, Salmon, and Imnaha river canyons in Wallowa		Herbicide and pesticide spraying	No Mention	High

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							County in northeastern Oregon, and adjacent Idaho County in Idaho. The species global range is approximately 28.5 miles (46 km) by 17.5 miles (28.5 km) (NatureServe, 2015). *Mirabilis macfarlanei* occurs within the geographic area identified in the 2000 Recovery Plan: the Salmon, Snake, and Imnaha river canyons in Idaho and Oregon. The species occurs in 13 Element Occurrences (EOs), 9 in Idaho and 4 in Oregon. Land ownership is comprised of BLM, Forest Service, and private lands. Of the 13 EOs, 5 are located on BLM land, 1 is located on both BLM and private land, 4 are located on Forest Service land, 1 is located on both Forest Service and private land, and 2 are located solely on private land (USFWS, 2016).				
Oenothera deltoides ssp. howellii	Antioch Dunes evening-primrose	120	Endangered			1 - 5 (NatureServe, 2015)	Endemic to the Antioch Dunes, known from Contra Costa County and introduced in Sacramento County, California (Skinner 1997). (NatureServe, 2015)		No Mention	Loss of pollinators	High
Opuntia treleasei	Bakersfield cactus	121	Endangered	Not Available		6 - 20 (NatureServe, 2015)	California: San Joaquin Valley (central Kern County). Other reports are no longer considered to be this taxon (cf. Munz 1974; Benson 1982; Brown and Cypher 1997).		No Mention	No Mention	High
Oxytropis campestris var. chartacea	Fassett's locoweed	174	Threatened	Fluctuating, but apparently increasing (USFWS, 2013)	Fluctuating, but apparently increasing (USFWS, 2013)	10 (USFWS, 2013)	Restricted to small inland lakes at eight sites in central and northwestern Wisconsin: Waushara, Portage, and Bayfield counties. (NatureServe, 2015)	Approximately 190,000 in 2012 (USFWS, 2013)	Herbicides (USFWS, 1991; 2013)	No Mention	Medium
Pediocactus bradyi	Brady pincushion cactus	122	Endangered	Short-term trends indicate a decline of 10-30% (NatureServe, 2015)		8 (NatureServe, 2015)	Restricted to a specific and limited limestone soil type and known only from Coconino County, in northern Arizona, along Marble Canyon. The species' range comprises an area approximately 23 kilometers (km) in length, north to south, and varies in width from 1.6 km to 4.58 km (USFWS 2012).	<2,500 (USFWS, 2012)	No Mention	No Mention	High

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Pediocactus despainii	San Rafael cactus	175	Endangered	Not Available	10 - 30% decline (NatureServe, 2015)	21 (USFWS, 2015)	San Rafael cactus is found exclusively in Emery County, Utah. Overall, the known San Rafael cactus populations are found from Dripping Spring in the north, to Big Ridge South/Keesle Country to the south (approximately 122 km (78.5 mi) north to south), and from Mussentuchit Mine in the west, near the border of Sevier to the Humbug population in the east (approximately 88 km (48.5 mi) east-west) (USFWS, 2015).	~8,200 (USFWS, 2015)	No Mention	No Mention	Medium
Pediocactus knowltonii	Knowlton's cactus	123	Endangered	Long-term trends indicate a decline of >90%, whereas short-term trends suggest a decline of 10-30% (NatureServe, 2015)		1 (NatureServe, 2015)	Known only from one site in northwestern New Mexico in northern San Juan County. (NatureServe, 2015)	5,000-10,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Pediocactus peeblesianus var. fickeiseniae	Fickeisen plains cactus	176	Endangered	Short-term trends indicate a decline of 10-30% (NatureServe, 2015)		33 (USFWS, 2016)	*Pediocactus peeblesianus var. fickeiseniae* is found only in Coconino and Mohave counties, Arizona. It grows along the northern and southern ledges of the Colorado and Little Colorado Rivers to the hills of lower House Rock Valley. In June 1957 and 1958, collections were made by Lyman Benson near Cameron, Arizona. Plants have continued to be found in these areas. On BLM land, the geographic range extends from Marble Canyon, on the east, westwards to Mainstreet Valley. Other scattered locations in the Arizona strip where this cactus is found include Hurricane Valley, Hurricane Cliff tops, Clayhole Ridge, Sunshine Ridge, and Houserock Valley. Further, this species is known from the south and east of the Colorado River, on	1,132 (USFWS, 2016)	No Mention	No Mention	Medium

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							Navajo Nation lands, between Echo Cliffs, the Grand Canyon and the Little Colorado River gorge. One other location is known from Gray Mountain (Arizona State Trust and private lands) (Hughes 2000). (NatureServe, 2015)				
Pediocactus winkleri	Winkler cactus	177	Threatened			58	Winkler cacti grow on fine textured alkaline soils derived primarily from the following geologic formations: Dakota, Morrison, Summerville, Entrada and Emery sandstone member of the Mancos formation (Heil 1984, Neese 1987, Clark 1998b, Clark 1999). It is generally found at elevations between 1,500 and 2,130 meters (4,900 and 7,000 feet) on rocky, alkaline hill tops and benches, and gentle slopes on barren, open sites in salt desert shrub communities. Heil (1984) describe it as typically occurring on the tops and sides of rocky hills or benches in Atriplex (saltbush) dominated desert shrub communities. Winkler cactus is endemic to Wayne, Emery and Sevier counties in south central Utah. Populations of the species occur primarily on lands managed by the Utah BLM through the Richfield Field Office and by the NPS at CRNP. The range of Winkler cactus extends approximately 48 km (30 miles) in a narrow band from Notom in central Wayne County to the Last Chance Desert in southwestern Emery County, Utah. Plants are estimated to occupy only 80 hectares (200 acres) within this band (Spector 2013b). The majority of the known populations occur on lands managed by BLM.	2380	No Mention	No Mention	Medium
Pentachaeta bellidiflora	White-rayed pentachaeta	124	Endangered	Not Available			At the time of listing, *Pentachaeta bellidiflora* was known from a single large occurrence in the Triangle area which extended east of I-280 into Eastwood Regional Park. Historically, the species was more widespread and was known from at		No Mention	No Mention	High

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							least nine locations in Marin, San Mateo, and Santa Cruz Counties. Most of the occurrences were lost due to urbanization or disturbance from off-road vehicles (CNDDB 2010). The Triangle remains the only known verified occurrence of *P. bellidiflora* (CNDDB 2010); however, since the time of listing, a small occurrence of *P. bellidiflora* may have been found on the west side of Upper Crystal Springs Reservoir in San Mateo County (M. Vasey, San Francisco State University, in litt, May 28, 2010). Further surveys need to be done to confirm this occurrence (USFWS, 2010)				
Pentachaeta lyonii	Lyon's pentachaeta	178	Endangered	Decreasing (NatureServe, 2015)		21 - 80 (NatureServe, 2015)	Endemic to coastal southern California, where currently known only from eastern Ventura and western Los Angeles Counties, in the Santa Monica Mountains and western Simi Hills (CNDDB 2008 cited in USFWS 2008). Formerly also known from the Palos Verdes Peninsula and Santa Catalina Island, but now believed historical/extirpated from these areas (CNDDB 2008 cited in USFWS 2008). (NatureServe, 2015)	65,000-70,000 plants (NatureServe, 2015)	No Mention	No Mention	Medium
Phacelia argillacea	Clay phacelia	125	Endangered	Unknown (USFWS, 2013)		3 (USFWS, 2013)	It is only found in Utah along the Douglas Creek and Gordon Gulch members of the Green River formation in the Wasatch Mountains in Pleasant Valley (NatureServe, 2015).	Unknown (USFWS, 2013)	No Mention	No Mention	High
Phacelia formosula	North Park phacelia	126	Endangered	Unknown (NatureServe, 2015)	Stable (NatureServe, 2015)	6 (USFWS, 2016)	Known from Jackson and possibly Larimer counties, Colorado. The species is found within about 60 square miles in North Park, from Michigan Creek west to the North Platte River in Jackson County, and potentially in an additional six square miles in the Laramie River Valley in Larimer County. Estimated range is 534 square kilometers.	~16,000 (USFWS, 2016)	No Mention	No Mention	High
Phacelia submutica	DeBeque phacelia	179	Threatened	Unknown (NatureServe, 2015)		21 - 80 (NatureServe, 2015)	*Phacelia submutica* is endemic to Colorado and known only from Garfield and Mesa	10,000 - 100,000 individuals	No Mention	No Mention	Medium

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							counties. Estimated range is 356 square kilometers.	(NatureServe, 2015)			
Phlox hirsuta	Yreka phlox	127	Endangered	Declines of less than 10% at all 4 populations (2019 5-Year Review)		4 (2019 5-Year Review)	A narrow endemic known to occur at four locations in the vicinity of Yreka, California (Recovery Plan).	Approximately 1,350 (2019 5-Year Review)	No Mention	No Mention	High
Phlox nivalis ssp. texensis	Texas trailing phlox	128	Endangered	Long-term trends indicate a decline of 30 to 70%, whereas short-term trends suggest a relatively stable population (NatureServe, 2015)		2 (NatureServe, 2015)	Endemic to the Pineywoods of the West Gulf Coastal Plain of east Texas. Texas trailing phlox is presently known from only two sites, one each in Tyler and Hardin counties, Texas. (USFWS, 1994; NatureServe, 2015)	<750 individuals (NatureServe, 2015)	No Mention	No Mention	High
Physaria douglasii ssp. tuplashensis	White Bluffs bladderpod	129	Threatened	Decline of 30 - 50% (NatureServe, 2015)	10 - 30% decline (NatureServe, 2015)	1 (NatureServe, 2015)	White Bluffs bladderpod is still known only from the single population that occurs along the upper edge of the White Bluffs of the Columbia River, Franklin County, Washington (USFWS, 2013a). Extensive searches of suitable substrate elsewhere in Washington have been conducted but no other plants have been found (USFWS, 2004; NatureServe, 2015).	Variable between years; 47,593 - 58,887 in 2011 (USFWS, 2013a)	Pesticide use (NatureServe, 2015)	No Mention	High
Physaria filiformis	Missouri bladderpod	25	Threatened	Increasing (USFWS, 2015)	Increasing (USFWS, 2015)	76 (USFWS, 2015)	The Missouri bladderpod currently occurs in four counties in Missouri and five counties in Arkansas and the species is distributed on limestone glades in Southwest Missouri, dolomite glades in northern Arkansas (a report for Missouri on a dolomitic glade has not been confirmed, George Yatskievych, pers. comm. Aug. 11, 2014), and shale glades in the Ouachita Mountains in central Arkansas (Witsell, 2008). (USFWS, 2015)	10,000 to >1,000,000 individuals (NatureServe, 2015)	No Mention	No Mention	Low

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Physaria globosa	Short's bladderpod	180	Endangered	Decreasing (USFWS, 2014)		21 - 80 (NatureServe, 2015)	Southwest Indiana, north central Kentucky, and north central Tennessee. (NatureServe, 2015)	1000 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	Medium
Physaria obcordata	Dudley Bluffs twinpod	130	Threatened	Unknown (NatureServe, 2015)		6 - 20 (NatureServe, 2015)	Endemic to Colorado; known from Rio Blanco County only along the Piceance and Yellow Creek drainages and at Clamity Ridge. Estimated range is 574 square kilometers,	10,000 - 100,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Plagiobothrys hirtus	rough popcornflower	131	Endangered	Decreasing (USFWS, 2016)		14 (USFWS, 2016)	At present, 36 distinct patches, within 14 extant popcornflower occurrences, are distributed discontinuously from Yoncalla Creek, near Rice Hill, Oregon, south to the Sutherlin Creek, near Wilbur, in the Umpqua River watershed (Maddux and Meyers 2008, USFWS 2010) (USFWS, 2016).	2500 - 100,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Pogogyne abramsii	San Diego mesa-mint	181	Endangered	Decreasing (USFWS, 2010)		21 - 80 (NatureServe, 2015).	California endemic. San Diego Co., mesas from San Diego to Miramar. (NatureServe, 2015)		No Mention	No Mention	Medium
Polygonella basiramia	Wireweed	11	Endangered		Insufficient data to evaluate trends (2021 5-year Status Review)	69 extant occurrences (2021 5-year Status Review)	Wireweed is a narrow endemic, restricted to the Winter Haven, Bombing Range and Lake Wales Ridges in Polk and Highlands Counties, Florida. The northern limit of its range is at Auburndale, Avon Park Air Force Range, and Catfish Creek (about 8 km east of the town of Lake Wales) and ranges southward to Archbold Biological Station (about12.9 km south of the town of Lake Placid) (Christman 1988). Wireweed is predominately a Lake Wales Ridge species, with 84 percent of occurrences located there (Turner et al. 2006). The last FNAI Element Tracking Summary (2021) reported 69 extant occurrences, 44 of which were on protected lands. This was a significant decrease (~40%) from the 119 reported occurrences in the last 5-year status review in 2010 (2019 Lake Wales Ridge Plants Recovery Plan Amendment, 2021 5-year Status Review).		No Mention	No Mention	High

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Polygonella myriophylla	Sandlace	12	Endangered			6 - 80 (NatureServe, 2015)	Sandlace's range is from Orange County south through Highlands County in scrub vegetation. It occurs near Interstate 4 in Orange County and at one site in northwestern Osceola County. In Polk County, sandlace is found on the Lake Wales Ridge (LWR) from the Davenport-Poinciana area. It is also found well west of the LWR in a highly altered area just southeast of Bartow. In Highlands County, sandlace is found on the LWR as far south as the Archbold Biological Station.	2500 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Potentilla hickmanii	Hickman's potentilla	132	Endangered	Decreasing (NatureServe, 2015)		1 - 5 (NatureServe, 2015)	California endemic. One extant population in Monterey County. One large population exists in San Mateo County. The total range extent consists of 3 areas and about 9 sq. mi. (NatureServe, 2015)	250 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	High
Prunus geniculata	Scrub plum	19	Endangered			21 - 80 (NatureServe, 2015)	*Prunus geniculata* is a Florida endemic found on the Central Florida Ridge Highlands, Lake, Orange and Polk Counties. Also reported from DeSoto County (74-11), Smithsonian Institute and Osceola County (NatureServe, 2015).	2500 - 10,000 individuals (NatureServe, 2015)	No Mention	Low seed viability (USFWS, 2009)	Medium
Pseudobahia bahiifolia	Hartweg's golden sunburst	133	Endangered	Not Available		6 - 20 (NatureServe, 2015)	The current distribution of the majority of the species occurs in two isolated clusters, including six extant occurrences near Friant along both sides of the San Joaquin River in high pumice content soils (Fresno and Madera Counties) and six occurrences near Cooperstown in Stanislaus County. The species grows in loam or sandy loam soil associated with Amador and Pentz series (Stanislaus County), Rocklin series (Fresno and Madera County), Amador and Hornitos soils (Merced County) (Stebbins 1991). (USFWS, 2007)	10,000 to >1,000,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Pseudobahia peirsonii	San Joaquin adobe sunburst	182	Threatened	Not Available		32 (USFWS, 2007)	Three major population concentrations of *P. peirsonii* now include: east of Fresno in Fresno County, west of Lake Success in Tulare County, and northeast of Bakersfield		No Mention	No Mention	Medium

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							in Kern County (CNDDB 2007). (USFWS, 2007)				
Purshia (=Cowania) subintegra	Arizona Cliff-rose	134	Endangered	Declining	Declining	4	All known occurrences of *P. subintegra* are located in four disjunct populations, which occur along the sub-Mogollon region of central Arizona over a distance of 320 kilometers (200 miles) (Rutman 1992).	Unknown, estimated to exceed 40,000	Herbicides (USFWS, 1995)	No Mention	High
Sarracenia rubra ssp. alabamensis	Alabama canebrake pitcher-plant	135	Endangered	Decreasing (NatureServe, 2015)		6 - 20 (NatureServe, 2015)	Endemic to three counties in central Alabama along the Fall Line. (NatureServe, 2015)	2500 - 10,000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Schoenocrambe barnebyi	Barneby reed-mustard	136	Endangered	Unknown (NatureServe, 2015)		2 (NatureServe, 2015)	Endemic to the Canyonlands of south-central Utah, where known from two distinct clusters of occurrences: one in the southern portion of the San Rafael Swell near Muddy Creek in southern Emery County and the other in Capitol Reef National Park in the Fremont River drainage west of Fruita in central Wayne County. (NatureServe, 2015)	2,251 (USFWS, 2011)	No Mention	No Mention	High
Sclerocactus brevihamatus ssp. tobuschii	Tobusch fishhook cactus	26	Threatened	Not Available		~33 (NatureServe, 2015)	Hill Country of central Texas, on the escarpment of the Edwards Plateau. (NatureServe, 2015)	Max population of 3,404 (USFWS, 2010)	No Mention	No Mention	Low
Sclerocactus brevispinus	Pariette cactus	137	Threatened	Unknown		1 - 5 (NatureServe, 2015)	Known only from a single area a few miles across in the Pariette Draw region of Duchesne County, Utah, U.S.A.		Pesticides (USFWS, 2010)	No Mention	High
Sclerocactus glaucus	Colorado hookless Cactus	183	Threatened	Unknown (NatureServe, 2015)		98 (USFWS, 2010)	Colorado hookless cactus is an endemic plant found in Delta, Montrose, Mesa, and Garfield Counties, Colorado. There are two population centers of Colorado hookless cactus: (1) on alluvial river terraces of the Gunnison River from near Delta, Colorado, to southern Mesa County, Colorado; and (2) on alluvial river terraces of the Colorado River and in the Plateau and Roan Creek drainages in the vicinity of DeBeque, Colorado (Service 1990). (USFWS, 2010)	~19,000 (USFWS, 2010)	Herbicides and pesticides (USFWS, 2010)	No Mention	Medium
Sclerocactus mesae-verdae	Mesa Verde cactus	184	Threatened	Long-term trends are unknown but		78 (NatureServe, 2015)	Occurs only in parts of Montezuma County, Colorado and San Juan County, New Mexico. Mostly on Navajo Indian	10,000 individuals (NatureServe, 2015)	Pesticide use (USFWS, 2010)	No Mention	Medium

