United States Department of the Interior

FISH AND WILDLIFE SERVICE

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5600 American Boulevard West, Suite 990

Bloomington, Minnesota 55437-1458

FWS/ES/

Memorandum

To: Regional Director, Great Lakes Region, U.S. Fish and Wildlife Service, Bloomington, MN

From: Assistant Regional Director, Division of Ecological Services, Great Lakes Region, U.S. Fish and Wildlife Service, Bloomington, MN

Subject: Biological Opinion and Conference Opinion on the U.S. Fish and Wildlife Service's approval of a Candidate Conservation Agreement with Assurances and Candidate Conservation Agreement and its issuance of an associated Endangered Species Act Section 10(a)(1)(A) Permit (TAILS No. 03E00000-2020-F-0001)

The U.S. Fish and Wildlife Service (USFWS) proposes to sign a Nationwide Candidate Conservation Agreement with Assurances/ Candidate Conservation Agreement for the Monarch Butterfly on Energy and Transportation Lands (CCAA/CCA or Agreement) with the Energy Resources Center at The University of Illinois at Chicago (UIC). To accompany the Agreement, the Service would also issue UIC an enhancement of survival (EOS) permit under §10(a)(1)(A) of the Endangered Species Act (ESA). This document transmits our biological and conference opinion (Opinion) based on our review of the subject action and its effects to the monarch (*Danaus plexipus plexipus*); to species listed under the ESA as endangered or threatened or proposed for such listing; and, to designated and proposed critical habitat. We are issuing this Opinion in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.).

The Agreement and the Permit will result in a net benefit to the monarch. Based on the overall net benefit, it is also our conclusion that the proposed action is not likely to jeopardize the species' continued existence. The measures that Partners will implement under the Agreement and in accordance with the Permit will also ensure that consequences caused by the Agreement or Permit are not likely to jeopardize the continued existence of any endangered, threatened, or proposed species and will not destroy or adversely modify proposed or designated critical habitat.

Actions caused by the Agreement or Permit that are not already subject to section 7 review will be subject to specific avoidance and minimization measures for listed and proposed plants and for designated and proposed critical habitat. The Partners will also be required to review each activity that they implement under the Agreement to ensure that they will not result in the take of any species of animal listed as

endangered or threatened or proposed for such listing. The Service's ongoing participation in the implementation of the Agreement will include technical assistance and review of the Partners' actions, as needed, to ensure that these requirements are met.

We based this Opinion on the Nationwide Candidate Conservation Agreement with Assurances/Candidate Conservation Agreement for Monarch Butterfly on Energy and Transportation Lands and additional information, as described in the Opinion.

LORI NORDSTROM Digitally signed by LORI NORDSTROM Date: 2020.04.03 10:59:43 -05'00' 4.3.20

Lori H. Nordstrom Date

Ecological Services Assistant Regional Director
Great Lakes Region
U.S. Fish & Wildlife Service

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1 DESCRIPTION OF THE PROPOSED ACTION

1.1 THE AGREEMENT AND THE ENHANCEMENT OF SURVIVAL PERMIT

The U.S. Fish and Wildlife Service (Service) proposes to sign a Nationwide Candidate Conservation Agreement with Assurances/ Candidate Conservation Agreement for the Monarch Butterfly on Energy and Transportation Lands (CCAA/CCA or Agreement) with the Energy Resources Center at The University of Illinois at Chicago (UIC or Programmatic Administrator). To accompany the Agreement, the Service would also issue UIC an enhancement of survival (EOS) permit under §10(a)(1)(A) of the Endangered Species Act (ESA). Once both parties sign the Agreement and after the Service issues the permit, UIC would be able to issue certificates of inclusion (CI) to rights-of-way landowners (Partners) until such time that the monarch (*Danaus plexipus plexipus*) is listed as endangered or threatened under the ESA. The Agreement would remain in effect for 25 years.

After receiving a CI, Partners would be required to implement monarch conservation measures on a portion of their Enrolled Lands referred to as the Adopted Acres. The proportion of their Enrolled Lands that they must adopt for monarch conservation is sector-dependent (Table 1). The EOS Permit would authorize Partners to take monarchs in accordance with the Agreement and the conditions of the permit. Partners would also be required to ensure that their activities are not reasonably certain to cause take of any listed or proposed wildlife species other than monarch unless the take is authorized under the provisions of an incidental take statement or another section 10 permit. Before UIC would issue them a CI, each Partner would also have to agree to implement certain measures to avoid or minimize effects to listed or proposed plant species and to designated or proposed critical habitat. Potential partners will be required to include a description of those avoidance and minimization measures with their CI applications. The Service will review those measures to ensure that no activity carried out in pursuit of the Agreement or that is authorized by the Permit is likely to jeopardize any listed or proposed plant species or would be likely to destroy or adversely modify proposed or designated critical habitat.

Table 1. Sector-specific adoption rates required for enrollment in the Agreement. Partners would carry out monarch conservation measures on at least the percentage of their Enrolled Lands that corresponds to the adoption rates for each sector.

Adoption Rate/Sector and Subsector	Energy			Transportation		
	Transmission	Distribution	Generation	Highways (Interstate, U.S., State)	Highways (County, Local)	Rail
CCAA/CCA Adoption Rates	18%	1%	9%	8%	5%	5%

The purpose of a CCAA/CCA is to provide incentives for non-Federal property owners to act in a manner that results in a net conservation benefit to the species. By consenting to the Agreement, Partners agree to address the key threats to the covered species that are under their control. In return, the Service assures them that if it later lists the species as endangered or threatened it would not require them to implement additional conservation measures on non-Federal lands beyond those in the Agreement for covered species in relation to covered activities. In this case, if the monarch were listed, the Service would not impose additional land, water, or resource use limitations on participating landowners to conserve monarchs on enrolled non-Federal lands unless they consent to such changes so long as they are in compliance with the Agreement, CI, and Permit. The Service would issue the Permit to UIC upon signing the Agreement, but it would not go into effect unless the monarch is listed as endangered or threatened because the ESA does not prohibit take of non-listed species. As stated above, however, Partners would be expected to carry out specific measures to conserve monarch before any such listing – in this case, when UIC issues them a CI.

The CCAA is integrated with a Candidate Conservation Agreement (CCA) for conservation measures and covered activities implemented on Federal lands.

The parties involved in the development of the Agreement defined an objective statement focused on working collectively to "encourage participation in voluntary conservation on energy and transportation lands that results in a net benefit to monarchs." Together, the cooperating partners through the development of the CCAA/CCA for monarch butterfly conservation will strive to:

- Enhance and expand available monarch habitat by adopting appropriate conservation measures that promote sustainable breeding (milkweed) and foraging (nectar plants) habitat.
- Maintain a public-private partnership between the Service, Transportation, and Energy Sector managers to facilitate voluntary conservation and communicate its benefits.
- Ensure regulatory certainty and maximize operational flexibility for ongoing rights-of-way and facilities management activities in the event of listing, or by precluding the need to list.

1.2 PARTICIPANT ROLES & OBLIGATIONS

1.2.1 Energy Resources Center at the University of Illinois at Chicago – Program Administrator

UIC will hold the EOS Permit, subject to Service oversight consistent with 50 CFR § 13.21(e)(2). UIC will maintain positions for program administration to facilitate enrollment of Applicants in the CCAA/CCA and distribute information for conservation efforts through coordination with other state and Federal agency staff and outreach to Partners and landowners. UIC will also serve as the fiscal agent for this Agreement, including management of a non-wasting endowment to fund permit and program administration activities that will benefit the monarch through coordination of annual Partner reporting and collaboration that addresses habitat restoration, enhancement, and the removal of threats.

The Agreement (section 7.1) describes the obligations to which UIC would agree as Program Administrator. They include the suspension, in whole or in part, or revocation, of the Certificate of Inclusion of any Partner found to be in non-compliance with the requirements of the Agreement.

1.2.2 Partners

Any non-Federal person or entity with a fee simple, leasehold, easement, or other property interest on lands managed for energy and transportation purposes is eligible to become a Partner in the Agreement. Partners must be able to carry out the conservation measures and covered activities described in the Agreement and the attached CI on their Enrolled Lands, subject to applicable local, state, other Federal, and tribal law. By executing a CI, the Partner agrees to the obligations and responsibilities identified in the CI and the Agreement.

Applicants will likely include non-Federal landowners and other entities who manage lands associated with electric power generation, electric transmission and distribution, oil and gas transmission and distribution, and renewable energy development, as well as a network of individual state departments of transportation. Several of the prospective Applicants worked with UIC and the Service to help develop the Agreement.

Additional specific obligations of the Partners are described in Section 7.3 of the Agreement and include:

- Tracking the location (county, statewide, or finer scale) of where, how many acres, and date when conservation measures are implemented for compliance verification.
- Reporting annually on compliance and effectiveness, as specified in the CI. Compliance must be reported annually to the Programmatic Administrator according to provisions in Section 14 of the Agreement (Monitoring Provisions).
- Conducting effectiveness monitoring within a subset of locations where they have implemented conservation measures for compliance verification as described in Section 14 of the Agreement (Monitoring Provisions).
- Providing the Service and the Programmatic Administrator, or their agreed upon representatives, access to the enrolled property to identify or monitor monarchs and their habitat, evaluate conservation measures, and monitor effectiveness and compliance with individual Partners at mutually agreeable times.

- Allowing the Programmatic Administrator to share, as requested, with the Service or other Partners to the Agreement, habitat and other planning or monitoring information related to the enrolled properties.

1.2.3 U.S. Fish and Wildlife Service

The Service's obligations are described in section 7.2 of the Agreement and include the following:

- Issue the Permit to the Programmatic Administrator.
- The Service will provide assurances that it will not require Partners to carry out additional conservation measures for monarchs on enrolled non-Federal land beyond those of the Agreement or impose additional incidental take restrictions for monarchs on enrolled non-Federal land beyond those identified in the draft Enhancement of Survival Permit.
- The Service will work with UIC and Partners to provide technical assistance and ensure the best information is available to inform ongoing implementation, and advise when and if any adaptive management triggers require follow up actions.
- The Service will provide oversight on the issuance of Certificates of Inclusion and Partner applications in consultation with the Programmatic Administrator.
- The Service may suspend, in whole or part, or revoke, the Certificate of Inclusion of Partners found to be in non-compliance with the requirements of the agreement.
- Annually review the compiled monitoring and reporting on the implementation and effectiveness of the Agreement. The Service will advise UIC on any recommendations, or required changes in conservation strategy considering the adaptive management scenarios in the Agreement, or other changed circumstances.

1.3 COVERED LANDS

Enrolled lands may include both non-Federal and Federal lands, as follows:

- Non-Federal Enrolled Lands are the non-Federal areas to which the Agreement's assurances apply and on which the Service would authorize the incidental take of the monarch under the Permit.
- Partners may enroll Federal lands only to the extent that the non-Federal Partners maintain easements, leases, or permits on those lands for energy or transportation infrastructure that would allow for their implementation of the monarch conservation measures. Assurances and incidental take of the monarch are not authorized through the Permit on CCA lands (i.e., Federal lands), but Partners and other Federal agencies reviewing their activities receive regulatory predictability through the Section 7 consultation conducted in association with this Agreement.

Lands managed by energy and transportation Partners within the migratory and breeding range of the monarch in the contiguous U.S. comprise the area that may be covered by the Agreement (Fig. 1). The covered area excludes documented overwintering sites, including those along the California coast and other documented overwintering sites and requires specific conservation measures within half mile buffers of these documented areas (see section 4.1 – Covered Lands, in the Agreement).

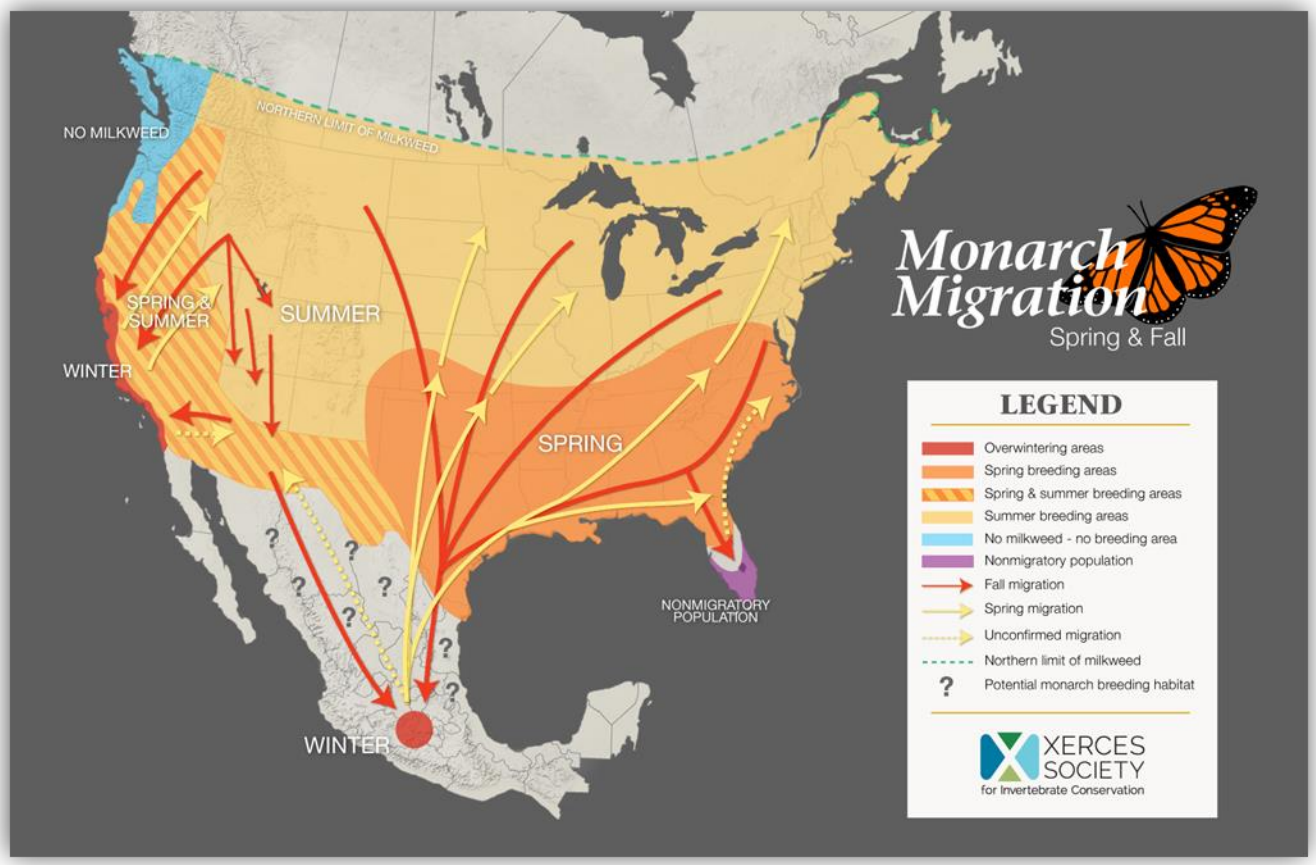

Figure 1. The migratory, non-migratory, breeding, and overwintering range of the monarch butterfly within the lower 48 states of the continental U.S. (Xerces Society 2018a).