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				short-term trends indicate a decline of 10-30% (NatureServe, 2015)			Reservation lands (Roth, pers. comm., 1998). (NatureServe, 2015)				
Sclerocactus wetlandicus	Uinta Basin hookless cactus	138	Threatened	Unknown		6 - 80 (NatureServe, 2015)	Known only from Duchesne and Uintah counties, Utah (Flora of North America Editorial Committee (2003).		Herbicides and Pesticides (USFWS, 2010)	No Mention	High
Sclerocactus wrightiae	Wright fishhook cactus	185	Endangered			130	The known range of Wright fishhook cactus extends across approximately 696,099 acres (ac) (281,701 hectares (ha)) of Utah's western Emery County, southeastern Sevier County, and central Wayne County.	2348	No Mention	No Mention	Medium
Senecio layneae	Layne's butterweed	139	Threatened	Decreasing (NatureServe, 2015)		6 - 20 (NatureServe, 2015)	Restricted to gabbroic soils in El Dorado and Tuolumne counties in California. (NatureServe, 2015)	1000 - 2500 individuals (NatureServe, 2015)	No Mention	No Mention	High
Sidalcea oregana var. calva	Wenatchee Mountains checkermallow	140	Endangered	Decreasing (NatureServe, 2015)		1 - 5 (NatureServe, 2015)	Occurs in a small area within Chelan County, Washington.		No Mention	No Mention	High
Silene spaldingii	Spalding's Catchfly	186	Threatened	Increasing (USFWS, 2016)		~99 (USFWS, 2016)	Regional endemic restricted to remnants of the Poulouse Prairie grasslands of eastern Washington, northeastern Oregon, northern Idaho, and western Montana (barely extending into British Columbia, Canada) (NatureServe, 2015). The species is endemic to the Palouse region of south-east Washington and adjacent Oregon and Idaho, and is disjunct in northwestern Montana and British Columbia, Canada (USFWS, 2016).	~28,750 (USFWS, 2016)	Herbicides (USFWS, 2016)	No Mention	Medium
Solidago houghtonii	Houghton's goldenrod	27	Threatened	Long-term trends suggest declines of 30-70%, whereas short-term trends indicate a		~90 (NatureServe, 2015)	*Solidago houghtonii* is primarily an endemic of the Upper Great Lakes region, occurring principally on the northern shores of Lakes Michigan and Huron in Michigan and Ontario; peripheral range extends north to Canadian shores of Georgian Bay, also 1 disjunct site in New York. (NatureServe, 2015)		No Mention	No Mention	Low

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				decline of <30% to relatively stable (NatureServe, 2015)							
Solidago shortii	Short's goldenrod	141	Endangered	Stable to declining (USFWS, 2007)	Decline of 10-30% (NatureServe, 2015)	14 (USFWS, 2007)	Known from Robertson, Nicholas, and Fleming Counties in Kentucky (the vicinity of Blue Licks, Kentucky) and along the Blue River in Harrison County, Indiana (USFWS, 2007).	1 - 1000 individuals (NatureServe, 2015)	No Mention	No Mention	High
Streptanthus albidus ssp. albidus	Metcalf Canyon jewelflower	142	Endangered	Not Available			Santa Clara county, California. (NatureServe, 2015)		No Mention	No Mention	High
Thymophylla tephroleuca	Ashy dogweed	143	Endangered			Six	Several ashy dogweed populations are considered meta-populations based on relative distance between sites. Surveys conducted in the years since listing have identified five other extant populations in addition to the one known at the time of listing. These populations have increased the known range of the species from Webb to southern Zapata County. The loss, fragmentation and/or alteration of habitat may be increased at these meta-population sites as opposed to plants in populations that are farther apart. Ashy dogweed was first recorded in Starr County in 1932, near Rio Grande City, but is now considered extirpated from this area. This species was federally listed as endangered on July 19, 1984 and a recovery plan for the species was completed in 1988. At the time of listing, the ashy dogweed population was estimated to be 25 acres in size and contained approximately 1,300 individuals (USFWS 1984, 1987). Since then five additional populations have been found and the species' known range has expanded from Webb County into Zapata County, Texas (USFWS 2011). One of the six extant		Pesticides	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
							populations is partially on state-owned ROW lands that are maintained by TxDOT. The five remaining populations are found on private lands and three of the land owners have entered into Voluntary Conservation Agreements with TPWD (USFWS 2011). No critical habitat has been designated for ashy dogweed.				
Townsendia aprica	Last Chance townsendia	187	Threatened			23	Populations occur on BLM, National Forest, and NPS lands in Emery, Sevier, and Wayne counties of south-central Utah. Last Chance townsendia is endemic to the Colorado Plateau and occurs primarily in a long, narrow band, approximately 8 kilometers (5 miles) wide by 48 kilometers (30 miles) long, from near Interstate 70 in the north, southwest to the Fremont Junction area, then south to CRNP. Most localities appear to be isolated and less than an acre in size (USFWS 1993).	total population estimates from 2008 (7,215 individuals) and 2009 (4,000 – 4,500 individuals)	No Mention	No Mention	Medium
Trifolium trichocalyx	Monterey clover	144	Endangered	Decreasing (USFWS, 2009)			Monterey clover is known from only one area (Huckleberry Hill) covering approximately 16 hectares (40 acres) on property owned by the Pebble Beach Company on the Monterey Peninsula. During 1996, two locations in the Huckleberry Hill area with a total of 22 plants were located (USFWS, 2004).		No Mention	No Mention	High
Verbena californica	Red Hills vervain	145	Threatened	Decreasing (USFWS, 2012)		6 - 20 (NatureServe, 2015)	Currently, the entire range of *Verbena californica* is presumed to be an area of about 77 square kilometers (30 square miles) or 12 kilometers (7.5 miles) by 6.4 kilometers (4 miles). Within this narrow range, the total area occupied by the populations is estimated to be 50 hectares (124 acres) (CNDDB 2011). *Verbena californica* grows at elevations between 255 and 400 meters (837 to 1,310 feet) (CNDDB 2011). Most of the sites are within the expanded Red Hills Area of Critical Environmental Concern (ACEC) that now	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
							consists of about 4,042 hectares (9,988 acres, about 15.6 square miles) of public land south of the historic town of Chinese Camp in Tuolumne County (BLM 2011) (USFWS, 2012).				
Warea amplexifolia	Wide-leaf warea	13	Endangered	A number of naturally occurring populations in decline (2017 5-year review)		9 naturally occurring extant populations (2017 5-year Review)	Endemic to three counties (Polk, Lake and Marion) in the Lake Wales Region of central Florida. As of the 2017 5-year Review, there were nine naturally occurring, extant populations. These nine populations consist of five that existed at the time of the last status review in 2007, and four that have been discovered since that time. There were five populations documented in 2007 that have since been extirpated. In addition, there are three extant introduced populations as of the 2017 Review. One of these populations only has one individual remaining and the long term viability of all three is unknown. Of the nine naturally occurring populations, two (the Warea tract on State forest land) and the Ocklawaha on private land) typically account for greater than 95% of plants range-wide. The remaining seven populations generally have low numbers (2017 5-year Status Review).	Over 10,000 plants in the 9 extant naturally occurring populations (2017 5-year review)	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 plot 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.
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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
Abronia macrocarpa	Large-fruited sand-verbena	28	Yes (12%)	35.91	Biotic - Outcrosser	Abitotic	No Mention	Insect	High
Acanthomintha obovata ssp. duttonii	San Mateo thornmint	29	Yes (12%)	162.74	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Acmispon dendroideus var. traskiae (=Lotus d. ssp. traskiae)	San Clemente Island lotus (=broom)	146	Yes (12%)	72.92	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Aeschynomene virginica	Sensitive joint-vetch	30	Yes (12%)	107.58	Biotic - Outcrosser	Abiotic	No Mention	Insect	High
Agalinis acuta	Sandplain gerardia	20	Yes (12%)	93.68	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Amorpha crenulata	Crenulate lead-plant	31	Yes (12%)	84.02	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Amsinckia grandiflora	Large-flowered fiddleneck	32	Yes (12%)	131.18	Biotic - Outcrosser	Abiotic, Biotic	Unknown	Insect	High
Amsonia kearneyana	Kearney's blue-star	33	Yes (12%)	0.90 (0.18)	Biotic - Outcrosser	Abiotic	No	Insect, Bird	Medium
Apios priceana	Price's potato-bean	21	Yes (12%)	56.50	Biotic - Outcrosser	Abiotic	No	Insect	High
Arabis georgiana	Georgia rockcress	34	Yes (12%)	74.58	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Arabis serotina	Shale barren rock cress	147	Yes (12%)	49.28	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Arctostaphylos confertiflora	Santa Rosa Island manzanita	35	Yes (12%)	0	Biotic - Outcrosser	Abiotic, Bird, Mammal	No	Insect	Medium
Arctostaphylos glandulosa ssp. crassifolia	Del Mar manzanita	148	Yes (12%)	6.26	Biotic - Outcrosser	Abiotic, Bird, Mammal	No	Insect	Medium
Arctostaphylos hookeri var. ravenii	Presidio Manzanita	36	Yes (12%)	143.97	Biotic - Outcrosser	Abiotic, Bird, Mammal	Unknown	Insect	High
Arctostaphylos morroensis	Morro manzanita	37	Yes (12%)	84.61	Biotic - Outcrosser	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
Arctostaphylos myrtifolia	Ione manzanita	38	Yes (12%)	61.58	Biotic - Outcrosser	Abiotic, Bird, Mammal	Unknown	Insect	High
Arctostaphylos pallida	Pallid manzanita	39	Yes (12%)	13.68	Biotic - Outcrosser	Abiotic, Bird, Mammal	No	Insect	High
Arenaria ursina	Bear Valley sandwort	149	Yes (12%)	0	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	Medium
Argemone pleiacantha ssp. pinnatisecta	Sacramento prickly poppy	40	Yes (12%)	1.57	Biotic - Outcrosser	Abiotic, Insect, Bird, Mammal	No	Insect	Medium
Argythamnia blodgettii	Blodgett's silverbush	41	Yes (12%)	40.56	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Asimina tetramera	Four-petal pawpaw	150	Yes (12%)	167.41	Biotic - Outcrosser	Bird, Mammal	No	Insect	High
Astragalus albens	Cushenbury milk-vetch	42	Yes (12%)	0	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Astragalus ampullarioides	Shivwits milk-vetch	43	Yes (12%)	80.83	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Astragalus bibullatus	Guthrie's (=Pyne's) ground-plum	44	Yes (12%)	151.34	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Astragalus holmgreniorum	Holmgren milk-vetch	45	Yes (12%)	32.42	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Astragalus humillimus	Mancos milk-vetch	46	Yes (12%)	89.24	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Astragalus jaegerianus	Lane Mountain milk-vetch	47	Yes (12%)	0	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	Medium
Astragalus lentiginosus var. coachellae	Coachella Valley milk-vetch	151	Yes (12%)	22.99	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Astragalus lentiginosus var. piscinensis	Fish Slough milk-vetch	48	Yes (12%)	39.77	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Astragalus magdalenae var. peirsonii	Peirson's milk-vetch	49	Yes (12%)	0.03	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Astragalus montii	Heliotrope milk-vetch	50	Yes (12%)	0	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Astragalus osterhoutii	Osterhout milkvetch	51	Yes (12%)	8.42	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Astragalus pycnostachyus var. lanosissimus	Ventura Marsh Milk-vetch	52	Yes (12%)	175.35	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Astragalus robbinsii var. jesupi	Jesup's milk-vetch	53	Yes (12%)	0.000101	Biotic - Outcrosser	Abiotic, Biotic	Unknown	Insect	Medium
Astrophytum asterias	Star cactus	14	Yes (12%)	178.10	Biotic - Outcrosser	Insect, Bird, Mammal	Yes	Insect	High
Ayenia limitaris	Texas ayenia	1	Yes (12%)	207.45	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Baptisia arachnifera	Hairy rattleweed	152	Yes (12%)	88.67	Biotic - Outcrosser	Abiotic	Unknown	Insect	Medium
Berberis nevinii	Nevin's barberry	54	Yes (12%)	129.42	Biotic - Outcrosser	Bird, Mammal	Unknown	Insect	High
Blennosperma bakeri	Sonoma sunshine	55	Yes (12%)	172.20	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Boltonia decurrens	Decurrent false aster	153	Yes (12%)	120.47	Biotic - Outcrosser	Abiotic	No Mention	Insect	High
Brickellia mosieri	Florida brickell-bush	56	Yes (12%)	84.02	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Callirhoe scabriuscula	Texas poppy-mallow	2	Yes (12%)	89.16	Biotic - Outcrosser	Abiotic, Biotic	No	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
Calochortus tiburonensis	Tiburon mariposa lily	57	Yes (12%)	206.57	Biotic - Outcrosser	Abiotic, Biotic	Unknown	Insect	High
Calystegia stebbinsii	Stebbins' morning-glory	58	Yes (12%)	124.80	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Castilleja affinis ssp. neglecta	Tiburon paintbrush	59	Yes (12%)	135.39 (20.02)	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Bird	High
Castilleja cinerea	Ash-grey paintbrush	154	Yes (12%)	0	Biotic - Outcrosser	Abiotic, Biotic	Unknown	Insect	Medium
Castilleja levisecta	Golden Paintbrush	15	Yes (12%)	142.08	Biotic - Outcrosser	Abiotic	No Mention	Insect	High
Cereus eriophorus var. fragrans	Fragrant prickly-apple	3	Yes (12%)	158.52	Biotic - Outcrosser	Biotic	Unknown	Insect	High
Chamaecrista lineata keyensis	Big Pine partridge pea	60	Yes (12%)	12.38	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Chamaesyce deltoidea pinetorum	Pineland sandmat	61	Yes (12%)	84.02	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Chamaesyce deltoidea serpyllum	Wedge spurge	62	Yes (12%)	12.38	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Chorizanthe pungens var. hartwegiana	Ben Lomond spineflower	63	Yes (12%)	123.15	Biotic - Outcrosser	Mammal	No Mention	Insect	High
Chromolaena frustrata	Cape Sable Thoroughwort	64	Yes (12%)	40.56	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Cirsium fontinale var. fontinale	Fountain thistle	65	Yes (12%)	162.08	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Cirsium pitcheri	Pitcher's thistle	22	Yes (12%)	41.14	Biotic - Outcrosser	Abiotic	No Mention	Insect	High
Cirsium wrightii	Wright's marsh thistle	155	Yes (12%)	37.04	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Abiotic, Insect	High
Conradina etonia	Etonia rosemary	156	Yes (12%)	130.15	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Conradina glabra	Apalachicola rosemary	66	Yes (12%)	67.66	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Conradina verticillata	Cumberland rosemary	157	Yes (12%)	18.39	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Cordylanthus mollis ssp. mollis	Soft bird's-beak	67	Yes (12%)	122.91	Biotic - Outcrosser	Abiotic	Unknown	Insect	Medium
Cordylanthus palmatus	Palmate-bracted bird's beak	68	Yes (12%)	303.02	Biotic - Outcrosser	Abiotic	No	Insect	Medium
Cordylanthus tenuis ssp. capillaris	Pennell's bird's-beak	69	Yes (12%)	143.10	Biotic - Outcrosser	Abiotic	No Mention	Insect	High
Coryphantha minima	Nellie cory cactus	70	Yes (12%)	1.50	Biotic - Outcrosser	Abiotic, Biotic	Unknown	Insect	Medium
Coryphantha ramillosa	Bunched cory cactus	71	Yes (12%)	1.71	Biotic - Outcrosser	Insect, Bird, Mammal	Yes	Insect	Medium
Coryphantha robbinsiorum	Cochise pincushion cactus	72	Yes (12%)	4.06	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	Medium
Crotalaria avonensis	Avon Park harebells	4	Yes (12%)	111.25	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Cryptantha crassipes	Terlingua Creek cat's-eye	73	Yes (12%)	1.50	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium

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Cucurbita okeechobeensis ssp. okeechobeensis	Okeechobee gourd	5	Yes (12%)	158.84	Biotic - Outcrosser	Bird, Mammal	No Mention	Insect	High
Dalea carthagenensis floridana	Florida prairie-clover	74	Yes (12%)	75.02	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Deeringothamnus pulchellus	Beautiful pawpaw	75	Yes (12%)	136.26	Biotic - Outcrosser	Bird, Mammal	No Mention	Insect	High
Deinandra (=Hemizonia) conjugens	Otay tarplant	158	Yes (12%)	161.41	Biotic - Outcrosser	Bird, Mammal	No	Insect	High
Deinandra increscens ssp. villosa	Gaviota Tarplant	76	Yes (12%)	108.18	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	High
Delphinium bakeri	Baker's larkspur	77	Yes (12%)	115.06 (6.06)	Biotic - Outcrosser	Abiotic, Biotic	No	Insect, Bird	High
Dicerandra cornutissima	Longspurred mint	78	Yes (12%)	112.66	Biotic - Outcrosser	Insect	No Mention	Insect	High
Dicerandra immaculata	Lakela's mint	6	Yes (12%)	156.28	Biotic - Outcrosser	Abiotic, Biotic	Unknown	Insect	High
Dodecahema leptoceras	Slender-horned spineflower	159	Yes (12%)	92.23	Biotic - Outcrosser	Mammal	No Mention	Insect	High
Dudleya cymosa ssp. marcescens	Marcescent dudleya	79	Yes (12%)	45.00	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Dudleya cymosa ssp. ovatifolia	Santa Monica Mountains dudleyea	80	Yes (12%)	86.92	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Dudleya nesiotica	Santa Cruz Island dudleya	81	Yes (12%)	0	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	Medium
Dudleya verityi	Verity's dudleya	82	Yes (12%)	88.82	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Echinocactus horizonthalonius var. nicholii	Nichol's Turk's head cactus	83	Yes (12%)	28.25	Biotic - Outcrosser	Insect, Bird, Mammal	Unknown	Insect	Medium
Echinocereus chisoensis var. chisoensis	Chisos Mountain hedgehog Cactus	84	Yes (12%)	1.50	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	Medium
Echinocereus fendleri var. kuenzleri	Kuenzler hedgehog cactus	85	Yes (12%)	34.44	Biotic - Outcrosser	Insect, Bird, Mammal	Unknown	Insect	High
Echinocereus reichenbachii var. albertii	Black lace cactus	7	Yes (12%)	87.49	Biotic - Outcrosser	Insect, Bird, Mammal	No	Insect	High
Echinocereus viridiflorus var. davisii	Davis' green pitaya	86	Yes (12%)	1.50	Biotic - Outcrosser	Insect, Bird, Mammal	Yes	Insect	Medium
Echinomastus erectocentrus var. acunensis	Acuna Cactus	87	Yes (12%)	28.12	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	Medium
Echinomastus mariposensis	Lloyd's Mariposa cactus	88	Yes (12%)	4.52	Biotic - Outcrosser	Insect, Bird, Mammal	Unknown	Insect	Medium
Enceliopsis nudicaulis var. corrugata	Ash Meadows sunray	160	Yes (12%)	0.37	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium

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Eremalche kernensis	Kern mallow	89	Yes (12%)	179.28	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Eriastrum densifolium ssp. sanctorum	Santa Ana River woolly-star	161	Yes (12%)	152.51 (58.04)	Biotic - Outcrosser	Abiotic, Bird, Mammal	No	Insect, Bird	High
Eriogonum codium	Umtanum Desert buckwheat	90	Yes (12%)	0.38	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Eriogonum longifolium var. gnaphalifolium	Scrub buckwheat	17	Yes (12%)	122.47	Biotic - Outcrosser	Abiotic, Bird, Mammal	No Mention	Insect	High
Eriogonum ovalifolium var. vineum	Cushenbury buckwheat	162	Yes (12%)	0.001908	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Eriophyllum latilobum	San Mateo woolly sunflower	163	Yes (12%)	127.92	Biotic - Outcrosser	Abiotic	No Mention	Insect	High
Eryngium aristulatum var. parishii	San Diego button-celery	91	Yes (12%)	156.89	Biotic - Outcrosser	Abiotic	No Mention	Insect	Medium
Eryngium sparganophyllum	Arizona eryngo	188	Yes (12%)	13	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Erysimum capitatum var. angustatum	Contra Costa wallflower	92	Yes (12%)	196.51	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Erysimum teretifolium	Ben Lomond wallflower	93	Yes (12%)	123.15	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Eutrema penlandii	Penland alpine fen mustard	94	Yes (12%)	0.34	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Fremontodendron californicum ssp. decumbens	Pine Hill flannelbush	95	Yes (12%)	139.80	Biotic - Outcrosser	Abiotic, Biotic	Yes	Insect	High
Galactia smallii	Small's milkpea	96	Yes (12%)	84.02	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Galium buxifolium	Island bedstraw	164	Yes (12%)	0	Biotic - Outcrosser	Abiotic, Biotic	Unknown	Insect	Medium
Gilia tenuiflora ssp. hoffmannii	Hoffmann's slender-flowered gilia	97	Yes (12%)	0	Biotic - Outcrosser	Abiotic, Bird, Mammal	Unknown	Insect	Medium
Hackelia venusta	Showy stickseed	98	Yes (12%)	11.39	Biotic - Outcrosser	Abiotic, Biotic	No	Abiotic, Insect	High
Harrisia (=Cereus) aboriginum (=gracilis)	Aboriginal Prickly-apple	99	Yes (12%)	124.79	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Helenium virginicum	Virginia sneezeweed	165	Yes (12%)	12.89	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Helianthemum greenei	Island rush-rose	166	Yes (12%)	0	Biotic - Outcrosser	Abiotic, Insect, Bird	Unknown	Insect	Medium
Helianthus verticillatus	Whorled Sunflower	100	Yes (12%)	53.17	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Hesperolinon congestum	Marin dwarf-flax	167	Yes (12%)	143.22	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Hibiscus dasycalyx	Neches River rose-mallow	168	Yes (12%)	22.67	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Holocarpha macradenia	Santa Cruz tarplant	101	Yes (12%)	181.61	Biotic - Outcrosser	Abiotic	No	Insect	High
Hymenoxys herbacea	Lakeside daisy	102	Yes (12%)	79.85	Biotic - Outcrosser	Abiotic	No Mention	Abiotic, Insect	High

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Ipomopsis polyantha	Pagosa skyrocket	103	Yes (12%)	8.26	Biotic - Outcrosser	Abiotic, Bird, Mammal	No Mention	Insect	High
Ipomopsis sancti-spiritus	Holy Ghost ipomopsis	104	Yes (12%)	3.36	Biotic - Outcrosser	Abiotic, Bird, Mammal	No Mention	Insect	Medium
Ivesia webberi	Webber Ivesia	105	Yes (12%)	31.48	Biotic - Outcrosser	Abiotic	No Mention	Insect	Medium
Lasthenia burkei	Burke's goldfields	106	Yes (12%)	41.64	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Lasthenia conjugens	Contra Costa goldfields	107	Yes (12%)	54.01	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Layia carnosa	Beach layia	108	Yes (12%)	76.62	Biotic - Outcrosser	Abiotic	No Mention	Insect	Medium
Leavenworthia crassa	Fleshy-fruit gladecress	109	Yes (12%)	109.57	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Lepidium barnebyanum	Barneby ridge-cress	110	Yes (12%)	112.27	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Lepidium papilliferum	Slickspot peppergrass	18	Yes (12%)	110.05	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Lesquerella congesta	Dudley Bluffs bladderpod	111	Yes (12%)	31.67	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Lessingia germanorum (=L.g. var. germanorum)	San Francisco lessingia	112	Yes (12%)	143.33	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Abiotic, Insect	High
Liatris helleri	Heller's blazingstar	169	Yes (12%)	37.54	Biotic - Outcrosser	Abiotic	No Mention	Insect	High
Liatris ohlingerae	Scrub blazingstar	8	Yes (12%)	111.25	Biotic - Outcrosser	Abiotic	No Mention	Insect	High
Limnanthes vinculans	Sebastopol meadowfoam	113	Yes (12%)	166.39 (29.62)	Biotic - Outcrosser	Abiotic, Bird, Mammal	No Mention	Insect, Bird	High
Lindera melissifolia	Pondberry	170	Yes (12%)	132.70	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Linum carteri carteri	Carter's small-flowered flax	114	Yes (12%)	84.02	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Lithophragma maximum	San Clemente Island woodland-star	115	Yes (12%)	72.92	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Lupinus aridorum	Scrub lupine	9	Yes (12%)	143.11	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Lupinus nipomensis	Nipomo Mesa lupine	116	Yes (12%)	76.45	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Lupinus sulphureus ssp. kincaidii	Kincaid's Lupine	23	Yes (12%)	77.11	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Lysimachia asperulaefolia	Rough-leaved loosestrife	172	Yes (12%)	134.78	Biotic - Outcrosser	Abiotic, Bird, Mammal	No Mention	Insect	High
Macbridea alba	White birds-in-a-nest	24	Yes (12%)	83.82	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Malacothrix indecora	Santa Cruz Island malacothrix	117	Yes (12%)	0	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Manihot walkerae	Walker's manioc	10	Yes (12%)	118.99	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Marshallia mohrii	Mohr's Barbara button	173	Yes (12%)	62.11	Biotic - Outcrosser	Bird, Mammal	No Mention	Insect	High
Mimulus fremontii var. vandenbergensis	Vandenberg monkeyflower	118	Yes (12%)	87.55	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Mirabilis macfarlanei	MacFarlane's four-o'clock	119	Yes (12%)	14.39	Biotic - Outcrosser	Abiotic	No Mention	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
Oenothera deltoides ssp. howellii	Antioch Dunes evening-primrose	120	Yes (12%)	209.63	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Opuntia treleasei	Bakersfield cactus	121	Yes (12%)	228.96	Biotic - Outcrosser	Biotic	No Mention	Insect	High
Oxytropis campestris var. chartacea	Fassett's locoweed	174	Yes (12%)	56.30	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Pediocactus bradyi	Brady pincushion cactus	122	Yes (12%)	48.96	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	Medium
Pediocactus despainii	San Rafael cactus	175	Yes (12%)	16.49	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	Medium
Pediocactus knowltonii	Knowlton's cactus	123	Yes (12%)	88.93	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	High
Pediocactus peeblesianus var. fickeiseniae	Fickeisen plains cactus	176	Yes (12%)	54.31	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	Medium
Pediocactus winkleri	Winkler cactus	177	Yes (12%)	2.73	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	Medium
Pentachaeta bellidiflora	White-rayed pentachaeta	124	Yes (12%)	135.10	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Pentachaeta lyonii	Lyon's pentachaeta	178	Yes (12%)	113.47	Biotic - Outcrosser	Abiotic	No	Insect	Medium
Phacelia argillacea	Clay phacelia	125	Yes (12%)	26.62	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Phacelia formosula	North Park phacelia	126	Yes (12%)	55.93	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Phacelia submutica	DeBeque phacelia	179	Yes (12%)	75.56	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Phlox hirsuta	Yreka phlox	127	Yes (12%)	25.42	Biotic - Outcrosser	Abiotic, Bird, Mammal	Unknown	Insect	High
Phlox nivalis ssp. texensis	Texas trailing phlox	128	Yes (12%)	18.56	Biotic - Outcrosser	Abiotic, Bird, Mammal	No Mention	Insect	High
Physaria douglasii ssp. tuplashensis	White Bluffs bladderpod	129	Yes (12%)	8.14	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Physaria filiformis	Missouri bladderpod	25	Yes (12%)	23.64	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Physaria globosa	Short's bladderpod	180	Yes (12%)	46.88	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Physaria obcordata	Dudley Bluffs twinpod	130	Yes (12%)	25.99	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Plagiobothrys hirtus	rough popcornflower	131	Yes (12%)	19.41	Biotic - Outcrosser	Biotic	Unknown	Insect	High
Pogogyne abramsii	San Diego mesa-mint	181	Yes (12%)	166.10	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Polygonella basiramia	Wireweed	11	Yes (12%)	111.25	Biotic - Outcrosser	Abiotic	No Mention	Insect	High
Polygonella myriophylla	Sandlace	12	Yes (12%)	123.83	Biotic - Outcrosser	Abiotic	No Mention	Insect	High
Potentilla hickmanii	Hickman's potentilla	132	Yes (12%)	97.00	Biotic - Outcrosser	Abiotic, Biotic	Unknown	Insect	High
Prunus geniculata	Scrub plum	19	Yes (12%)	125.27	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Pseudobahia bahiifolia	Hartweg's golden sunburst	133	Yes (12%)	181.85	Biotic - Outcrosser	Abiotic	Unknown	Insect	High
Pseudobahia peirsonii	San Joaquin adobe sunburst	182	Yes (12%)	180.01	Biotic - Outcrosser	Abiotic, Biotic	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
Purshia (=Cowania) subintegra	Arizona Cliff-rose	134	Yes (12%)	7.26	Biotic - Outcrosser	Abiotic	No Mention	Insect	Medium
Sarracenia rubra ssp. alabamensis	Alabama canebrake pitcher-plant	135	Yes (12%)	75.57	Biotic - Outcrosser	Abiotic, Bird, Mammal	No Mention	Insect	High
Schoenocrambe barnebyi	Barneby reed-mustard	136	Yes (12%)	6.37	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	Medium
Sclerocactus brevihamatus ssp. tobuschii	Tobusch fishhook cactus	26	Yes (12%)	47.33	Biotic - Outcrosser	Insect, Bird, Mammal	No	Insect	High
Sclerocactus brevispinus	Pariette cactus	137	Yes (12%)	83.16	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	High
Sclerocactus glaucus	Colorado hookless Cactus	183	Yes (12%)	85.16	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	High
Sclerocactus mesae-verdae	Mesa Verde cactus	184	Yes (12%)	90.84	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	Medium
Sclerocactus wetlandicus	Uinta Basin hookless cactus	138	Yes (12%)	49.36	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	High
Sclerocactus wrightiae	Wright fishhook cactus	185	Yes (12%)	8.43	Biotic - Outcrosser	Insect, Bird, Mammal	No Mention	Insect	Medium
Senecio layneae	Layne's butterweed	139	Yes (12%)	94.55	Biotic - Outcrosser	Abiotic, Biotic	Unknown	Insect	High
Sidalcea oregana var. calva	Wenatchee Mountains checkermallow	140	Yes (12%)	16.02	Biotic - Outcrosser	Abiotic, Biotic	Unknown	Insect	High
Silene spaldingii	Spalding's Catchfly	186	Yes (12%)	101.50	Biotic - Outcrosser	Abiotic	Yes	Insect	High
Solidago houghtonii	Houghton's goldenrod	27	Yes (12%)	26.09	Biotic - Outcrosser	Abiotic	No Mention	Insect	High
Solidago shortii	Short's goldenrod	141	Yes (12%)	71.96	Biotic - Outcrosser	Bird	No Mention	Insect	High
Streptanthus albidus ssp. albidus	Metcalf Canyon jewelflower	142	Yes (12%)	166.71	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Thymophylla tephroleuca	Ashy dogweed	143	Yes (12%)	27.85	Biotic - Outcrosser	Abiotic, Biotic	No	Insect	High
Townsendia aprica	Last Chance townsendia	187	Yes (12%)	14.17	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Abiotic, Insect	Medium
Trifolium trichocalyx	Monterey clover	144	Yes (12%)	22.22	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Verbena californica	Red Hills vervain	145	Yes (12%)	98.50	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High
Warea amplexifolia	Wide-leaf warea	13	Yes (12%)	140.45	Biotic - Outcrosser	Abiotic, Biotic	No Mention	Insect	High