The Agreement allows Partners to place conservation measures strategically on their Enrolled Lands, where they are likely to benefit monarchs and where land use and authorities are compatible. Partners may shift placement of conservation measures over time to address conservation needs of the species, interests of other underlying or adjacent landowners, local laws, regulations, or other constraints that may limit the ability to apply conservation measures in a given area.

The scope of the covered area excludes documented overwintering sites, such as overwintering groves along the California coast, and other documented overwintering sites. Monarchs do also occasionally overwinter incidentally in other locations across the southern U.S. The locations of these incidental overwintering locations may change from year-to-year. For the Agreement, only documented overwintering sites repeatedly used by monarchs are excluded from the covered area.

1.4 ENROLLMENT

1.4.1 Enrollment Period

Eligible Applicants may be enrolled at any time before an effective date of a final rule listing the monarch as threatened or endangered under the ESA. If the Program Administrator receives a complete application for a CI during the enrollment period before listing, it may still enroll the Applicant and issue a CI after the effective date of a listing decision. Applications will not be accepted after the effective date of a final listing rule.

1.4.2 Post-Listing Changes in Land Ownership or Management

For the purposes of the Agreement, lands owned, leased, easement-held, or otherwise managed by existing Partners, including lands acquired post-listing, can be added, transferred, or removed, to/from the existing Enrolled Lands as a modification to encourage consistent land management, maintain enrollment, adoption of conservation measures, and to increase the scope of habitat managed for monarchs. The Agreement requires Partners to report annually any changes in Enrolled Lands (added or removed).

1.4.3 Enrollment Process

The Applicant shall provide UIC with sufficient information regarding the property or lands it seeks to enroll for UIC to verify if they are located in the covered area and eligible for enrollment. The Applicant will also review the Agreement obligations, define their anticipated Enrolled Lands, and identify the adoption rate(s) applicable to the lands they are enrolling (Table 1). The Agreement (section 4.4) further details the information that the Applicant must collect to help characterize the lands it plans to enroll and the conservation measures it will implement.

1.4.3.1 Future Reviews to Ensure Ongoing Section 7 Compliance

To comply with §7(a)(2), the Service must ensure that its actions are not likely to (1) jeopardize the continued existence of any listed species or (2) destroy or adversely modify any designated critical habitat. In addition, section 7(a)(4) requires agencies to carry out an intra-Service conference for any actions that are likely to jeopardize proposed species or to destroy or adversely modify proposed critical habitat. To ensure compliance with the two sections, we must evaluate and describe the likely consequences of the Service's approval of the Agreement and its authorization of monarch incidental take under the Permit.

Although the analyses that we conduct to comply with section 7(a)(2) and section 7(a)(4) are similar, they have different procedural outcomes. Section 7(a)(2) forbids federal agencies from implementing any action that is likely to jeopardize listed species or to destroy or adversely modify critical habitat. Under section 7(a)(4), agencies must confer with the Service if their action is likely to jeopardize proposed species or to destroy or adversely modify proposed critical habitat. Therefore, we must ensure that ongoing section 7 compliance ensures the 7(a)(2) protections for listed species and critical habitat, while also ensuring that we identify any action that would require a conference under section 7(a)(4).

In this biological and conference opinion, we evaluate the likely effects of the proposed action on monarchs, proposed and listed species and, proposed and designated critical habitat. At this stage – before the Service and UIC have signed the Agreement and before the Program Administrator has issued

any CIs – we do not know specifically where Partners will carry out activities within the covered area (Fig. 1). Therefore, we must rely on the structure of the Agreement and the conditions of the Permit to determine whether they are sufficient to ensure compliance with sections 7(a)(2) and 7(a)(4) of the ESA.

1.4.3.1.1 Reviews of Applications for Certificates of Inclusion

To help ensure broad compliance with section 7 and to account for the broad scope and uncertainty of the consequences of the proposed action, the Service will carry out additional review of the potential effects to non-covered species and critical habitats when potential Partners apply for CIs. Applicants will first generate a full list of the endangered, threatened, and proposed species that may occur within the extent of the lands that they propose for enrollment and of any designated or proposed critical habitats that overlap with those lands. The Applicants will then include a list of specific measures they will follow to avoid or minimize effects to each listed or proposed plant species and to critical habitat that has been designated or proposed for either plant or animal species.

Before the Programmatic Administrator may issue the CI, the Service will review the information provided by each Applicant. The objective of this review will be to determine whether the inclusion of the Applicant in the Agreement and the authorization of the related monarch incidental take through the Permit would allow for the Service's ongoing compliance with sections 7(a)(2) and section 7(a)(4). The Service will determine, in cooperation with the Programmatic Administrator, whether:

1. The avoidance and minimization measures (AMMs) proposed by the applicant are sufficient to ensure that actions caused by the Agreement and Permit will neither jeopardize the continued existence of any listed or proposed plant species nor destroy or adversely modify any designated or proposed plant or animal critical habitat.
2. The Applicant will ensure that its implementation of monarch conservation measures and covered activities will not cause take of any listed or proposed animal species (see next section).

If the Service finds that the proposed AMMs are insufficient to ensure ongoing compliance with sections 7(a)(2) and 7(a)(4), it will work with the Applicant to revise the application.

To ensure that AMMs will be used for their intended purpose, the agreement also includes a checklist for Partners to determine what projects fit the definition of a covered activity. Use of the checklist would prompt the Partners to consider the following statement:

- For actions that are not covered by a separate section 7 consultation, the activity incorporates all avoidance and minimization measures attached to the Certificate of Inclusion that are applicable to any listed or proposed plant species, or Federal designated or proposed plant or animal critical habitat that is likely to occur in the action area or to overlap with the action area, respectively. For technical assistance, contact the local USFWS Ecological Services field office (https://www.fws.gov/offices/). Action area means all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action.

1.4.3.1.2 Ensuring No Take of Non-Covered Listed and Proposed Animal Species under the Agreement
Applicants will not be required to provide avoidance and minimization measures for listed and proposed animals, but will be required to ensure that any activity implemented pursuant to the Agreement or under the authority of the Permit would not result in their take.

As they implement the Agreement, Partners will be required to ensure that the following statement is true for each conservation measure and covered activity carried out under the Agreement:

- The activity is not reasonably certain to cause take of federally listed or proposed wildlife species, other than monarch, *unless that take is covered under another existing Section 7 consultation or Section 10 Permit*. For actions that are not covered under another Section 7 consultation or Section 10 Permit, there is an information basis on record to support at least one of the following two conclusions:
    - No listed or proposed animal species are likely to be exposed to the activity directly or to any stressors generated by the activity.
    - One or more listed or proposed animal species may be exposed to the activity directly or to one or more stressors generated by the activity, but that exposure will *not* result in the incidental take of one or more individuals. For technical assistance, contact the local USFWS Ecological Services field office (https://www.fws.gov/offices/). Note that USFWS field offices will not be expected to provide explicit or written concurrence or non-concurrence with the Partner's determination as to whether or not an activity is reasonably certain to result in the take of a listed or proposed species of fish or wildlife. They will be available to provide technical assistance to Partners to help them make this determination.