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

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 Uses Agricultural and Residential)*	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
Abronia macrocarpa	Large-fruited sand-verbena	28	1816287.67	0.00	0		9.65	0.04	2.50		Standard	Low
Acanthomintha obovata ssp. duttonii	San Mateo thornmint	29	102994.91	12.64	100		57.09	87.84	3.02	2.845	CalPUR	Low
Acmispon dendroideus var. traskiae (=Lotus d. ssp. traskiae)	San Clemente Island lotus (=broom)	146	709782.90	54.32	100		19.15	45.96	1.01	0.962	CalPUR	Low
Aeschynomene virginica	Sensitive joint-vetch	30	2906274.86	9.93	0		12.77	47.80	1.16**		Standard	Low
Agalinis acuta	Sandplain gerardia	20	1813247.27	1.96	0		26.97	50.45	1.76		Standard	Low
Amorpha crenulata	Crenulate lead-plant	31	1552659.59	46.08	0		19.38	47.36	1.76**		Standard	Low
Amsinckia grandiflora	Large-flowered fiddleneck	32	206109.40	4.80	100		14.93	95.52	3.27	0.590**	CalPUR	Low
Amsonia kearneyana	Kearney's blue-star	33	162062.20	4.15	0		0.18	0	0.01		Standard	Low
Apios priceana	Price's potato-bean	21	10700912.10	7.83	0		11.53	15.52	0.93		Standard	Low
Arabis georgiana	Georgia rockcress	34	3439388.76	9.83	0		13.53	22.16	1.84		Standard	Low
Arabis serotina	Shale barren rock cress	147	1527027.36	36.04	0		4.02	34.38	0.28		Standard	Low
Arctostaphylos confertiflora	Santa Rosa Island manzanita	35	43469.78	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	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 Uses Agricultural and Residential)*	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 glandulosa ssp. crassifolia	Del Mar manzanita	148	180066.80	11.07	100		2.21	3.27	0.12	0.147	CalPUR	Low
Arctostaphylos hookeri var. ravenii	Presidio Manzanita	36	52811.32	8.35	100		84.08	42.14	4.51	4.188	CalPUR	Low
Arctostaphylos morroensis	Morro manzanita	37	431126.80	45.69	99	100% range is in CA.	9.50	54.19	2.33	0.397	CalPUR	Low
Arctostaphylos myrtifolia	Ione manzanita	38	337398.23	1.75	100		3.22	49.42	0.44	0.153	CalPUR	Low
Arctostaphylos pallida	Pallid manzanita	39	104845.67	0.34	100		4.29	8.11	0.22	0.214	CalPUR	Low
Arenaria ursina	Bear Valley sandwort	149	138098.32	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Argemone pleiacantha ssp. pinnatisecta	Sacramento prickly poppy	40	4241623.73	71.45	0		0.41	0.01	0.04		Standard	Low
Argythamnia blodgettii	Blodgett's silverbush	41	3947860.80	48.40	0		8.16	25.22	0.72**		Standard	Low
Asimina tetramera	Four-petal pawpaw	150	2009101.72	0.19	0		42.79	92.45	3.61		Standard	Low
Astragalus albens	Cushenbury milk-vetch	42	68987.91	100.00	100		0	0	0	0	Standard	Low
Astragalus ampullarioides	Shivwits milk-vetch	43	64527.96	35.56	0		4.98	65.14	0.64		Standard	Low
Astragalus bibullatus	Guthrie's (=Pyne's) ground-plum	44	736042.94	0.12	0		30.11	99.09	1.88		Standard	Low
Astragalus holmgreniorum	Holmgren milk-vetch	45	201531.47	75.98	0		3.61	24.38	0.37**		Standard	Low
Astragalus humillimus	Mancos milk-vetch	46	3639296.42	24.77	0		3.77	75.57	0.51**		Standard	Low
Astragalus jaegerianus	Lane Mountain milk-vetch	47	136602.01	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low

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Astragalus lentiginosus var. coachellae	Coachella Valley milk-vetch	151	227906.75	84.54	100		4.77	15.89	0.26	0.235	CalPUR	Low
Astragalus lentiginosus var. piscinensis	Fish Slough milk-vetch	48	151624.86	65.09	100	No CA usage overlap	3.02	31.60	0.34	0.138	CalPUR	Low
Astragalus magdalenae var. peirsonii	Peirson's milk-vetch	49	211416.02	99.99	98	100% range is in CA.	0	0.03	0	0	CalPUR	Low
Astragalus montii	Heliotrope milk-vetch	50	6439.59	100.00	0		0	0	0		Standard	Low
Astragalus osterhoutii	Osterhout milkvetch	51	292206.62	33.66	0		1.79	0	0.27		Standard	Low
Astragalus pycnostachyus var. lanosissimus	Ventura Marsh Milk-vetch	52	251217.94	17.16	100		65.50	83.20	5.10	5.040	CalPUR	Low
Astragalus robbinsii var. jesupi	Jesup's milk-vetch	53	506.30	0.00	0		0.000101	0	2.1E-05		Standard	Low
Astrophytum asterias	Star cactus	14	1799512.69	2.24	0		34.34	54.83	8.26		Standard	Medium
Ayenia limitaris	Texas ayenia	1	2330416.93	7.27	0		44.57	66.12	10.47		Standard	High
Baptisia arachnifera	Hairy rattleweed	152	270647.11	0.00	0		10.10	40.52	5.10		Standard	Medium
Berberis nevinii	Nevin's barberry	54	713144.15	23.89	100		40.35	72.83	2.81	2.000	CalPUR	Low
Blennosperma bakeri	Sonoma sunshine	55	333112.43	0.99	100		32.06	99.21	10.79	1.062	CalPUR	Low
Boltonia decurrens	Decurrent false aster	153	10983130.26	1.15	0		35.76	40.46	1.18		Standard	Low
Brickellia mosieri	Florida brickell-bush	56	1552659.59	46.08	0		19.38	47.36	1.76**		Standard	Low
Callirhoe scabriuscula	Texas poppy-mallow	2	1856984.28	0.00	0		25.61	0.12	17.33		Standard	High
Calochortus tiburonensis	Tiburon mariposa lily	57	11527.87	0.00	96	100% range is in CA.	71.97	100.25	4.01	3.579	CalPUR	Low

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Calystegia stebbinsii	Stebbins' morning-glory	58	223202.10	6.40	100		15.07	93.73	0.82	0.753	CalPUR	Low
Castilleja affinis ssp. neglecta	Tiburon paintbrush	59	150681.55	13.69	100		20.65	86.79	2.31	1.101	CalPUR	Low
Castilleja cinerea	Ash-grey paintbrush	154	147985.14	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Castilleja levisecta	Golden Paintbrush	15	3351143.02	4.56	0		29.03	41.18	5.11		Standard	Medium
Cereus eriophorus var. fragrans	Fragrant prickly-apple	3	835268.44	0.05	0		36.57	88.16	19.45		Standard	High
Chamaecrista lineata keyensis	Big Pine partridge pea	60	2395377.96	49.92	0		0.88	10.88	0.05		Standard	Low
Chamaesyce deltoidea pinetorum	Pineland sandmat	61	1552659.59	46.08	0		19.38	47.36	1.76**		Standard	Low
Chamaesyce deltoidea serpyllum	Wedge spurge	62	2395377.74	49.92	0		0.88	10.88	0.05		Standard	Low
Chorizanthe pungens var. hartwegiana	Ben Lomond spineflower	63	162912.54	0.01	100		12.10	100.46	0.67	0.641	CalPUR	Low
Chromolaena frustrata	Cape Sable Thoroughwort	64	3947861.29	48.40	0		8.16	25.22	0.72**		Standard	Low
Chrysopsis floridana	Florida golden aster	16	1607978.13	0.35	0		32.07	55.79	7.86		Standard	Medium
Cirsium fontinale var. fontinale	Fountain thistle	65	100854.85	12.87	100		56.75	87.68	3.01	2.828	CalPUR	Low
Cirsium pitcheri	Pitcher's thistle	22	32843803.61	7.49	0		9.23	3.51	0.75		Standard	Low
Cirsium wrightii	Wright's marsh thistle	155	20991955.61	43.33	0		2.98	27.91	0.37		Standard	Low
Conradina etonia	Etonia rosemary	156	529522.34	5.28	0		12.67	94.86	1.09		Standard	Low
Conradina glabra	Apalachicola rosemary	66	539571.47	52.46	0		2.13	47.83	0.24		Standard	Low

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Conradina verticillata	Cumberland rosemary	157	1951973.62	18.89	0		6.57	0	0.44		Standard	Low
Cordylanthus mollis ssp. mollis	Soft bird's-beak	67	115334.69	0.84	76	100% range is in CA.	13.69	67.05	1.85	0.553	CalPUR	Low
Cordylanthus palmatus	Palmate-bracted bird's beak	68	601393.92	3.87	100		79.18	96.55	38.77	1.716**	CalPUR	Low
Cordylanthus tenuis ssp. capillaris	Pennell's bird's-beak	69	112088.66	0.00	100		19.94	100.47	14.75	0.318	CalPUR	Low
Coryphantha minima	Nellie cory cactus	70	3961761.08	20.50	0		0.20	0	0.01		Standard	Low
Coryphantha ramillosa	Bunched cory cactus	71	5470491.19	14.85	0		0.23	0.01	0.01		Standard	Low
Coryphantha robbinsiorum	Cochise pincushion cactus	72	86939.44	17.53	0		0.43	0	0.02		Standard	Low
Crotalaria avonensis	Avon Park harebells	4	1995189.22	5.52	0		25.66	61.96	13.19		Standard	High
Cryptantha crassipes	Terlingua Creek cat's-eye	73	3961761.08	20.50	0		0.20	0	0.01		Standard	Low
Cucurbita okeechobeensis ssp. okeechobeensis	Okeechobee gourd	5	280618.20	0.00	0		25.50	100.43	7.77**		Standard	Medium
Dalea carthagenensis floridana	Florida prairie-clover	74	6950253.37	37.08	0		17.82	44.71	1.75		Standard	Low
Deeringothamnus pulchellus	Beautiful pawpaw	75	1968572.72	0.24	0		31.45	85.98	4.24**		Standard	Low
Deinandra (=Hemizonia) conjugens	Otay tarplant	158	107715.76	6.68	100		53.61	93.83	2.76	2.675	CalPUR	Low
Deinandra increscens ssp. villosa	Gaviota Tarplant	76	225253.13	28.16	100		7.94	70.90	3.24	0.590	CalPUR	Low

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Delphinium bakeri	Baker's larkspur	77	164464.11	5.59	100		6.12	94.72	1.71	0	CalPUR	Low
Dicerandra cornutissima	Longspurred mint	78	1064411.07	30.28	0		15.22	69.85	1.52		Standard	Low
Dicerandra immaculata	Lakela's mint	6	1317188.00	0.11	0		31.84	88.76	15.33		Standard	High
Dodecahema leptoceras	Slender-horned spineflower	159	1089996.97	41.11	100		20.47	59.01	1.56	0.982	CalPUR	Low
Dudleya cymosa ssp. marcescens	Marcescent dudleya	79	125080.24	75.81	100		12.90	24.44	0.68	1.114	CalPUR	Low
Dudleya cymosa ssp. ovatifolia	Santa Monica Mountains dudleyea	80	391340.38	49.32	100		25.79	51.02	1.33	1.489	CalPUR	Low
Dudleya nesiotica	Santa Cruz Island dudleya	81	10233.05	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Dudleya verityi	Verity's dudleya	82	135845.52	50.31	100		26.39	49.95	1.36	1.751	CalPUR	Low
Echinocactus horizonthalonius var. nicholii	Nichol's Turk's head cactus	83	483059.06	32.06	0		0.27	26.75	0.07		Standard	Low
Echinocereus chisoensis var. chisoensis	Chisos Mountain hedgehog Cactus	84	3961761.08	20.50	0		0.20	0	0.01		Standard	Low
Echinocereus fendleri var. kuenzleri	Kuenzler hedgehog cactus	85	13908186.91	49.92	0		1.97	27.54	0.34		Standard	Low
Echinocereus reichenbachii var. albertii	Black lace cactus	7	2508740.63	2.72	0		17.30	22.20	7.19		Standard	Medium
Echinocereus viridiflorus var. davisii	Davis' green pitaya	86	3961761.08	20.50	0		0.20	0	0.01		Standard	Low

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Echinomastus erectocentrus var. acunensis	Acuna Cactus	87	803090.25	69.17	0		1.21	24.52	0.26		Standard	Low
Echinomastus mariposensis	Lloyd's Mariposa cactus	88	10984805.71	7.39	0		0.82	0.01	0.14		Standard	Low
Enceliopsis nudicaulis var. corrugata	Ash Meadows sunray	160	1447310.70	97.55	0	Only found in NV.	0.13	0	0.01		Standard	Low
Eremalche kernensis	Kern mallow	89	748570.58	23.15	100		44.34	76.55	21.11	0.701	CalPUR	Low
Eriastrum densifolium ssp. sanctorum	Santa Ana River woolly-star	161	148257.30	19.96	100		58.08	76.37	2.98	3.027	CalPUR	Low
Eriogonum codium	Umtanum Desert buckwheat	90	4667.79	36.53	0		0.001674	0.35	0.001283**		Standard	Low
Eriogonum longifolium var. gnaphalifolium	Scrub buckwheat	17	5406075.19	9.77	0		21.17	78.25	5.67**		Standard	Medium
Eriogonum ovalifolium var. vineum	Cushenbury buckwheat	162	128165.21	100.00	0	100% range is in CA.	0	0.001908	0	0	CalPUR	Low
Eriophyllum latilobum	San Mateo woolly sunflower	163	140450.22	13.81	100		27.35	86.82	1.52	1.371	CalPUR	Low
Eryngium aristulatum var. parishii	San Diego button-celery	91	333606.20	15.08	100		54.80	85.47	2.96	2.735	CalPUR	Low
Eryngium sparganophyllum	Arizona eryngo	188	9,860,586	28.13	0		5.75	0.0127	0.57		Standard	Low
Erysimum capitatum var. angustatum	Contra Costa wallflower	92	37611.82	0.00	100		36.36	78.56	11.90	0.955	CalPUR	Low
Erysimum teretifolium	Ben Lomond wallflower	93	162912.54	0.01	100		12.10	100.46	0.67	0.641	CalPUR	Low

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Eutrema penlandii	Penland alpine fen mustard	94	224162.01	93.73	0		0.11	0	0.01		Standard	Low
Fremontodendron californicum ssp. decumbens	Pine Hill flannelbush	95	111641.54	3.73	100		22.42	96.85	1.20	1.117	CalPUR	Low
Galactia smallii	Small's milkpea	96	1552659.59	46.08	0		19.38	47.36	1.76**		Standard	Low
Galium buxifolium	Island bedstraw	164	18660.79	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Gilia tenuiflora ssp. hoffmannii	Hoffmann's slender-flowered gilia	97	43469.78	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Hackelia venusta	Showy stickseed	98	284421.95	85.48	0		4.43	0	2.33		Standard	Low
Harrisia (=Cereus) aboriginum (=gracilis)	Aboriginal Prickly-apple	99	1789935.38	0.26	0		28.33	80.24	3.82**		Standard	Low
Helenium virginicum	Virginia sneezeweed	165	4173793.75	17.95	0		4.26	0.001699	0.39		Standard	Low
Helianthemum greenei	Island rush-rose	166	62133.23	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Helianthus verticillatus	Whorled Sunflower	100	1773971.18	8.60	0		12.41	0.04	1.79		Standard	Low
Hesperolinon congestum	Marin dwarf-flax	167	305497.80	16.09	0		40.07	79.93	3.33	0.001	Standard	Low
Hibiscus dasycalyx	Neches River rose-mallow	168	3141961.22	14.69	0		3.88	11.26	0.27		Standard	Low
Holocarpha macradenia	Santa Cruz tarplant	101	472427.72	1.32	100		38.07	99.03	3.65	5.268	CalPUR	Medium
Hymenoxys herbacea	Lakeside daisy	102	3081948.86	7.61	0		20.83	30.47	2.43		Standard	Low
Ipomopsis polyantha	Pagosa skyrocket	103	148302.65	38.46	0		2.26	0	0.27		Standard	Low
Ipomopsis sancti-spiritus	Holy Ghost ipomopsis	104	3031043.42	13.98	0		0.59	0.01	0.10		Standard	Low

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Ivesia webberi	Webber Ivesia	105	390267.13	66.37	36	Other portion of range occurs in NV	6.10	21.74	0.40	No info	Standard	Low
Lasthenia burkei	Burke's goldfields	106	3158891.41	15.60	100		7.98	23.54	1.19	0.348	CalPUR	Low
Lasthenia conjugens	Contra Costa goldfields	107	3225519.47	15.13	100		14.01	24.50	2.16	0.886	CalPUR	Low
Layia carnosa	Beach layia	108	380377.69	38.95	100		10.26	56.87	0.66	1.239	CalPUR	Low
Leavenworthia crassa	Fleshy-fruit gladecress	109	338579.44	8.25	0		14.05	53.78	2.06		Standard	Low
Lepidium barnebyanum	Barneby ridge-cress	110	42248.40	0.00	0		2.34	101.08	0.27**		Standard	Low
Lepidium papilliferum	Slickspot peppergrass	18	2341080.00	53.72	0		22.01	36.98	7.25		Standard	Medium
Lesquerella congesta	Dudley Bluffs bladderpod	111	2063105.34	73.74	0		1.14	26.73	0.76**		Standard	Low
Lessingia germanorum (=L.g. var. germanorum)	San Francisco lessingia	112	53482.54	8.45	99	100% range is in CA.	83.56	41.94	4.49	4.161	CalPUR	Low
Liatris helleri	Heller's blazingstar	169	1406919.10	31.00	0		9.26	0	0.81		Standard	Low
Liatris ohlingerae	Scrub blazingstar	8	1995300.46	5.52	0		25.66	61.96	13.19		Standard	High
Limnanthes vinculans	Sebastopol meadowfoam	113	334785.79	2.33	100		30.77	97.99	10.58	0.954	CalPUR	Low
Lindera melissifolia	Pondberry	170	16148077.71	8.71	0		22.81	44.30	1.54		Standard	Low
Linum carteri carteri	Carter's small-flowered flax	114	1552659.59	46.08	0		19.38	47.36	1.76**		Standard	Low
Lithophragma maximum	San Clemente Island woodland-star	115	709782.90	54.32	100		19.15	45.96	1.01	0.962	CalPUR	Low
Lupinus aridorum	Scrub lupine	9	2893427.28	1.85	0		23.76	98.17	7.05		Standard	Medium
Lupinus nipomensis	Nipomo Mesa lupine	116	346632.67	54.45	100		9.69	45.91	3.04	2.650	CalPUR	Low

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Lupinus sulphureus ssp. kincaidii	Kincaid's Lupine	23	9684915.09	25.10	0		10.81	30.33	1.92		Standard	Low
Lysimachia asperulaefolia	Rough-leaved loosestrife	172	7995599.83	8.23	0		14.40	64.70	0.79		Standard	Low
Macbridea alba	White birds-in-a-nest	24	2340978.89	14.81	0		5.06	63.47	0.32		Standard	Low
Malacothrix indecora	Santa Cruz Island malacothrix	117	62133.23	100.00	100	Only occurs on Federal Lands	0	0	0	No usage overlap	CalPUR	Low
Manihot walkerae	Walker's manioc	10	2948802.00	1.37	0		23.00	33.46	5.15**		Standard	Medium
Marshallia mohrii	Mohr's Barbara button	173	2781248.27	10.88	0		10.65	25.61	1.05		Standard	Low
Mimulus fremontii var. vandenbergensis	Vandenberg monkeyflower	118	1634500.58	46.39	100		10.01	52.59	3.43	2.372	CalPUR	Low
Mirabilis macfarlanei	MacFarlane's four-o'clock	119	2403854.22	54.39	0		3.21	0.01	2.05		Standard	Low
Oenothera deltoides ssp. howellii	Antioch Dunes evening-primrose	120	263540.19	2.08	97	100% range is in CA.	46.45	89.42	10.87	1.790	CalPUR	Low
Opuntia treleasei	Bakersfield cactus	121	584453.76	3.79	100		52.13	76.23	26.50	1.560	CalPUR	Low
Oxytropis campestris var. chartacea	Fassett's locoweed	174	3188457.13	10.97	0		12.85	0	2.47		Standard	Low
Pediocactus bradyi	Brady pincushion cactus	122	421510.39	51.99	0		0.23	48.26	0.01		Standard	Low
Pediocactus despainii	San Rafael cactus	175	3465480.64	83.60	0		1.32	12.69	0.68		Standard	Low
Pediocactus knowltonii	Knowlton's cactus	123	3954597.21	23.64	0		4.13	73.69	0.94**		Standard	Low

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Pediocactus peeblesianus var. fickeiseniae	Fickeisen plains cactus	176	3964591.72	46.45	0		0.14	53.69	0.01		Standard	Low
Pediocactus winkleri	Winkler cactus	177	592750.25	89.79	0		0.14	2.16	0.09		Standard	Low
Pentachaeta bellidiflora	White-rayed pentachaeta	124	211316.12	21.38	100		51.37	66.77	2.80	2.557	CalPUR	Low
Pentachaeta lyonii	Lyon's pentachaeta	178	405731.80	32.77	100		29.29	67.58	1.60	1.642	CalPUR	Low
Phacelia argillacea	Clay phacelia	125	170940.49	67.72	0		1.46	23.07	0.72		Standard	Low
Phacelia formosula	North Park phacelia	126	2101636.82	55.82	0		6.54	32.87	2.10		Standard	Low
Phacelia submutica	DeBeque phacelia	179	748186.74	45.72	0		8.74	55.03	3.83**		Standard	Low
Phlox hirsuta	Yreka phlox	127	679300.40	33.82	100		9.08	0	5.82	0.181	CalPUR	Low
Phlox nivalis ssp. texensis	Texas trailing phlox	128	1883682.78	4.14	0		7.02	0.06	0.41		Standard	Low
Physaria douglasii ssp. tuplashensis	White Bluffs bladderpod	129	9712.91	99.81	0		0.92	3.03	0.77		Standard	Low
Physaria filiformis	Missouri bladderpod	25	3753650.34	9.41	0		9.22	0.02	0.72		Standard	Low
Physaria globosa	Short's bladderpod	180	4272692.86	2.61	0		15.18	7.84	1.05		Standard	Low
Physaria obcordata	Dudley Bluffs twinpod	130	359999.22	78.04	0		0.78	22.68	0.54		Standard	Low
Plagiobothrys hirtus	rough popcornflower	131	207662.02	7.74	0		6.21	0	0.39		Standard	Low
Pogogyne abramsii	San Diego mesa-mint	181	90207.51	17.58	100		67.86	82.88	3.52	3.386	CalPUR	Low
Polygonella basiramia	Wireweed	11	1995189.22	5.52	0		25.66	61.96	13.19		Standard	High
Polygonella myriophylla	Sandlace	12	3601419.30	3.06	0		23.75	78.92	7.97**		Standard	Medium

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Potentilla hickmanii	Hickman's potentilla	132	58470.26	28.91	100		33.92	42.68	1.95	1.684	CalPUR	Low
Prunus geniculata	Scrub plum	19	3378126.17	6.10	0		26.13	74.73	8.54**		Standard	Medium
Pseudobahia bahiifolia	Hartweg's golden sunburst	133	451597.98	2.62	100		35.59	82.30	16.11	0.475	CalPUR	Low
Pseudobahia peirsonii	San Joaquin adobe sunburst	182	810017.89	0.62	100		42.21	53.32	18.49	0.956	CalPUR	Low
Purshia (=Cowania) subintegra	Arizona Cliff-rose	134	946174.12	65.63	0		0.93	4.66	0.07		Standard	Low
Sarracenia rubra ssp. alabamensis	Alabama canebrake pitcher-plant	135	733573.54	1.81	0		10.08	13.53	2.01		Standard	Low
Schoenocrambe barnebyi	Barneby reed-mustard	136	462168.20	90.21	0		0.45	4.78	0.24		Standard	Low
Sclerocactus brevihamatus ssp. tobuschii	Tobusch fishhook cactus	26	9041856.12	0.57	0		5.53	22.31	1.95		Standard	Low
Sclerocactus brevispinus	Pariette cactus	137	187439.44	40.20	0		6.00	60.18	3.85**		Standard	Low
Sclerocactus glaucus	Colorado hookless Cactus	183	1439268.27	44.35	0		11.43	47.26	2.70**		Standard	Low
Sclerocactus mesae-verdae	Mesa Verde cactus	184	3823928.91	23.84	0		3.99	76.50	0.74**		Standard	Low
Sclerocactus wetlandicus	Uinta Basin hookless cactus	138	957545.15	60.74	0		2.39	39.74	1.50**		Standard	Low
Sclerocactus wrightiae	Wright fishhook cactus	185	993638.50	87.68	0		0.29	7.27	0.16		Standard	Low
Senecio layneae	Layne's butterweed	139	484008.02	22.69	100		7.37	77.73	0.41	0.367	CalPUR	Low

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Sidalcea oregana var. calva	Wenatchee Mountains checkermallow	140	129387.37	74.84	100		6.70	0	4.06		CalPUR	Low
Silene spaldingii	Spalding's Catchfly	186	9650190.53	18.71	0		40.30	9.10	3.82		Standard	Low
Solidago houghtonii	Houghton's goldenrod	27	8987359.52	11.04	0		4.92	0	0.97		Standard	Low
Solidago shortii	Short's goldenrod	141	924700.41	0.01	0		8.92	33.63	2.10		Standard	Low
Streptanthus albidus ssp. albidus	Metcalf Canyon jewelflower	142	264271.98	0.00	100		34.09	100.10	3.06	1.972	CalPUR	Low
Thymophylla tephroleuca	Ashy dogweed	143	3623217.16	0.35	0		7.41	1.62	1.95		Standard	Low
Townsendia aprica	Last Chance townsendia	187	1002374.00	87.20	0		1.38	10.29	1.04		Standard	Low
Trifolium trichocalyx	Monterey clover	144	279567.54	0.34	100		11.52	1.16	0.61	0.574	CalPUR	Low
Verbena californica	Red Hills vervain	145	113167.69	14.29	100		4.21	86.37	0.27	0.208**	CalPUR	Low
Warea amplexifolia	Wide-leaf warea	13	3633451.58	4.11	0		22.42	95.91	6.67		Standard	Medium

* 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 substantially reduced by the mosquito adulticide timing restriction conservation measure described below, thus substantially limiting reproductive effects to these species.

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: The reduction in the maximum application rate for citrus (in California instead of reducing application rates, users can only apply once per year by ground application only) is anticipated to reduce potential environmental concentrations to one-third of modeled values, reducing the effects to species and their pollinators/seed dispersers on and adjacent to these use areas.

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, a number of species will also have species-specific conservation measures, which will fall into one of two types: measures that would allow for a choice of application restrictions, or avoidance of areas in which the species occurs (for mosquito adulticide applications near the specified species).

The first type of measure applies to: Avon Park harebells, fragrant prickly-apple, Lakela’s mint, scrub blazingstar, scrub lupine, wireweed, wide-leaf warea, Texas ayenia, and Texas poppy-mallow.

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 particular species in this assessment group, 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.

For the Fragrant prickly-apple, mosquito adulticide applicators must avoid application within, and 200 feet surrounding the suitable habitat of this species from April to December (the flowering period of this species, when pollinators are more likely to be present in proximity to the suitable habitat of this species), where feasible. If avoidance is not feasible, or impairs the ability of the mosquito control district or agency to protect the public's health and welfare, applicators must coordinate with the local FWS Ecological Services field office to determine appropriate measures to ensure the proposed application is likely to have no more than minor effects on the species (FWS points of contact and maps of designated critical habitat are available through the Information, Planning, and Consultation (IPaC) website https://ecos.fws.gov/ipac). The applicator must retain documentation of this technical assistance and the agreed-upon species-specific measures that were implemented.

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	*Ayenia limitaris*	Texas ayenia	High	High	High	NJ
2	*Callirhoe scabriuscula*	Texas poppy-mallow	High	High	High	NJ
3	*Cereus eriophorus var. fragrans*	Fragrant prickly-apple	High	High	High	NJ
4	*Crotalaria avonensis*	Avon Park harebells	High	High	High	NJ
5	*Cucurbita okeechobeensis ssp. okeechobeensis*	Okeechobee gourd	High	High	Medium	NJ
6	*Dicerandra immaculata*	Lakela's mint	High	High	High	NJ
7	*Echinocereus reichenbachii var. albertii*	Black lace cactus	High	High	Medium	NJ
8	*Liatris ohlingerae*	Scrub blazingstar	Medium	High	High	NJ
9	*Lupinus aridorum*	Scrub lupine	High	High	Medium	NJ
10	*Manihot walkerae*	Walker's manioc	High	High	Medium	NJ
11	*Polygonella basiramia*	Wireweed	High	High	High	NJ
12	*Polygonella myriophylla*	Sandlace	High	High	Medium	NJ
13	*Warea amplexifolia*	Wide-leaf warea	High	High	Medium	NJ
14	*Astrophytum asterias*	Star cactus	Medium	High	Medium	NJ
15	*Castilleja levisecta*	Golden Paintbrush	Medium	High	Medium	NJ
16	*Chrysopsis floridana*	Florida golden aster	Low	High	Medium	NJ
17	*Eriogonum longifolium var. gnaphalifolium*	Scrub buckwheat	Medium	High	Medium	NJ
18	*Lepidium papilliferum*	Slickspot peppergrass	Medium	High	Medium	NJ
19	*Prunus geniculata*	Scrub plum	Medium	High	Medium	NJ
20	*Agalinis acuta*	Sandplain gerardia	Low	High	Low	NJ
21	*Apios priceana*	Price's potato-bean	Low	High	Low	NJ
22	*Cirsium pitcheri*	Pitcher's thistle	Low	High	Low	NJ

23	*Lupinus sulphureus ssp. kincaidii*	Kincaid's Lupine	Low	High	Low	NJ
24	*Macbridea alba*	White birds-in-a-nest	Low	High	Low	NJ
25	*Physaria filiformis*	Missouri bladderpod	Low	High	Low	NJ
26	*Sclerocactus brevihamatus ssp. tobuschii*	Tobusch fishhook cactus	Low	High	Low	NJ
27	*Solidago houghtonii*	Houghton's goldenrod	Low	High	Low	NJ
28	*Abronia macrocarpa*	Large-fruited sand-verbena	High	High	Low	NJ
29	*Acanthomintha obovata ssp. duttonii*	San Mateo thornmint	High	High	Low	NJ
30	*Aeschynomene virginica*	Sensitive joint-vetch	High	High	Low	NJ
31	*Amorpha crenulata*	Crenulate lead-plant	High	High	Low	NJ
32	*Amsinckia grandiflora*	Large-flowered fiddleneck	High	High	Low	NJ
33	*Amsonia kearneyana*	Kearney's blue-star	High	Medium	Low	NJ
34	*Arabis georgiana*	Georgia rockcress	High	High	Low	NJ
35	*Arctostaphylos confertiflora*	Santa Rosa Island manzanita	High	Medium	Low	NJ
36	*Arctostaphylos hookeri var. ravenii*	Presidio Manzanita	High	High	Low	NJ
37	*Arctostaphylos morroensis*	Morro manzanita	High	High	Low	NJ
38	*Arctostaphylos myrtifolia*	Ione manzanita	High	High	Low	NJ
39	*Arctostaphylos pallida*	Pallid manzanita	High	High	Low	NJ
40	*Argemone pleiacantha ssp. pinnatisecta*	Sacramento prickly poppy	High	Medium	Low	NJ
41	*Argythamnia blodgettii*	Blodgett's silverbush	High	High	Low	NJ
42	*Astragalus albens*	Cushenbury milk-vetch	High	Medium	Low	NJ
43	*Astragalus ampullarioides*	Shivwits milk-vetch	High	High	Low	NJ
44	*Astragalus bibullatus*	Guthrie's (=Pyne's) ground-plum	High	High	Low	NJ
45	*Astragalus holmgreniorum*	Holmgren milk-vetch	High	High	Low	NJ
46	*Astragalus humillimus*	Mancos milk-vetch	High	High	Low	NJ
47	*Astragalus jaegerianus*	Lane Mountain milk-vetch	High	Medium	Low	NJ
48	*Astragalus lentiginosus var. piscinensis*	Fish Slough milk-vetch	High	High	Low	NJ
49	*Astragalus magdalenae var. peirsonii*	Peirson's milk-vetch	High	High	Low	NJ
50	*Astragalus montii*	Heliotrope milk-vetch	High	Medium	Low	NJ
51	*Astragalus osterhoutii*	Osterhout milkvetch	High	High	Low	NJ
52	*Astragalus pycnostachyus var. lanosissimus*	Ventura Marsh Milk-vetch	High	High	Low	NJ
53	*Astragalus robbinsii var. jesupi*	Jesup's milk-vetch	High	Medium	Low	NJ
54	*Berberis nevinii*	Nevin's barberry	High	High	Low	NJ
55	*Blennosperma bakeri*	Sonoma sunshine	High	High	Low	NJ
56	*Brickellia mosieri*	Florida brickell-bush	High	High	Low	NJ
57	*Calochortus tiburonensis*	Tiburon mariposa lily	High	High	Low	NJ
58	*Calystegia stebbinsii*	Stebbins' morning-glory	High	High	Low	NJ
59	*Castilleja affinis ssp. neglecta*	Tiburon paintbrush	High	High	Low	NJ
60	*Chamaecrista lineata keyensis*	Big Pine partridge pea	High	Medium	Low	NJ
61	*Chamaesyce deltoidea pinetorum*	Pineland sandmat	High	High	Low	NJ
62	*Chamaesyce deltoidea serpyllum*	Wedge spurge	High	Medium	Low	NJ
63	*Chorizanthe pungens var. hartwegiana*	Ben Lomond spineflower	High	High	Low	NJ
64	*Chromolaena frustrata*	Cape Sable Thoroughwort	High	High	Low	NJ
65	*Cirsium fontinale var. fontinale*	Fountain thistle	High	High	Low	NJ