We anticipate that the preclusion of any take of listed or proposed wildlife will be sufficient to ensure compliance with section 7. If, however, the Service determines that the Applicant would have to adopt additional measures with respect to any wildlife species to ensure such compliance, it will work with the Applicant and the Programmatic Administrator to ensure that sufficient measures are incorporated into their certificate of inclusion. If they wish, Applicants may affirmatively provide such additional measures as part of their application.

As part of its responsibilities under the Agreement (see **Participants and Their Roles,** above), the Service will provide technical assistance to the Partners, as needed, to assist them in determining that Actions implemented under the Agreement or under the authority of the Permit will not result in take of any listed or proposed animal species other than monarch, as authorized.

1.5 CONSERVATION MEASURES

Partners that receive CIs commit to implementing certain measures that address the loss of monarch habitat resulting from land conversion, herbicide use, or mowing due to maintenance and modernization activities on energy and transportation lands. The conservation measures described in the Agreement

would address this habitat loss by increasing milkweed and nectar plants and by reducing negative impacts to the species from mowing and herbicide use.

To enroll in the Agreement, each Partner must first identify a suite of monarch conservation measures that they can implement over the course of the Agreement and that they can conduct on enough lands to achieve the Adopted Acres target that is consistent with the applicable adoption rate(s) (see Table 1). The selected conservation measures must address each of the key threats to monarch that are within their control. Partners would select conservation measures during the initial application, but will be able to change them later through a modification of the CI. Partners will base conservation measures on the key threats within their control and their management ability with respect to those threats.

Partners will describe local or regional considerations and explain how they would conduct specific measures on Adopted Acres across their Enrolled Lands as part of their implementation plan. For example, under the Agreement, a right-of-way manager conducting routine mowing and broadcast herbicide treatments would be required to address two key threats – habitat loss from herbicide use and mowing. To comply with the Agreement, the land manager would select conservation measures that address those threats, such as conservation mowing and targeted herbicide use. They would then implement those conservation measures across the Adopted Acres to the extent needed to achieve the Adopted Acres target they are committed to by their CI.

Table 6-2 in the Agreement contains summary descriptions of conservation measures, the key threats that each would address, their intended purposes, and implementation examples. Conservation measures listed in the table include:

- Seeding and planting to restore or create monarch habitat;
- Controlled grazing to promote monarch habitat;
- Removing brush to promote monarch habitat;
- Idling or setting aside suitable monarch habitat;
- Mowing to enhance monarch floral resources;
- Treating undesired plant species with targeted herbicide treatments; and,
- Implementing best management practices to control invasive species.

Partners will develop specific measures to account for local conditions and management capabilities or constraints. A description for one measure in the Agreement, for example, states, “Completing seeding or planting projects that create areas of suitable habitat with milkweed and/or floral resources available throughout the growing season.” Based on this general description, the Partner will develop a plan that includes a list of species to be included in seed mixes, site preparation, timing of planting, follow-up site management, etc.

For all conservation measures employed by a Partner, the Partner will detail in their implementation plan how they plan on using best management practices and guidance available on the Monarch Agreement Toolbox website to implement monarch conservation strategies and update implementation as appropriate. The Rights-of-Way as Habitat Working Group website will likely host the Monarch CCAA/CCA Toolbox, which will provide information from the Service and other conservation partners.

1.5.1 Adoption Rates

Adoption rates are the minimum percentage of Enrolled Lands on which Partners must apply conservation measures to enhance, restore, and maintain monarch butterfly habitat annually. The total area on which each Partner must implement conservation measures annually will be determined by multiplying the number of their Enrolled Acres in each sector by the sector-specific adoption rates (Table 1).

The proposed adoption rates reflect the range of landscapes, management abilities, and constraints facing each individual sector. Potential Partners representing multiple sectors and geographic regions developed the adoption rates in the Agreement, which are slightly different from those in Thogmartin et al. (2017), and MAFWA (2018). Thogmartin et al. (2017) focused on the Midwest, but Partners will implement the Agreement throughout the 48 contiguous States. The adoption rates in the Agreement are intended to reflect variation in ecological conditions across the plan area.

1.5.1.1 Variances below the Adopted Acres Targets

If Applicants think that they are unable to achieve the required adoption rates, they may request a variance to a level that exceeds 60% of the sector-specific adoption rate. UIC will only consider applications that include variances below expected adoption rates after they have administered applications that meet the sector-specific adoption rates. To receive a variance, applicants will need to provide additional information, as specified in the Agreement, including a justification "that the Applicant can demonstrate a net conservation benefit to monarchs."

If the Applicant is able to achieve the Adopted Acres target resulting from the expected adoption rate(s), but is unable to do so in its first full calendar year of implementation, the Applicant can propose an appropriate implementation timeline (up to five years) for achieving their Adopted Acres target. The Partner's CCAA/CCA implementation plan would be expected to outline the timeline for achieving the Adopted Acres target, and forecast the expected annual Adopted Acres target(s) that can be achieved over the interim period. See Section 6 in the Agreement for further details.

1.5.1.2 Variances in Adoption Rates and Net Conservation Benefit

As necessary, the Programmatic Administrator would review the collective variances, both above and below the expected adoption rates, to verify that collective net conservation benefit of the Agreement among Partners is maintained. (See Section 6.2.2 – Adoption Rate Variances in the Agreement).

1.5.2 Adaptive Management

The Agreement identifies triggers or thresholds that could prompt one or more of the parties to make adjustments to ensure the integrity of the Agreement. The Program Administrator will provide resources through the CCAA/CCA toolbox and website and will otherwise provide technical assistance to ensure that Partners have the best available information when making management adjustments. When adaptive management thresholds are triggered, the Programmatic Administrator and/or Partners will review the trigger, initial corrective action or management adjustment, and the anticipated response expected under the individual scenario to determine next steps. A summary of any changes will be included in the Partner's annual compliance reporting.

1.5.3 Compliance Tracking and Reporting

The Partners will be responsible for annual compliance tracking and annual reporting specified in the Agreement related to its implementation and fulfillment of its provisions, including implementation of agreed-upon conservation measures, in accordance with the executed CI. Compliance tracking will require information on which conservation measures the Partners implemented, as well as when and where they implemented them. Table 14-1 in the Agreement summarizes the data that the Partners will be expected to collect.

1.5.4 Effectiveness Monitoring

The Partners will carry out monitoring to document whether conservation measures are effectively creating, enhancing, restoring, or sustaining habitat that supports monarch breeding and/or foraging requirements.

1.6 COVERED ACTIVITIES

The term "covered activities" refers to those activities carried out on enrolled energy and transportation lands that may result in incidental take of monarchs, consistent with the Agreement and EOS Permit during the term of the CI. By committing upfront to the conservation measures, the Agreement will provide energy and transportation land managers certainty that current maintenance and modernization practices, covered within the Agreement – the covered activities, can continue in the event the Service lists the monarch.