66	*Conradina glabra*	Apalachicola rosemary	High	High	Low	NJ
67	*Cordylanthus mollis ssp. mollis*	Soft bird's-beak	High	Medium	Low	NJ
68	*Cordylanthus palmatus*	Palmate-bracted bird's beak	High	Medium	Low	NJ
69	*Cordylanthus tenuis ssp. capillaris*	Pennell's bird's-beak	High	High	Low	NJ
70	*Coryphantha minima*	Nellie cory cactus	High	Medium	Low	NJ
71	*Coryphantha ramillosa*	Bunched cory cactus	High	Medium	Low	NJ
72	*Coryphantha robbinsiorum*	Cochise pincushion cactus	High	Medium	Low	NJ
73	*Cryptantha crassipes*	Terlingua Creek cat's-eye	High	Medium	Low	NJ
74	*Dalea carthagenensis floridana*	Florida prairie-clover	High	High	Low	NJ
75	*Deeringothamnus pulchellus*	Beautiful pawpaw	High	High	Low	NJ
76	*Deinandra increscens ssp. villosa*	Gaviota Tarplant	High	High	Low	NJ
77	*Delphinium bakeri*	Baker's larkspur	High	High	Low	NJ
78	*Dicerandra cornutissima*	Longspurred mint	High	High	Low	NJ
79	*Dudleya cymosa ssp. marcescens*	Marcescent dudleya	High	High	Low	NJ
80	*Dudleya cymosa ssp. ovatifolia*	Santa Monica Mountains dudleyea	High	High	Low	NJ
81	*Dudleya nesiotica*	Santa Cruz Island dudleya	High	Medium	Low	NJ
82	*Dudleya verityi*	Verity's dudleya	High	High	Low	NJ
83	*Echinocactus horizonthalonius var. nicholii*	Nichol's Turk's head cactus	High	Medium	Low	NJ
84	*Echinocereus chisoensis var. chisoensis*	Chisos Mountain hedgehog Cactus	High	Medium	Low	NJ
85	*Echinocereus fendleri var. kuenzleri*	Kuenzler hedgehog cactus	High	High	Low	NJ
86	*Echinocereus viridiflorus var. davisii*	Davis' green pitaya	High	Medium	Low	NJ
87	*Echinomastus erectocentrus var. acunensis*	Acuna Cactus	High	Medium	Low	NJ
88	*Echinomastus mariposensis*	Lloyd's Mariposa cactus	High	Medium	Low	NJ
89	*Eremalche kernensis*	Kern mallow	High	High	Low	NJ
90	*Eriogonum codium*	Umtanum Desert buckwheat	High	Medium	Low	NJ
91	*Eryngium aristulatum var. parishii*	San Diego button-celery	High	Medium	Low	NJ
92	*Erysimum capitatum var. angustatum*	Contra Costa wallflower	High	High	Low	NJ
93	*Erysimum teretifolium*	Ben Lomond wallflower	High	High	Low	NJ
94	*Eutrema penlandii*	Penland alpine fen mustard	High	Medium	Low	NJ
95	*Fremontodendron californicum ssp. decumbens*	Pine Hill flannelbush	High	High	Low	NJ
96	*Galactia smallii*	Small's milkpea	High	High	Low	NJ
97	*Gilia tenuiflora ssp. hoffmannii*	Hoffmann's slender-flowered gilia	High	Medium	Low	NJ
98	*Hackelia venusta*	Showy stickseed	High	High	Low	NJ
99	*Harrisia (=Cereus) aboriginum (=gracilis)*	Aboriginal Prickly-apple	High	High	Low	NJ
100	*Helianthus verticillatus*	Whorled Sunflower	High	High	Low	NJ
101	*Holocarpha macradenia*	Santa Cruz tarplant	High	High	Medium	NJ
102	*Hymenoxys herbacea*	Lakeside daisy	High	High	Low	NJ
103	*Ipomopsis polyantha*	Pagosa skyrocket	High	High	Low	NJ
104	*Ipomopsis sancti-spiritus*	Holy Ghost ipomopsis	High	Medium	Low	NJ
105	*Ivesia webberi*	Webber Ivesia	High	Medium	Low	NJ
106	*Lasthenia burkei*	Burke's goldfields	High	High	Low	NJ
107	*Lasthenia conjugens*	Contra Costa goldfields	High	High	Low	NJ
108	*Layia carnosa*	Beach layia	High	Medium	Low	NJ

109	*Leavenworthia crassa*	Fleshy-fruit gladecress	High	High	Low	NJ
110	*Lepidium barnebyanum*	Barneby ridge-cress	High	High	Low	NJ
111	*Lesquerella congesta*	Dudley Bluffs bladderpod	High	Medium	Low	NJ
112	*Lessingia germanorum (=L.g. var. germanorum)*	San Francisco lessingia	High	High	Low	NJ
113	*Limnanthes vinculans*	Sebastopol meadowfoam	High	High	Low	NJ
114	*Linum carteri carteri*	Carter's small-flowered flax	High	High	Low	NJ
115	*Lithophragma maximum*	San Clemente Island woodland-star	High	High	Low	NJ
116	*Lupinus nipomensis*	Nipomo Mesa lupine	High	High	Low	NJ
117	*Malacothrix indecora*	Santa Cruz Island malacothrix	High	Medium	Low	NJ
118	*Mimulus fremontii var. vandenbergensis*	Vandenberg monkeyflower	High	High	Low	NJ
119	*Mirabilis macfarlanei*	MacFarlane's four-o'clock	High	Medium	Low	NJ
120	*Oenothera deltoides ssp. howellii*	Antioch Dunes evening-primrose	High	High	Low	NJ
121	*Opuntia treleasei*	Bakersfield cactus	High	High	Low	NJ
122	*Pediocactus bradyi*	Brady pincushion cactus	High	Medium	Low	NJ
123	*Pediocactus knowltonii*	Knowlton's cactus	High	High	Low	NJ
124	*Pentachaeta bellidiflora*	White-rayed pentachaeta	High	High	Low	NJ
125	*Phacelia argillacea*	Clay phacelia	High	Medium	Low	NJ
126	*Phacelia formosula*	North Park phacelia	High	High	Low	NJ
127	*Phlox hirsuta*	Yreka phlox	High	High	Low	NJ
128	*Phlox nivalis ssp. texensis*	Texas trailing phlox	High	High	Low	NJ
129	*Physaria douglasii ssp. tuplashensis*	White Bluffs bladderpod	High	High	Low	NJ
130	*Physaria obcordata*	Dudley Bluffs twinpod	High	Medium	Low	NJ
131	*Plagiobothrys hirtus*	rough popcornflower	High	High	Low	NJ
132	*Potentilla hickmanii*	Hickman's potentilla	High	High	Low	NJ
133	*Pseudobahia bahiifolia*	Hartweg's golden sunburst	High	High	Low	NJ
134	*Purshia (=Cowania) subintegra*	Arizona Cliff-rose	High	Medium	Low	NJ
135	*Sarracenia rubra ssp. alabamensis*	Alabama canebrake pitcher-plant	High	High	Low	NJ
136	*Schoenocrambe barnebyi*	Barneby reed-mustard	High	Medium	Low	NJ
137	*Sclerocactus brevispinus*	Pariette cactus	High	High	Low	NJ
138	*Sclerocactus wetlandicus*	Uinta Basin hookless cactus	High	High	Low	NJ
139	*Senecio layneae*	Layne's butterweed	High	High	Low	NJ
140	*Sidalcea oregana var. calva*	Wenatchee Mountains checkermallow	High	High	Low	NJ
141	*Solidago shortii*	Short's goldenrod	High	High	Low	NJ
142	*Streptanthus albidus ssp. albidus*	Metcalf Canyon jewelflower	High	High	Low	NJ
143	*Thymophylla tephroleuca*	Ashy dogweed	High	High	Low	NJ
144	*Trifolium trichocalyx*	Monterey clover	High	High	Low	NJ
145	*Verbena californica*	Red Hills vervain	High	High	Low	NJ
146	*Acmispon dendroideus var. traskiae (=Lotus d. ssp. traskiae)*	San Clemente Island lotus (=broom)	Medium	High	Low	NJ
147	*Arabis serotina*	Shale barren rock cress	Medium	High	Low	NJ
148	*Arctostaphylos glandulosa ssp. crassifolia*	Del Mar manzanita	Medium	Medium	Low	NJ
149	*Arenaria ursina*	Bear Valley sandwort	Medium	Medium	Low	NJ
150	*Asimina tetramera*	Four-petal pawpaw	Medium	High	Low	NJ
151	*Astragalus lentiginosus var. coachellae*	Coachella Valley milk-vetch	Medium	High	Low	NJ

152	*Baptisia arachnifera*	Hairy rattleweed	Medium	Medium	Medium	NJ
153	*Boltonia decurrens*	Decurrent false aster	Medium	High	Low	NJ
154	*Castilleja cinerea*	Ash-grey paintbrush	Medium	Medium	Low	NJ
155	*Cirsium wrightii*	Wright's marsh thistle	Medium	High	Low	NJ - conference
156	*Conradina etonia*	Etonia rosemary	Medium	High	Low	NJ
157	*Conradina verticillata*	Cumberland rosemary	Medium	High	Low	NJ
158	*Deinandra (=Hemizonia) conjugens*	Otay tarplant	Medium	High	Low	NJ
159	*Dodecahema leptoceras*	Slender-horned spineflower	Medium	High	Low	NJ
160	*Enceliopsis nudicaulis var. corrugata*	Ash Meadows sunray	Medium	Medium	Low	NJ
161	*Eriastrum densifolium ssp. sanctorum*	Santa Ana River woolly-star	Medium	High	Low	NJ
162	*Eriogonum ovalifolium var. vineum*	Cushenbury buckwheat	Medium	Medium	Low	NJ
163	*Eriophyllum latilobum*	San Mateo woolly sunflower	Medium	High	Low	NJ
164	*Galium buxifolium*	Island bedstraw	Medium	Medium	Low	NJ
165	*Helenium virginicum*	Virginia sneezeweed	Medium	High	Low	NJ
166	*Helianthemum greenei*	Island rush-rose	Medium	Medium	Low	NJ
167	*Hesperolinon congestum*	Marin dwarf-flax	Medium	High	Low	NJ
168	*Hibiscus dasycalyx*	Neches River rose-mallow	Medium	High	Low	NJ
169	*Liatris helleri*	Heller's blazingstar	Medium	High	Low	NJ
170	*Lindera melissifolia*	Pondberry	Medium	High	Low	NJ
171	*Lysimachia asperulaefolia*	Rough-leaved loosestrife	Medium	High	Low	NJ
172	*Marshallia mohrii*	Mohr's Barbara button	Medium	High	Low	NJ
173	*Oxytropis campestris var. chartacea*	Fassett's locoweed	Medium	High	Low	NJ
174	*Pediocactus despainii*	San Rafael cactus	Medium	Medium	Low	NJ
175	*Pediocactus peeblesianus var. fickeiseniae*	Fickeisen plains cactus	Medium	Medium	Low	NJ
176	*Pediocactus winkleri*	Winkler cactus	Medium	Medium	Low	NJ
177	*Pentachaeta lyonii*	Lyon's pentachaeta	Medium	Medium	Low	NJ
178	*Phacelia submutica*	DeBeque phacelia	Medium	High	Low	NJ
179	*Physaria globosa*	Short's bladderpod	Medium	High	Low	NJ
180	*Pogogyne abramsii*	San Diego mesa-mint	Medium	High	Low	NJ
181	*Pseudobahia peirsonii*	San Joaquin adobe sunburst	Medium	High	Low	NJ
182	*Sclerocactus glaucus*	Colorado hookless Cactus	Medium	High	Low	NJ
183	*Sclerocactus mesae-verdae*	Mesa Verde cactus	Medium	Medium	Low	NJ
184	*Sclerocactus wrightiae*	Wright fishhook cactus	Medium	Medium	Low	NJ
185	*Silene spaldingii*	Spalding's Catchfly	Medium	High	Low	NJ
186	*Townsendia aprica*	Last Chance townsendia	Medium	Medium	Low	NJ
187	*Erngium sparganophyllum*	Arizona eryngo	High	High	Low	NJ- conference

*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.While we expect some individual plants in this assessment group will experience reduced growth due to direct exposure to malathion or small reductions in their pollinators and/or seed dispersers, we do not anticipate these impacts would have species-level effects.

Species with No Anticipated Usage in Range
The following species occur completely within California and have no malathion usage reported in their range through the CalPUR system: : 35, 42, 47, 49, 77, 154, 81, 164, 97, 166, 117 (refer to Table 4 for species names). An additional species (Heliotrope milk vetch (50)), has no use reported using standard data within its range. Given that we do not expect malathion usage on any portion of the range of these species, we do not anticipate they will experience adverse reproductive effects from pollinator and seed disperser mortality within their range.

Species Entirely on Federal Lands
The following species occur 100% on Federal lands: 35, 149, 42, 47, 50, 154, 81, 162, 164, 97, 166, and 117. We anticipate usage within the range of these species will be low, based primarily on the information we acquired about malathion usage on Federal lands. 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 20-27 (refer to Table 4) all have low vulnerability based on their status, distribution and trends, high risk posed by labeled uses across the range, and low estimated usage within their ranges as described above. **Species numbered 146-186** (except those species identified as having no usage reported or occurring 100% on federal lands, as addressed in the previous sections) all have medium vulnerability based on their status, distribution and trends, medium or high risk posed by labeled uses across the range, and low estimated usage within their ranges. These plant species are expected to experience medium to high (ranging from <1 to over 100%) insect pollinator mortality across their ranges, which factored into the risk ranking for these species. We anticipate adverse effects to the species due to the reduction in pollinating insects that would result in reduced reproductive success. However, the anticipated usage within these species' ranges is very low (all are 3.82% or less, most less than 2%) and we expect malathion to be applied on a very small portion of the ranges of these species. Furthermore, we anticipate the additional 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 would be applied. For example, the conservation measure limiting mosquito adulticide applications during most daytime hours, when many pollinators are active, is anticipated to substantially reduce exposure and therefore mortality of diurnal pollinators and seed dispersers, which are important for the reproductive success of the listed plants. In addition, because these species have low or medium vulnerabilities, they are more likely to be able to withstand additional stressors in their environment, including temporary declines in their pollinator and seed disperser populations in very small portions of their ranges from malathion exposure. Therefore, we do not anticipate that the proposed action would appreciably reduce survival and recovery of these species in the wild.

Species numbered 28-145 and 187 (except species identified as having no usage reported or occurring 100% on federal lands, discussed above) all have high vulnerabilities based on their status, distribution and trends, high or medium risk posed by labeled uses across their ranges, and low estimated usage within their ranges as described above. Due to their high vulnerabilies, these species are less likely to be able to withstand additional stressors in their environment, including declines in available pollinator and seed disperser populations across their range from malathion exposure. Insect pollinators are expected to experience moderate to significant mortality across the ranges of these species from exposure to malathion on use sites, spray drift from these sites, and from mosquito adulticide applications. All species in this assessment group require pollen transfer between individual plants in order to reproduce successfully and therefore rely on sufficient pollinator populations within their range. All of these species rely on insects for this pollen transfer, except one (161) that uses birds as pollinators or birds in combination with insect pollinators. We anticipate that bird pollinators will experience some mortality from malathion exposure as indicated in Table 2 (Effects to Pollinators column). These species also rely on seed dispersal vectors to maintain populations and colonize new sites within their range. If the species uses insects or birds for seed dispersal, populations of these dispersal species are expected to experience losses due to malathion exposure (refer to Table 2, column titled Seed Dispersal Vector). In addition, a sub-set of these species have pesticides or pollinator loss/decline listed as a threat in their recovery plans or most recent 5-year status reviews (species number 36, 41 ,45, 46, 65, 68, 72, 73, 89, 91, 92, 98, 111, 112, 119, 120, 129, 137, 138, 143). Given that species with these threats may already be experiencing adverse reproductive effects from reduced pollinator populations within their ranges, we expect these species may be less able to withstand additional losses to pollinator populations. However, the anticipated usage of malathion within these species' ranges is very low. None of the species are expected to have more than 4.24% of their range treated and the vast majority will have 2% or less treated with malathion. Furthermore, we anticipate the additional conservation measures 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 spot treatments only, substantially 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), low amounts of chemical used, and prohibition against use on impermeable surfaces. As a result, we do not anticipate the level of pollinator and seed disperser mortality to cause species-level reproductive effects. Therefore, we do not anticipate that the proposed action would appreciably reduce survival and recovery of these species in the wild.

Species 135, the Alabama canebrake pitcher-plant, as described in the General Effects to Plants section, could experience greater effects from direct exposure to malathion due to the potential presence of digestive glands within its pitchers. These digestive glands have been shown to increase uptake of chemicals into the plant and cause an increased plant mortality. Plant mortality due to malathion exposure is only anticipated for a limited number of malathion use types, including vegetables and ground fruit, developed and open space developed (residential uses), nurseries and Christmas trees. Usage data indicates there is very little overlap of the green pitcher's range with agricultural and residential use (2%), thus we do not anticipated substantial effects to this species from direct application of malathion. In addition, as described above, we anticipate the additional conservation measures will further reduce the risk of exposure to the plants themselves and their pollinators and seed dispersers in the small portion of the range where we anticipate malathion to be applied. There for, we do not anticipate the proposed action would appreciably reduce the survival and recovery of the Alabama canebrake pitcher-plant in the wild.

Species numbered 14, 15 and 17-19 all have medium vulnerabilities based on their status, distribution and trends, high risk posed by labeled uses across their ranges, and medium estimated usage within their ranges as described above.

Florida golden aster (species 16) is a narrow endemic found in four counties of west-central Florida. It has a low vulnerability based on increasing population trends across its range,and a recent proposal to delist the species (USFWS 2021). Ninety two percent of individual plants of the Florida golden aster occur on protected lands, and at least one protected population occurs in each of the five counties where the Florida golden aster is found, thus preserving representation across its range (Species Status Assessment, USFWS 2018). The primary threats to individuals on unprotected lands include habitat loss and degradation from developmet and inadequate fire regimes. While pollinator species are unknown for the golden aster, they are assumed to be insects based on related species. All species in this assessment group require pollen transfer between individual plants in order to reproduce successfully and therefore rely on sufficient pollinator populations within their range. Insect pollinators, if exposed are expected to experience mortality across the range of this species (100%). We anticipate adverse effects to the species due to the reduction in pollinating insects that would result in reduced reproductive success. Seed dispersal for this species is primarily via wind, so the golden aster should therefore not experience adverse reproductive effects from seed disperser loss due to malathion exposure. We anticipate moderate malathion usage (7.86%) within the species' range. While we anticipate adverse effects in the form of loss of insect pollinators and resultant decrease in reproductive success of the Florida golden aster, we do not expect these adverse effects will result in species-level effects due to the moderate level of usage across the range and the fact that 92% of the individuals are protected from the adverse effects of malathion on pollinating species. Therefore, we do not anticipate the proposed action would appreciably reduce the survival and recovery of the Florida golden aster.

The **star cactus (species 14)** is endemic to a small area of southern Texas along the Mexican border (encompassing approximately 125 square km). It has a medium vulnerability based on the number of populations, however, the 2019 Recovery Plan Amendment reports that a recent study found low levels of genetic differentiation among the sub-populations in Texas, indicating cacti in Texas are likely a single population. If this is the case, the vulnerability for this species would more accurately be described as 'high.' All twenty-four known occurrence sites exist on unprotected private lands, except one owned by The Nature Conservancy. Threats include habitat loss and hydrologic alterations mainly due to energy development and a decline of bees this species depends on for pollination, especially cactus-specialist bees (2019 Recovery Plan amendments). Like all species in this assessment group, the star cactus relies on pollen transfer between individual plants for successful reproduction and therefore needs sufficient pollinator populations within its range. While there is overlap of agricultural use sites with the range of this species, occupied sites are likely restricted to the Catahoula and Frio soil formations in Starr County. These soil types are saline and sodic, and completely unsuitable for row crop farming. As a result, we do not anticipate that agricultural use sites will be found in the vicinity of star cactus occurrences or would be close enough to cause appreciable mortality to the pollinators of this species (Pers. Comm. Chris Best, Austin FWS Field Office 2021). We anticipate adverse effects to the species due to the reduction in pollinating insects from malathion use for mosquito control that would result in reduced reproductive success. Furthermore, plants that depend on a few specific pollinator species are likely to experience a disproportionately greater negative reproductive effect since these plants cannot use other species for pollination if the few they rely on have been reduced or temporarily extirpated from the area due to malathion use. The star cactus relies on a variety of seed dispersers to maintain populations and colonize new sites in its range. It can disperse seeds using 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 avian 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 avian seed dispersers to cause significant adverse effects to the reproductive capacity of this species.

We anticipate a moderate level of malathion usage (8.26%) within the species' range, especially in unprotected areas. This species is a narrow endemic whose reproductive success is dependent upon the presence of cactus-specialist bee pollinators for reproduction; this species cannot utilize other species of pollinators. However, agricultural use sites are not anticipated to overlap with areas of star cactus occurrences (Pers. Comm. Chris Best, Austin FWS Field Office 2021). In addition, the additional conservation measure that will be implemented for mosquito adulticide use will prohibit application during most daylight hours (from two hours after dawn until two hours before sunset). This period is when many diurnal insect pollinators are most active, including those for the Star cactus. This would further limit the anticipated exposure of pollinators present in and around the range of this species to malathion when used as a mosquito adulticide. While we anticipate adverse effects from small losses of insect pollinators, including the cactus-specialist bees this species relies upon, we do not anticipate these adverse effects will cause species-level effects due to the moderate level of usage across the range, lack of agricultural overlap with species occurrances, and the conservation measures that will be implemented. Therefore, we do not anticipate the proposed action would appreciably reduce survival and recovery of the star cactus in the wild.

The **golden paintbrush (species 15)** is endemic to upland prairie habitats in the Puget Trough of Washington, Gulf Islands of British Columbia, and the Willamette Valley of Oregon. This species has medium vulnerability based on its threatened status and number of stable populations (15 out of 20 stable populations are protected). Habitat loss and fragmentation, and invasive woody plants primarily threaten the 48 known sites where this species occurs. Known sites vary in their level of protection and management. Pollinators of golden paintbrush are primarily bumblebees, especially the native California bumblebee (*Bombus impatiens*), though flies and

halictid bees are also pollinators. The IUCN lists this bumblebee species as vulnerable because of long-term patterns of decline. Additionally, a non-native bumblebee, *Bombus impatiens,* has been moving southward towards the range of *B. californicus* and has the potential to displace the native bumblebee, thus potentially impairing the reproductive success of this plant species (2019 Species Biological Report, USFWS). Insect pollinators 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, additional conservation measures will be implemented that we anticipate will substantially reduce the risk of exposure to pollinators and reproductive effects to this species. For example, the conservation measure limiting mosquito adulticide applications during most daytime hours is anticipated to substantially reduce exposure and therefore mortality of diurnal pollinators and seed dispersers, which are important for the reproductive success of the listed plants.The golden paintbrush relies on wind for seed dispersal and therefore will not experience adverse reproductive effects from seed disperser loss due to malathion exposure.

We anticipate a relatively low level of malathion usage (5%) within the species' range, especially in unprotected areas. This species is a narrow endemic whose reproductive success is dependent upon the presence of insect pollinators for reproduction. While we anticipate adverse effects in the form of minor loss of insect pollinators, including small numbers of the native bumblebee this species relies upon, we do not expect that these adverse effects will cause species –level effects because of the low amount of usage, the level of protected lands within this species range, and the additional conservation measures that will be implemented. Therefore, we do not anticipate the proposed action would appreciably reduce survival and recovery of the golden paintbrush in the wild.

The **scrub buckwheat (species 17) and scrub plum (species 19)** are both endemic to the Lake Wales Ridge region of Florida, a narrow ridge of ancient sand dunes that runs down the central peninsula of Florida and harbors a large diversity of endemic plants and animals. Both have medium vulnerabilities based on their threatened status or number of populations. Both species are restricted to five or six counties in the Ridge area that are also experiencing high rates of development, causing fragmentation and destruction of their already limited habitat. Of the 105 known localities of scrub buckwheat, 63 occur on conservation lands (2018 5-year status review). Likewise, half the populations and the majority of individual plants of scrub plum occur on protected lands, including the two largest populations (approximately 3000 plants each) that occur in the Lake Wales Ridge National Wildlife Refuge and Lake Wales Ridge Environmental Area (2017 5-year status review). Insects are the primary pollinators of both plants and like all the species in this assessment group, they require pollen transfer between individual plants in order to reproduce successfully and therefore rely on sufficient pollination populations within their range. Insects are expected to experience significant mortality (100% for both species) within the range of these 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, additional conservation measures will be implemented that are anticipated to substantially reduce the risk of exposure to pollinators and reproductive effects to this species. For example, there are new restrictions prohibiting 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.

Specific seed dispersal species are unknown, though they may use a combination of biotic (potentially insects, birds, and/or mammals) and abiotic (wind) vectors for dispersal. No mortality or sublethal effects are expected for mammalian seed dispersers, although insect and bird seed dispersal species are expected to experience losses due to malathion exposure. However, given that these species can rely on a variety of seed dispersal vectors, we do not anticipate the small reductions in insect or bird seed dispersers will cause significant adverse effects to the reproductive capacity of this species.

We anticipate low to moderate malathion usage (5.67% for scrub buckwheat and 8.54% for scrub plum) with these species' ranges, especially in unprotected areas. These species are narrow endemics whose reproductive success is dependent upon the presence of insect pollinators for reproduction. We anticipate adverse effects in the form of minor to moderate loss of insect pollinators, but do not expect that these adverse effects will cause species –level effects because of the moderate amount of usage, the level of protected lands within the ranges of these species where malathion usage is anticipated to be very low, and the additional conservation measures that will be implemented. Therefore, we do not anticipate the action would appreciably reduce survival and recovery of the scrub buckwheat and scrub plum in the wild.

The **slickspot peppergrass (species 18)** is a narrow endemic species found primarily in soil inclusions known as slick spots scattered within sagebrush steppe ecosystems of southwest Idaho. It has medium vulnerability based on its threatened status and number of protected populations. Of the 115 element occurrences, the vast majority occur on protected public lands, 87% on federal lands and 9% on state lands (2020 Species Status Assessment). Primary threats to the remaining 4% of occurrences on private lands include increasing frequency of wildfires, invasive plant species and habitat destruction due to development. Slickspot peppergrass uses insects as pollinators, specifically a number of bee and wasp species. Like all species in this assessment group, it relies on pollen transfer between individual plants for successful reproduction and therefore needs sufficient pollinator populations within its range. In addition, the 2020 Species Status Assessment discusses this species' limited genetic diversity due to small, fragmented populations across the landscape and limited capacity for dispersal due to utilization of gravity and wind for seed dispersal as a potential threat. Given the peppergrass' low genetic diversity, it is crucial for this species to maintain robust pollinator communities that are capable of transferring genetic material in the form of pollen between individuals and populations. Insect pollinators are expected to experience significant mortality (100%) across 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. As mentioned, this species relies on wind and gravity to disperse seeds, and should therefore not experience adverse reproductive effects from seed disperser loss due to malathion exposure.

We anticipate a moderate level of malathion usage (7.25%) within the species' range, though we expect usage on federal lands (encompassing 87% of element occurrences) will be much lower. Usage on protected state lands (additional 9% of occurrences) is also likely to be lower. Furthermore, the additional conservation measures that will be implemented are anticipated to substantially reduce exposure of pollinators to malathion applications on residential areas, orchards and vineyard, and pasture, the main use types overlapping with the species range, further reducing the risk of reproductive effects to the species. For example, the conservation measure limiting mosquito adulticide applications during most daytime hours is anticipated to substantially reduce exposure and therefore mortality of diurnal pollinators and seed dispersers, which are important for the reproductive success of the listed plants. As a result, while we anticipate adverse effects from loss of insect pollinators and a resultant decrease in reproductive success of the slickspot peppergrass, we do not anticipate these adverse effects will cause species-level effects due to the moderate level of usage across the range, anticipated low level of usage on federal and other protected lands, where the majority of occurrences of this species exist, and the conservation measures that will be implemented. Therefore, we do not anticipate that the action would appreciably reduce survival and recovery of the slickspot peppergrass in the wild.

Species numbered 1-13 all have high vulnerabilities (except for #8, scrub blazingstar which has medium vulnerability) based on their status, distribution and trends, high risk posed by labeled uses across their ranges, and high or medium estimated usage within their ranges as shown above.

Walker's manioc (species 10) is a narrow endemic occurring in two counties in the Lower Rio Grande Valley of Texas (Hidalgo and Starr counties). This species has a high vulnerability due to its endangered status, narrow distribution and small number of populations, as shown above. As of the 2009 5-year status review, there were nine extant documented sites of this plant species. Three of the largest sites are on national wildlife refuge lands. The Texas DOT protects one additional site and two others are protected on private lands by landowner agreements. We do not expect significant use of malathion on any of the protected sites. This species generally relies on insects for pollination, but does not appear to require a rare or specialized pollinator. However, Walker's manioc can self-fertilize in addition to utilizing tubers for vegetative reproduction, therefore decreasing its reliance on insect pollinators for successful reproduction and survival (2009 5- year review). Insects are expected to experience significant 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, particularly in unprotected areas. However, we anticipate the additional conservation measures (e.g., the measure limiting mosquito adulticide applications during most daytime hours) that will be implemented, and the location of the majority of the species sites on protected lands, will substantially reduce the risk of exposure to pollinators and reproductive effects to this species.

Ants are noted as a potential seed disperser, but this species primarily relies on explosive dehiscence (seeds forcefully ejected from their seed pod) to disperse seeds. The ant seed dispersers may experience mortality from malathion exposure, but given this plant's primary reliance on abiotic seed dispersal, we do not expect the level of mortality to ant disperser populations to cause significant adverse reproductive effects to the plant. We anticipate low malathion usage (5.15%) within this species range, especially in unprotected areas. This species is a narrow endemic whose reproductive success is dependent upon the presence of insect pollinators for reproduction, though it is capable of reproducing successfully using self-pollination and vegetative reproduction in the absence of or due to the limited availability of pollinators. As a result, while we anticipate adverse effects due to the loss of insect pollinators and resultant loss of reproductive success from malathion exposure, we do not expect that these adverse effects will cause species-level effects due to Walker's manioc's ability to rely on self-pollination and vegetative reproduction, the low level of malathion usage in its range, the high number of protected individuals, and the additional conservation measures that will be implemented. Therefore, we do not anticipate the action would appreciably reduce the survival and recovery of Walker's manioc in the wild.

Seven of these species **(species 4, 6, 8, 9, 11, 12 and 13 – Avon Park harebells, Lakela's mint, scrub blazingstar, scrub lupine, wireweed, sandlace and wide-leaf warea)** are narrow endemics found in and around the Lake Wales Ridge region of central and northern Florida. As discussed for the scrub buckwheat and scrub plum, the primary threat to all species in this geographic area is habitat destruction and fragmentation from high rates of development. The limited geographic range of these 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 these 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). All have high vulnerabilities due to limited distributions and/or small numbers of populations. Avon Park harebells is restricted to the Avon Park Lakes subdivision, at imminent risk of further development, and one sub-population protected by The Nature Conservancy. Lakela's mint is limited to a tiny range encompassing an area of 4.5 square miles. Some of this area is protected, though plants in unprotected areas are highly susceptible to extirpation from development pressure. Scrub blazingstar currently has 70 occurrences, a decline from 91 occurences in the 2010 5-year status review. Forty-five of these occurrences are in managed areas (Lake Wales Ridge Recovery Plan, 2019). Scrub lupine has nine remaining natural populations, six of which are on unprotected sites and are in a state of decline due to habitat loss and alteration from development. Likewise, wireweed has seen a decline from 119 occurrences in the 2010 5- year review to 71 currently (Lake Wales Ridge RP, 2019). Forty-seven of these occurrences are protected and managed. Sandlace has also seen a decline from 113 occurrences in 2010 to 72 currently, 39 of which are on protected lands. Only half of the 10 extant populations of wide-leaf warea in 2007 are currently in existence. Four additional populations were discovered, for a total of nine populations, five of which are on privately owned, unprotected lands. In addition, the long-term viability of three of the sites on protected lands is uncertain (2017 5-year review).

All seven of these Lake Wales Ridge species rely on insects for pollination, and like all the species in this assessment group, they require pollen transfer between individual plants in order to reproduce successfully and therefore rely on sufficient pollinator populations within their range. All seven species are expected to experience significant mortality to their insect pollinators (100%) within the range of these species from exposure to malathion from application on agricultural and non-agricultural use sites, spray drift from these sites, and from mosquito adulticide use. However, additional conservation measures will be implemented that are anticipated to

substantially reduce the risk of exposure to pollinators and reproductive effects to these species. Moreover, additional species-specific conservation measures will be implemented that will further reduce the risk of exposure and reproductive effects. These are described for individual species, as applicable, below.

Little is known about the seed dispersal vectors of these species, though abiotic vectors are suspected for the scrub blazingstar, wireweed and sandlace. The remaining species likely have a mixture of biotic and abiotic seed dispersal vectors. Mortality is expected for insect pollinators and seed dispersers exposed to malathion on use sites or via spray drift. 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 mortality or sublethal effects are expected for mammalian pollinators or seed dispersers from malathion exposure either on use sites or from spray drift. We anticipate adverse effects to the species due to the reduction in pollinating insects and seed dispersing insects and birds, if applicable, that would result in reduced reproductive success.

We anticipate moderate malathion usage (7.97%) within the range of the **sandlace**. However, the sandlace can reproduce vegetatively through the rooting of prostrate runners, thus reducing its reliance on insect pollinators for successful reproduction. As a result, while we anticipate adverse effects due to the loss of insect pollinators and resultant loss of reproductive success from malathion exposure, we do not expect that these adverse effects will cause species-level effects due to the sandlace's ability to rely on vegetative reproduction and the conservation measures that will be implemented. For example, there are new restrictions prohibiting 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, thereby reducing adverse impacts to the reproduction of the sandlance that depends on these pollinators to transport genetic material between individuals. Therefore, we do not anticipate the action would appreciably reduce the survival and recovery of the sandlace in the wild.