The Agreement defines covered activities as follows:

> Energy and transportation land management, maintenance, and modernization activities on enrolled lands that are reasonably certain to cause take of monarchs. Covered activities cannot result in incidental take of other ESA listed animals, or must be conducted in compliance with the terms and conditions of existing incidental take statements (Section 7) or Section 10 permits. Partners will develop and implement avoidance and minimization measures to ensure that covered activities do not jeopardize listed or proposed plants or destroy or adversely modify designated or proposed critical habitat. Partners shall carry out covered activities in accordance with existing permits, easements, and agreements that allow the Partners to access and manage their enrolled lands. Covered activities do not include actions that pose significant environmental, socioeconomic, historic, or cultural impacts. If the monarch is listed as endangered or threatened under the ESA, incidental take of monarchs that occurs as a result of covered activities carried out by a Partner who is adhering to the terms of the Certificate of Inclusion will be authorized under the EOS Permit and Consultation document. See Section 5 of this Agreement for additional detail and examples of covered activities.

Covered activities are described in the Agreement and include general operations; vehicle and equipment access; maintenance of existing roads and access routes; surveys and inspections; emergency response; structural maintenance; facilities management and maintenance; temporary staging and storage; facility repairs, upgrades, and replacement within existing parcels or rights-of-way; and vegetation management.

Vegetation management is conducted routinely on existing rights-of-way and other lands to ensure safe and reliable operations and to allow access for inspections, maintenance, and emergency response. Vegetation management is either a conservation measure or a covered activity, as described in more detail in the Agreement. This distinction is dependent on the timing, site conditions, management objectives, and techniques used. For example, mowing conducted in monarch habitat during the growing season and without consideration for timing relative to monarchs would be a covered activity if it otherwise meets the definition. If mowing avoids these impacts to monarchs and their habitat, then it may be a conservation measure.

To determine whether vegetation management is a covered activity or a conservation measure, Partners will be expected to consider the following:

a) Does the activity have the consideration of monarch habitat as part of the site or treatment management objectives (for example consideration for sustaining blooming nectar plants, along with other maintenance objectives such as safety, security, and reliability)?

b) Does the activity likely benefit the monarch butterfly in the area being treated (for example will it sustain or enhance the presence of diverse, flowering plants as suitable habitat)?

c) Does the activity attempt to avoid or minimize loss or negative impacts to suitable habitat and monarchs during the growing season when monarchs may be present?

If the answer is yes to all three considerations, then the activity would be considered a conservation measure. If the answer to any of these conditions is 'no', then the activity would likely be considered a covered activity.

Examples of vegetation management activities that would be considered covered activities include the following:

- broadcast application of herbicides in areas of suitable habitat;
- mowing in areas of suitable habitat during the growing season to remove woody vegetation or create temporary access routes; and,
- vegetation management applicable to other legal or regulatory requirements that may be incompatible with the maintenance of monarch habitat and with measures intended to minimize direct interactions with monarchs.

1.7 CHANGES TO ENROLLED LANDS

After the CI's effective date, Partners and UIC will update the Partner's description of lands to reflect approved additions to Enrolled Lands and any removal of Enrolled Lands resulting from transfer of ownership, voluntary removal by the Partner or termination of enrollment due to noncompliance as provided in the Agreement. UIC and the Service will ensure Enrolled Lands are within the context and limits of the programmatic consultation and that net conservation benefit is still being met. The Programmatic Administrator will include a cumulative summary of changes to Enrolled Lands during annual reporting to the Service.

1.8 EFFECTIVENESS MONITORING

1.8.1 Suitable Habitat Criteria

Effectiveness monitoring required by the Agreement is intended to answer the following questions to verify that the Adopted Acres the Partner has committed to the Agreement contain suitable habitat for monarchs:

1. Are numerous milkweed stems present within randomly selected portions of the Adopted Acres? Specifically, within sample plots:
    a. In the Midwestern and Eastern U.S. (Fig. 2), do sample plots contain at least six milkweed stems?
    b. In the Western and Southern U.S. (Fig. 2), do sample plots contain at least two milkweed stems?
2. For the Western and Southern U.S. only (Fig. 2), are potentially flowering nectar plants present across more than 10 percent of the sample plots?

For the Western and Southern U.S., a 'yes' answer to either question would indicate that the sample plot contains suitable habitat for the monarch. For the Midwestern and Eastern U.S., suitable habitat relies on the presence of numerous milkweed stems, as specified.

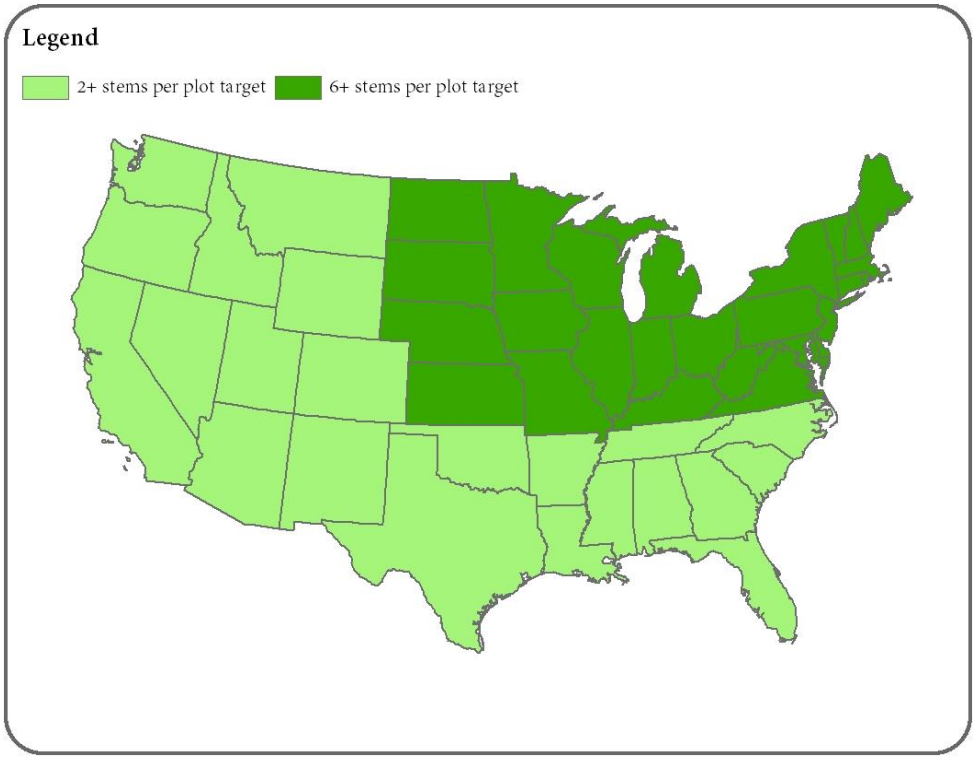

Figure 2. Geographic extents of minimum milkweed stem targets within the Agreement.

For the second question, the Agreement defines "potentially flowering nectar plants" as all flowering plants that can provide available nectar for monarchs at some point during the growing season. The Agreement sets 10% to be a minimum threshold expected across the diverse array of potential habitats that Partners may manage under the Agreement and is intended to omit unsuitable habitat such as grasslands dominated by invasive grass species, or woody thickets too dense to support herbaceous flowering vegetation.

In addition to the suitable habitat criteria, the Agreement includes several adaptive management triggers that are intended to further support the goal of providing a net conservation benefit to the monarch. These include the following management adjustment and anticipated response by the Program Administrator to help ensure that milkweed densities on the Adopted Acres in the East and the Midwest are supportive of a net conservation benefit:

- Management Adjustments - If more than 10% of the cumulative sample plots located within the Eastern and Midwest sample region (Fig. 2) demonstrate a lack of milkweed at the minimum threshold (150 and 156 stems/acre in the energy and transportation sectors, respectively), the Program Administrator and the USFWS will evaluate the monitoring results to determine the potential cause of the shortfall and its implications for monarch conservation in the program area.
- Anticipated Response - After the Program Administrator evaluates data provided by monitoring, the Administrator and Service will review the evaluation and results and together determine the appropriate follow up actions to increase milkweed on adopted acres; to modify or enhance our ability to make accurate and precise inferences about milkweed abundance on the adopted acres - for example, by adjusting the monitoring protocol; and/or, to amend the thresholds associated with this adaptive management response to align appropriately with new scientific information, Partner observations, and/or monitoring resources and opportunities. Amendments to the adaptive management thresholds for this response shall not reduce the likelihood that milkweed densities will average at least 150 and 156 stems per acre in the energy and transportation sectors, respectively. Moreover, any revision to the threshold levels will be done only after an analysis conducted by the Program Administrator and the Service demonstrates that the program would continue to provide a net conservation benefit to monarch by maintaining sufficient abundance of milkweed on the adopted acres.

1.8.2 Monitoring Methods

1.8.2.1 Extent of Sampling

The extent of sampling will depend on the extent of the Adopted Acres target defined for each Partner according to their adoption rate and extent of Enrolled Lands (Tables 1 and 2). Partners reporting actual Adopted Acres above-and-beyond their minimum target are not required to monitor any additional points above the threshold associated with their Adopted Acres target.

Table 2. Sampling extent expected for biological effectiveness monitoring.

Estimated Adopted Acres	Number of Samples
Less than 1,000	10
1,001 to 10,000	30
10,001 to 30,000	50
30,001 to 60,000	70
60,001 or more	70, plus one additional point for each 1,000 acres exceeding 60,001 adopted acres

1.8.2.2 Effectiveness Monitoring Reporting Frequency

Effectiveness monitoring reporting will be required at the end of the first year of implementation to an extent proportional to the amount of Adopted Acres during the initial year of enrollment. After the first year, Partners may report effectiveness monitoring results annually. Alternatively, the Partner may report on effectiveness monitoring only once every 2 or 3 years as long as they still report on the same number of samples as would be expected if reported annually. For example, if the extent of Adopted Acres would require 30 samples per year (Table 2), the Partner would be required to report on 90 sites if reporting every three years. A greater than annual reporting interval will only be allowed if Partner is currently fulfilling their obligations of this Agreement. The Programmatic Administrator and the Service reserves the ability to request more frequent reporting if deadlines are missed, reporting is incomplete, or other obligations have not been successfully met.

1.9 BUFFER ZONES

During the public comment period on the CCAA, the Farm Bureau commented that creating habitat adjacent to agricultural lands may put agricultural partners at risk of harming monarchs and other at-risk pollinators due to the land management practices they may use adjacent to rights-of-way. They requested the Agreement extend incidental take cover of monarch butterflies to adjacent agricultural landowners. To address this concern and to provide additional protection for monarchs, we added a permit condition that authorizes landowners (or their designees) to incidentally take monarch butterfly on lands within 100-feet of each edge of covered right-of-way lands immediately adjacent to adopted acres where Certificate of Inclusion holders are applying conservation measures provided that (1) appropriate monarch conservation measures identified in Table 6.3 of the Agreement are implemented and can be documented by landowners (or their designees) within the 100-foot buffer zone, (2) the incidental take by the landowners (or their designees) results from the implementation of these conservation measures or from covered activities (including the landowner's general operations, maintenance and modernization, or vegetation management activities), and (3) the activity will not result in take of listed or proposed species other than monarch butterfly, will not destroy or adversely modify designated or proposed critical habitat, and will not affect historic properties. The conservation measures in the CCAA were designed to address threats that are under the right-of-way landowner’s control and include: 1. loss of habitat resulting from land conversion, 2. loss of habitat resulting from herbicide use, and 3. loss of habitat resulting from mowing. (section 6.1 of the CCAA)

2 STATUS OF THE MONARCH

See also the description of the monarch's status in the action area in the Environmental Baseline section below (see section 3.4, STATUS OF THE SPECIES IN THE ACTION AREA).

2.1 DISTRIBUTION

North America contains two migratory populations of the monarch and the species breeds year-round in South Florida (Fig. 1). The largest migratory population, which we refer to below as the Eastern North American Population, breeds across the central and eastern part of the continent and winters in Mexico (Fig. 1). A smaller migratory population breeds in western North America and winters primarily along the California coast south into Baja California, Mexico (Fig. 1; Jepsen and Black 2015).

The monarch also occurs in parts of South America; Aruba and nearby islands; Central America and the Caribbean; Australia, New Zealand, and other Pacific Islands; Hawaii; and, the Iberian Peninsula (including Spain, Portugal, Morocco, and nearby Atlantic islands).

2.2 FACTORS INFLUENCING THE STATUS OF THE SPECIES[1]

2.2.1 Loss of Breeding and Migratory Habitat

For a discussion of the loss of breeding and migratory habitat and its effects on the monarch, see section 3.4, Status of the Species in the Action Area.

2.2.2 Loss of Overwintering Habitat

Loss and fragmentation of overwintering habitat is a threat to the long-term survival of monarchs. Both western and eastern monarchs rely on the microclimatic conditions present in the forests at their overwintering sites (Leong et al. 2004; Williams and Brower 2015). Loss of trees occurs at overwintering sites in Mexico because of small- and large-scale logging, storms, and an increasingly unsuitable climate. Most overwintering sites for the Eastern North American (ENA) population occur within the Monarch Butterfly Biosphere Reserve (MBBR), a 56,259-ha protected area. There is a logging ban within the 13,551-ha core zone at the MBBR (Ramírez et al. 2015), but illegal logging still occurs (Vidal et al. 2014, Brower et al. 2016).

[1] This section relies heavily on U.S. Fish and Wildlife Service (2018. Draft Monarch (*Danaus plexippus plexippus*) Species Status Assessment Report. 110 pp.).

2.2.3 Insecticides[2]

Based on patterns of use, chemical characteristics, exposure, laboratory toxicity tests, and the results of field studies, insecticides are a threat to monarch populations across the species' range. Authors have hypothesized that sub-lethal effects of insecticide exposure decrease the number of monarchs that migrate successfully to wintering grounds in Mexico (Inamine et al. 2016, p. 1089).

Insecticides pose a threat to monarchs due primarily to the following:

- Insecticides are used in areas where monarchs occur;
- They are designed to kill insects; and,
- Insecticides likely make contact with monarchs where they are applied and outside of application sites, due to drift of droplets, vapor, and dust; and,
- Monarchs are likely to ingest insecticides that plants have incorporated into their tissues.

We do not understand precisely the extent of monarch exposure to insecticides or the magnitude of the effects to monarch populations. Insecticide use varies in time and space. Outbreaks of certain pests and emerging pests change geographic patterns and intensity of insecticide use (e.g., O'Neal 2005). The development and use of new insecticides, the regulation of older insecticides, and the unknown effects of pesticide mixtures in the environment influence the degree of toxicity.