We anticipate moderate malathion usage (7%) within the range of the **scrub lupine**, especially in unprotected areas of the range. This species is a narrow endemic whose reproductive success is dependent upon the presence of insect pollinators for reproduction, especially given its highly fragmented and restricted range, which limits the ability of pollinators to find and transport pollen between genetically distinct individuals. We anticipate adverse effects from loss of insect pollinators and resultant loss of reproductive success from exposure to malathion that would be expected to occur over the duration of the action. However, in addition to the general conservation measures that will be implemented, species-specific conservation measures will be implemented for the scrub lupine. These measures direct agricultural applicators in the vicinity of suitable habitat for this species to choose one of three options when applying malathion, any one of which we anticipate would be protective of the the species' pollinators: 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 rates, as previously described above. 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%. Species level effects are not anticipated as these measures will substantially reduce pollinator exposure and mortality, thereby reducing adverse impacts to the reproduction of the scrub lupine that depends on these pollinators to transport genetic material between individuals. Therefore, we do not anticipate the proposed action would appreciably reduce survival and recovery of the scrub lupine in the wild.

We anticipate moderate malathion usage (6.67%) within the range of the **wide-leaf warea**, especially in unprotected areas. This species is a narrow endemic whose reproductive success is dependent upon the presence of insect pollinators for reproduction, especially given its highly fragmented and restricted range which limits the ability of pollinators to find and transport pollen between genetically distinct individuals. We anticipate adverse effects from loss of insect pollinators and resultant loss of reproductive success from exposure to malathion that would be expected to occur over the duration of the action. However, in addition to the general conservation measures that will be implemented, species-specific conservation measures will be implemented for the wide-leaf warea. These measures direct agricultural applicators in the vicinity of suitable habitat for this species to choose one of three options when applying malathion, any one of which we anticipate would be protective of the the species' pollinators, any one of which we anticipate would be protective of the the species' pollinators: 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 rates, as previously described above. 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%. Species level effects are not anticipated as these measures will substantially reduce pollinator exposure and mortality, thereby reducing adverse impacts to the reproduction of the wide-leaf warea that depends on these pollinators to transport genetic material between individuals. Therefore, we do not anticipate the proposed action would appreciably reduce survival and recovery of the wide-leaf warea in the wild.

We anticipate a high level of malathion usage within the range of **Avon park harebells, scrub blazing star, wireweed and Lakela's mint** (13.19% for Avon park harebells, scrub blazingstar and wireweed and 15.33% for Lakela's mint), especially in those areas that remain unprotected. These species are narrow endemics whose reproductive success is dependent upon the presence of insect pollinators for reproduction, especially given their highly fragmented and restricted ranges which limits the ability of pollinators to find and transport pollen between genetically distinct individuals. We anticipate adverse effects in the form of significant loss of insect pollinators and resultant loss of reproductive success from exposure to malathion that would be expected to occur over the duration of the action. However, in addition to the conservation measures that will be implemented, species-specific conservation measures will be implemented for these four species. These measures direct agricultural applicators in the vicinity of suitable habitat for this species to choose one of three options when applying malathion, any one of which we anticipate would be protective of the the species' pollinators: 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 rates, as

previously described above. 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%. Species level effects are not anticipated as these measures will substantially reduce pollinator exposure and mortality, thereby reducing adverse impacts to the reproduction of these four species that depend on insect pollinators to transport genetic material between individuals. Therefore, we do not anticipate the proposed action would appreciably reduce survival and recovery of Avon Park harebells, scrub blazingstar, wireweed and Lakela's mint in the wild.

Texas ayenia (species 1) is endemic to three counties in Texas, where only five populations exist. It has a high vulnerability based on its endangered status and limited distribution, as shown above. The primary threat to its existence is loss of habitat due to agricultural and urban development, especially in the three unprotected populations on private lands. This species relies on unknown species of insects for pollination, and like all species in this assessment group, requires pollen transfer between individual plants in order to reproduce successfully and therefore relies on sufficient pollinator populations within its range. Insects are expected to experience significant 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 this species due to the reduction in pollinating insects that would result in reduced reproductive success. The 2016 recovery plan for this species identifies pesticide use and resultant loss of pollinators as a "non-imminent and low magnitude" threat as pesticide drift and runoff from agriculture in and near the range of this species has the potential to cause declines in local pollinator populations. As a result, the recovery plan recommends the need to minimize impacts from pesticide drift and runoff to prevent significant decline in this species' status in the future. In order to address anticipated pollinator mortality from malathion exposure, in addition to the general conservation measures that will be implemented, species-specific conservation measures will be implemented for the Texas ayenia. These measures direct agricultural applicators in the range of this species and during its flowering period (June, July, and September – November), to choose one of three options when applying malathion, any one of which we anticipate would be protective of the the species' pollinators: 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 rates, as previously described above. 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%. Species level effects are not anticipated as these measures will substantially reduce pollinator exposure and mortality, thereby reducing adverse impacts to the reproduction of the Texas ayenia that depends on insect pollinators to transport genetic material between individuals.

Specific biotic seed dispersal species are unknown, though it may use a combination of biotic (insects, birds, and/or mammals) and abiotic (water) vectors for dispersal. 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 bird or insect seed dispersers to cause appreciable adverse effects to the reproductive capacity of this species.

We anticipate a high level of malathion usage (10.47%) within the species range, especially in those areas that remain unprotected. This species is a narrow endemic whose reproductive success is dependent upon the presence of insect pollinators for reproduction, especially given its restricted range and anticipated threat to local pollinator populations from pesticide use. We anticipate adverse effects from loss of insect pollinators and resultant loss of reproductive success from exposure to malathion. However, we do not anticipate that these adverse effects will cause species-level effects because ofthe conservation measures that will be implemented for this species. Therefore, we do not anticipate the proposed action would appreciably reduce survival and recovery of Texas ayenia in the wild.

Texas poppy-mallow (species 2) is endemic to four counties in Texas. It has a high vulnerability based on its endangered status and limited distribution, as shown above. All ten element occurrences are on private land in an extremely restricted range that covers a narrow band approximately 96 miles long running northwest to southeast through the counties (2019 5- year review). Destruction and disturbance of the habitat remaining to this species is the primary threat to its existence, along with problems arising from being a small, geographically restricted species. For instance, population density likely influences population viability in this species, since successful outcrossing, necessary to maintain genetic diversity, requires genetically distinct individuals to be in close proximity for cross-pollination to occur. Given this species restricted range and fragmented, small population, it is likely to have a decreased reproductive capacity (2019 5-year review). The Texas poppy-mallow relies on three specific species of solitary bees for pollination. Plants that depend on a few specific pollinator species are likely to experience a disproportionately greater negative reproductive effect from pollinator loss since these plants cannot use other species for pollination if the few they rely on have been reduced or temporarily extirpated from the area due to malathion use. Insects, including bees, are expected to experience mortality (89%) 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 this species due to the reduction in pollinating insects that would result in reduced reproductive success. However, in order to address anticipated pollinator mortality from malathion exposure, in addition to the general conservation measures that will be implemented, species-specific conservation measures will be implemented for the Texas poppy-mallow. These measures direct agricultural applicators in the recovery units of this species and during its flowering period (April - June), to choose one of three options when applying malathion, any one of which we anticipate would be protective of the the species' pollinators: 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 rates as described above.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%. Species level effects are not anticipated as these measures will substantially reduce pollinator exposure and mortality, thereby reducing adverse impacts to the reproduction of the Texas poppy-mallow that depends on insect pollinators to transport genetic material between individuals.

Specific seed dispersal vectors for this species are unknown, though it may rely on a combination of biotic (such as insects, birds, and/or mammals) and abiotic (water) vectors for dispersal. No mortality or sublethal effects are expected for mammalian seed dispersers, however bird and insect seed dispersal species are expected to experience losses due to malathion exposure. Given that this species may rely on a variety of seed dispersal vectors, we do not anticipate effects to its bird or insect seed dispersers to cause appreciable adverse effects to the reproductive capacity of this species.

We anticipate a high level of malathion usage (17.3%) within the species range. This species is a narrow endemic whose reproductive success is dependent upon the presence of insect pollinators for reproduction, especially given its restricted range. We anticipate adverse effects from loss of insect pollinators and resultant loss of reproductive success from exposure to malathion that would be expected to occur over the duration of the action. However, we do not anticipate that these adverse effects will cause species-level effects because of the conservation measures that will be implemented for this species. Therefore, we do not anticipate the proposed action would appreciably reduce survival and recovery of Texas poppy-mallow in the wild.

The **fragrant prickly-apple (species 3)** is a cactus endemic to two counties in the Atlantic Coastal Ridge area of Florida in an area approximately 10 miles long and half a mile wide. It has a high vulnerability based on its endangered status and limited distribution, as shown above. There are only ten known sites where this species exists, six of which occur on protected lands and another three are partially protected (2019 Recovery Plan amendment), though populations at all sites require active management to persist including periodic burning and removal of exotic plant species. Additionally, a priority research goal for this species is investigating the threat to pollinators from aerial spraying for mosquito control across this species' range (2010 5-year review). This species relies on unknown species of insects for pollination, and like all species in this assessment group, requires pollen transfer between individual plants in order to reproduce successfully and therefore relies on sufficient pollinator populations within its range. When exposed, 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. We anticipate adverse effects to this species due to the reduction in pollinating insects that would result in reduced reproductive success, especially given this plant's existing limited reproductive capacity reported in the latest Status Review in 2010.
This plant relies on birds, mammals and gopher tortoises for seed dispersal. No mortality or sublethal effects are expected for mammalian seed dispersers, however 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 species, we do not anticipate effects to its bird seed dispersers to cause appreciable adverse effects to the reproductive capacity of this species.

We anticipate a high level of malathion usage (19.45% from agricultural uses, 23% from mosquito control use) within the species range, especially in those areas that remain unprotected. Agricultural usage is predominantly from use on the orchards and vineyards UDL, which in the range of this species in Florida, is mainly citrus groves. Two general conservation measures address use on citrus groves and will contribute to an overall reduction in anticipated pollinator mortality from agricultural use. First, the maximum allowable application rate on citrus will be lowered on the malathion label. This rate reduction is anticipated to decrease environmental concentrations of malathion to one third of modeled values. Second, a new bloom restriction covering citrus groves will be added to the label. This conservation measure will prohibit malathion application while orange groves are in bloom and until petal fall is complete, thus limiting exposure to pollinators attracted to the blooms. In addition to the general conservation measures, species-specific conservation measures will be implemented for the fragrant prickly-apple specifically. To address agricultural usage, during the prickly-apple's flowering period (April – December), agricultural applicators in the vicinity of suitable habitat for this species must choose one of two options when applying malathion, both of which we anticipate would be protective of the the species' pollinators: 1. Apply malathion only when wind is blowing away from suitable habitat for this species, thus reducing exposure to pollinators OR 2. Use a 50-foot ground buffer from suitable habitat or an aerial buffer according to application rate, as previously desicrbed above. 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%.

To address anticipated pollinator mortality from mosquito control use, where feasible, mosquito adulticide applicators will avoid application within, and 200 feet surrounding suitable habitat for this species from April to December, the flowering period of this species when pollinators are more likely to be present within the suitable habitat of this species. If this avoidance is not feasible, or impairs the ability of the mosquito control district or agency to protect the public's health and welfare, applicators will coordinate with the local FWS Ecological Services field office to determine appropriate measures to ensure the proposed application is likely to have no more than minor effects on the species. The applicator must retain documentation of this technical assistance and the agreed upon species-specific measures (FWS points of contact can be found in IPaC, as described above).

Species level effects are not anticipated as together, these conservation measures will substantially reduce pollinator exposure and mortality, thereby reducing adverse impacts to the reproduction of the fragrant prickly-apple that depends on insect pollinators to transport genetic material between individuals.

This species is a narrow endemic whose reproductive success is dependent upon the presence of insect pollinators for reproduction, especially given its restricted range that may limit its reproductive capacity. We anticipate adverse effects from loss of insect pollinators and resultant loss of reproductive success from exposure to malathion that would be expected to occur over the duration of the action. However, we do not anticipate that these adverse effects will cause species-level effects because of the conservation measures that will be implemented for this species. Therefore, we do not anticipate the proposed action would appreciably reduce survival and recovery of fragrant prickly-apple in the wild.
The **Okeechobee gourd (species 5)** exists in two populations in the Lake Okeechobee area of Florida. It has a high vulnerability based on its endangered status and limited distribution, as shown above. The only self-sustaining populations are on a few islands in Lake Okeechobee. Most of the extant individuals are on public lands, but the extent of management for conservation of this species on those lands has not been reported (2009 5-year review). The primary threats to this species are habitat conversion for agricultural purposes and anthropomorphic water level fluctuations. This species relies on unknown species of insects for pollination, and like all

species in this assessment group, requires pollen transfer between individual plants in order to reproduce successfully and therefore relies on sufficient pollinator populations within its range. Insects are expected to experience significant mortality (over 100%) across 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 this species due to the reduction in pollinating insects that would result in reduced reproductive success. However, the 2009 5-year review reports that extant populations appear to produce large numbers of seeds, implying there are sufficient pollinator populations in the area to achieve outcrossing and resultant seed production. In addition, conservation measures will be implemented that we anticipate will reduce the risk of exposure to pollinators and reproductive effects to this species. For example, the conservation measure limiting mosquito adulticide applications during most daytime hours is anticipated to substantially reduce exposure and therefore mortality of diurnal pollinators and seed dispersers, which are important for the reproductive success of the listed plants.

Birds and mammals are likely the primary seed dispersers for this species. No mortality or sublethal effects are expected for mammalian seed dispersers, however 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 avian seed dispersers to cause appreciable adverse effects to the reproductive capacity of this species.

We anticipate a moderate level of malathion usage (7.77%) within the species range, especially in unprotected areas. This species is a narrow endemic whose reproductive success is dependent upon the presence of insect pollinators for successful reproduction. However, pollinator populations appear to be sufficiently large within its range at this time and conservation measures will be implemented, as described above. As a result, while we anticipate adverse effects due to the loss of insect pollinators and resultant loss of reproductive success from malathion exposure, we do not expect that these adverse effects will cause species-level effects due to its primary existence on public, protected lands, moderate malathion usage, adequate pollinator levels within its range, and implementation of the additional conservation measures. Therefore, we do not anticipate the action would appreciably reduce the survival and recovery of the Okeechobee gourd in the wild.

The **black lace cactus (species 7)** is endemic to three populations across south Texas, none of which is on protected lands. It has a high vulnerability based on its endangered status and limited distribution, as shown above. Threats to this species need further study, but are identified as feral hog rooting and displacement of cacti, competition with non-native grasses, and mound-building activities by non-native fire ants (2009 5-year review). Field studies have revealed black lace cacti partially or entirely covered by fire ant mounds. Efforts to eradicate the ants using pesticides may have unknown consequences for cactus pollinators and has been identified for further study. The black lace cactus relies on a variety of insect pollinators, including bumblebees, wasps, beetles and small bees. Insects are expected to experience significant mortality (87%) across 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 this species due to the reduction in pollinating insects that would result in reduced reproductive success, although they will be much reduced due to the conservation measures that will be implemented that we anticipate will reduce the risk of exposure to pollinators and reproductive effects to this species. For example, the conservation measure limiting mosquito adulticide applications during most daytime hours is anticipated to substantially reduce exposure and therefore mortality of diurnal pollinators and seed dispersers, which are important for the reproductive success of the listed plants.
Furthermore, although this species occurs in close proximity to cotton fields undergoing treatment for boll weevil eradication by USDA APHIS under their Boll Weevil Eradication Program. USDA APHIS has active conservation measures in place (as described in the *Environmental Baseline* section of the biological opinion) to protect the black lace cactus from adverse effects potentially caused by boll weevil eradication in the area. Thus we do not anticipate significant adverse effects to the cacti's pollinator populations from the use of malathion in these areas.

Seed dispersal vectors for this species are a variety of insect, bird and mammal species. No mortality or sublethal effects are expected for mammalian seed dispersers, however, bird and insect seed dispersal species are expected to experience losses due to malathion exposure. Given that this species may rely on a variety of seed dispersal vectors, we do not anticipate effects to its bird or insect seed dispersers to cause appreciable adverse effects to the reproductive capacity of this species, and the general conservation measures that will be implemented will further reduce effects to seed dispersers for this species.

We anticipate moderate level of malathion usage (7.19%) within the species range. This species is a narrow endemic whose reproductive success is dependent upon the presence of insect pollinators for successful reproduction; however, it can rely on a large variety of pollinating species, reducing the effects of the loss of pollinators throughout its range. In addition, conservation measures will be implemented, and, as previously noted, USDA APHIS is implementing conservation measures that will decrease the anticipated effects of pesticide spray drift and runoff on this species during boll weevil eradication activities. As a result, while we anticipate adverse effects due to the loss of small numbers of insect pollinators and resultant minor reductions in of reproductive success from malathion exposure, we do not expect that these adverse effects will cause species-level effects due the moderate level of malathion usage, ability to rely on a variety of insect pollinators, and implementation of conservation measures. Therefore, we do not anticipate the action would appreciably reduce the survival and recovery of the black lace cactus in the wild.

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