Factors that contribute to our uncertainty about the effects of pesticides to the monarch that we may manage to reduce that uncertainty include:

- General awareness of insecticide use (e.g., ornamental plants and other consumer products that may contain neonicotinoids) and public policy affecting insecticide registration and use.
- Extent of development and adoption of best management practices, including Integrated Pest Management and drift control measures.
- Extent of agricultural land uses with monoculture systems that increase the potential for, and frequency of, insect pest outbreaks and the economic need for control (e.g., see Meehan et al. 2011).
- Societal expectations for widespread use of mosquito control insecticides.
- Technological capability to develop chemical controls that could reduce monarch exposure or toxicity by being more selective, shorter-lived, and less mobile.
- Lack of standardized toxicity testing protocols to determine effects to the monarch.
- Field measurements of insecticide residues in select components of monarch habitat across a variety of land use sectors (i.e., quantified exposure).

2.2.4 Roadkill during Autumn Migration – Eastern North American Population

Roadkill of monarchs during autumn migration is a significant factor in the decline of the ENA population, but may be less important than declines in milkweed and nectaring habitat and overwintering mortality (Grant and Bradbury 2019, p. 10; Kantola et al. 2019, p. 158; Voorhies et al. 2019, p. 11).

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[2] The information below is adapted from USFWS (2018. Supplemental Materials 1a for the Monarch (*Danaus plexippus plexippus*) Species Status Assessment Report (Draft October 2018).

Roadkill mortality during autumn migration can be substantial, especially where the migration pathway narrows in the southern U.S. and in Mexico. In the "Central Funnel" of the monarch's Central Flyway in 2016, for example, roadkill of monarchs was equal to about 5% of the number estimated on the wintering grounds in 2016-2017 (Kantola et al. 2019, p. 156; Tracy et al. 2019, p. 452, 454).[3] Roadkill averaged 2.8% of the wintering population size over the two years of their study, 2016-2017 (Kantola 2019, p. 158). Roadkill mortality during migration may be especially important in this "Central Funnel" and in the "Coastal Funnel" (Tracy et al. 2019, p. 455). Kantola et al. (2019, p. 154) described a 'hotspot' of roadkill mortality on the stretch of U.S. Interstate 10 between Sheffield and Sonora, Texas and discussed five additional hotspots in Mexico.

The location of roadkill hotspots shift over time and with traffic volume and can be significant even north of the migratory funnels. Kantola et al. (2019, p. 154) found that roadkill rates varied from 6 to 646 dead monarchs per km depending on year, road type, and location. At the Sheffield-Sonora, Texas hotspot, for example, estimated monarch roadkill was 70,000 in 2016 compared to about 5,000 in 2017 (Kantola et al. 2019, p. 158). McKenna et al. (2001, p. 68) estimated that vehicles killed more than 500,000 monarchs on or about the week of September 16, 1998 along interstate highways in Illinois. They found "many more" males than females and suggested that male chasing behavior was to blame (McKenna et al. 2001, p. 68). They also suggested that the abundance of whorled milkweed (*A. verticillata*) "within two m of the roadway edge" might have led to the high mortality of monarchs (McKenna et al. 2001, p. 68).

In addition to the concentrating effect of continental autumn migration patterns, the authors in these studies hypothesize that local stochastic weather events, such as unfavorable winds "extended roosting and nectaring…in the vicinity of roadways" and local geography affect roadkill number (Kantola et al. 2019, p. 154). Increased time spent flying low to the ground to seek shelter from heat or to find nectar could also increase roadkill mortality (Kantola et al. 2019, p. 157).

Successful efforts to reduce roadkill during autumn migration might have a substantial effect on the status of the ENA population. For example, a 0.5% annual reduction in roadkill mortality "could significantly contribute to a reversal in the long-term 7.2% annual exponential decline in monarch populations" (Kantola et al. 2019, p. 159). Suggestions for reducing roadkill include strategic placement of nets to steer monarchs above traffic; closing lanes; and, reduced speed limits. In the coastal portions of the Eastern Flyway, Tracy et al. (2019, p. 454) suggest that wildflower plantings be placed away from roads to mitigate the impacts of roadkill.

2.2.5 Climate Change[4]

Climate change can affect monarchs both directly and indirectly (Nail and Oberhauser 2015). Increasing storm frequency in the Mexican overwintering colonies can lead to catastrophic mortality of up to 80% due to the freezing temperatures that accompany these storms (Anderson and Brower 1996, Brower et al.

[3] Kantola et al. (2019, p. 156) estimated 3 million road-killed monarchs per year for the Central Funnel in the fall of 2016. Based on the estimate of 2.91 hectare of monarchs on the wintering grounds (Thogmartin et al. 2017), approximately 61,110,000 monarchs overwintered there in 2016-2017.

[4] This section is adapted from U.S. Fish and Wildlife Service (2018. Draft Monarch (*Danaus plexippus plexippus*) Species Status Assessment Report. 110 pp.).

2004). Severe storms may become more frequent and precipitation may increase during the winter when monarchs are present in Mexico (Oberhauser and Peterson 2003). Moreover, the hazards faced by monarchs during their fall migration (e.g., roadkill – see above) could increase if their breeding grounds moved further north, as is predicted due to climate change (Lemoine 2015).

2.2.6 Predation

Predation of eggs and early larval stages may have a significant effect on the viability of monarch populations (Myers 2019, p. 77). Predation is the main source of mortality for monarch eggs (Myers 2019, p. 78).

3 ENVIRONMENTAL BASELINE

Environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline. [50 Code of Federal Regulations (CFR) §402.02]

3.1 ACTION AREA

The implementing regulations for section 7(a)(2) of the Act define the "action area" as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. [50 CFR §402.02] Enrolled lands may include all or some combination of suitable habitat types, or areas with the potential to create those habitats.

See the section **COVERED LANDS**, above, for additional description of the action area, which includes the portions of the contiguous U.S. where monarchs are likely to occur, excluding certain overwintering areas.

3.2 COVERED LANDS DESCRIPTION

This section is largely adapted from section 4.7 of the Agreement – Description of Lands Covered.

Lands that may be eligible for enrollment under the Agreement – transportation and utility rights-of-way and associated lands – are ubiquitous across the North American landscape, crisscrossing mountains, forests, grasslands, deserts, farms, parks, and cities. Based on input from 18 potential Partners, we estimate that 61% of the Enrolled Acres will be in the energy sector, with the remaining 39% in the transportation sector. Therefore, in our analyses below we include a High Enrollment scenario with

15,800,000 acres initially enrolled in the energy sector and 10,200,000 enrolled in the transportation sector.

Vegetation in most of the energy and transportation lands is generally managed to prevent the growth of trees and other large woody vegetation. This maintains a perpetual state of early successional habitat – grassland, meadow, shrubby areas, etc. (Lanham & Whitehead 2011).

3.3 ACTIVITIES IN THE ACTION AREA

Safety concerns and regulations and competing vegetation management objectives in any particular location limit the current and future extent of monarch habitat in the action area. In addition to linear rights-of-way, energy and transportation lands also include individual parcels that may contain infrastructure associated with rights-of-way operations. Energy sector lands may include parcels for generation sites, substations, pump stations, operation centers, or other office or storage facilities. Transportation lands may include parcels dedicated to facilities such as rest areas, local storage and maintenance, and regional operations and management. Partners obtain and maintain parcels in preparation of future project needs, many of which contain lands that they can manage in a similar manner to rights-of-ways to sustain suitable habitat for monarchs.

3.3.1 Transmission Power Line Rights-of-Way

Transmission powerline rights-of-way form a network of varying widths in the action area – from about 75 feet to 200 feet total right-of-way width. Transmission lines may be on fee-simple owned lands, but typically are on lands where companies have obtained management rights through easements. They generally require implementation of rights-of-way best management practices designed to ensure that the structures and wires are kept clear of other structures and vegetation that may interfere with electric reliability. Landowners who grant easements may continue to manage the property at their discretion according to the easement document. The easement document can constrain restoration and maintenance of rights-of-way vegetation if it does not align with the landowner's interest.

3.3.2 Substation Parcels

Substation parcels are typically installed on crushed rock pads on which vegetation growth is typically managed to little or no growth. They are managed typically on annual maintenance schedules that include the application of a sterilant herbicide to prevent vegetation growth throughout the station. Stations may be located on property that is larger than is required for the station. These parcels may provide open space buffer zones outside of the fenced-in station that may potentially be enhanced or planted into pollinator habitat. Local municipalities may require screening vegetation via either ordinances or construction permits, but there may be opportunities to coordinate with municipalities to restore to pollinator habitat.

3.3.3 Electric Generation Sites

Generation sites consist of power plants powered by fuels, solar arrays, or wind farms. Some lands maintained for current or future generation needs include land previously mined for coal and recreation areas. Companies may purchase lands around their facilities as buffer lands or for future projects. Lands adopted to support renewable energy sources are also becoming important for habitat management. Many

electric generation sites are managed free of vegetation where operations are conducted. Areas surrounding solar panel arrays, for example, are often maintained with gravel or in low-growing vegetation, including mowed lawn.

Some energy generation facilities, such as wind farms and solar facilities may be sited entirely on easements with private landowners. These easements extend for the life of the generation facility – typically 20 to 30 years – and require the removal of all facilities at the end of the easement life. Depending on the terms of these arrangements, company management of property surrounding the turbines or solar arrays may or may not be allowed. Where vegetation management rights are outside of the Partner's control, those lands may not be appropriate to enroll in the CCAA/CCA.

3.3.4 Oil and Gas Rights-of-Way

Oil and gas rights-of-way commonly have a defined width according to diameter and pressure of the pipeline. A right-of-way easement allows the utility company to keep the easement clear of any trees or other structures that may interfere with the ability to operate the pipeline and to maintain its integrity; perform essential maintenance; or, place additional lines in the rights-of-way. Pipelines and their rights-of-way exist throughout the country in both urban and rural areas. Similar to electric rights-of-way, pipelines may be located or co-located within road rights-of-way or on private land in an easement owned exclusively by the utility. Similar to electric utilities, the oil and gas rights-of-ways are comprised of larger (intrastate, interstate and interregional) transmission routes that transport high volumes to smaller distribution networks of smaller pipelines that ultimately end at homes, businesses, and other customers.

The width of a pipeline rights-of-way depends on the diameter and pressure of the line and the number of lines in a right-of-way. Rights-of-way for smaller distribution lines can range from 5 to 25 feet wide while typical transmission lines usually consist of 50-foot permanent rights-of-way. Often a temporary construction easement adjacent to a permanent 50-foot easement is used during the construction of the pipeline and may vary from 25 to 100 feet wide. When construction is complete, this temporary construction easement is voided, returned to the landowner, and restored to its preconstruction condition.

3.3.5 Transportation Rights-of-Way

Transportation networks consist of the interstates, highways, local roads, and railroads used daily for commuter transportation, as well as the movement of goods and services. As reflected by the previous discussion of energy lands, transportation rights-of-way and their associated lands are comprised of fee-simple owned lands, easements, and other access agreements across road and rail networks of various sizes.

Management and maintenance of these transportation networks are focused on the efficient movement of traffic with safety their primary focus. For this reason, roadsides (and to a similar extent rail) is managed with consideration for several zones (Fig. 3). Each state and local road authority may maintain these areas differently based on local laws and regulations.

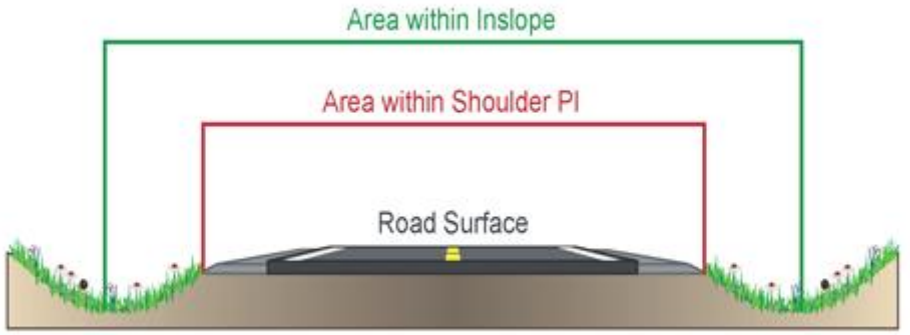

Figure 3. Operational Rights-of-Way Zones Used for Initial Categorization of Activities.

The transportation corridors also vary in their width and management control depending on their context. Corridors located in suburban and rural landscapes typically contain more diverse land cover and greater conservation opportunity under the Agreement. By comparison, adjacent land uses may limit the ability to maintain or restore monarch habitat in urban landscapes. Frequently managed cleared areas (clear zones) adjacent to pavement provide for the safety of the motoring public. Adjusting mowing standards with strategic and rotational mowing, or delayed roadside mowing could provide habitat opportunities for monarchs. Areas outside of routine management or excess rights-of-way parcels provide a significant opportunity for additional habitat.

3.3.5.1 Access-controlled Roadways (Interstates and Tollways)

Routinely mowed areas range from 15 to 30-feet wide adjacent to pavement and/or gravel shoulders and are routinely mowed to provide for the safety of the motoring public. These areas adjacent to pavement are not generally considered suitable habitat for monarchs, but are sometimes left unmaintained and may offer high potential for habitat that extends from the routinely mowed area to the access control fence, including median areas and interchange infields. The area inside the access control limits is generally protected from mowing and disturbances outside of authorized personnel. Due to their protected nature, these areas are considered to be the highest value habitat areas within the highway transportation system when properly managed.

3.3.5.2 Highways (U.S. or State-Marked Routes)

Similar to access-controlled highways, U.S. and state highways also maintain areas of low vegetation or clear zones free from obstructions adjacent to pavement to allow drivers to recover when vehicles leave the pavement. These areas are not generally considered suitable habitat for monarchs. Areas outside of the clear zone offer potential habitat that extends from the clear zone to the right-of-way boundary. In states where rural highways are typically not controlled by fencing, those areas are often subject to 'volunteer' mowing by others. If properly signed and maintained, those areas are primarily maintained by the transportation agency, and the potential for viable habitat is more likely.

3.3.5.3 Special Management Areas

Managed areas (signed and protected remnant vegetation, threatened and endangered species areas, waysides, and excess rights-of-way) already exist along rural, non-access controlled highways. These locations may be signed to identify the asset and to prohibit mowing or spraying. These areas are typically mapped and protected by policy within all sectors of transportation agencies.

3.3.5.4 County and Local Roadways

These roads include county, township, or other roads not designated as an interstate, U.S., or state marked route. The right-of-way width varies significantly but is often between 30 to 75-feet in total width, including both pavement and shoulders. These rights-of-way can be managed by a county, municipality (township, village, city), or their contractors.

3.3.5.5 Railroad Rights-of-Way

Vegetation in railroad rights-of-way is typically managed using herbicide treatments of the trackbed base (i.e. ballast) to facilitate required inspections, decrease fire potential, maintain safe walking areas for train inspections, and provide visual clearance for motorists and pedestrians so they can safely view approaching trains.

As noted, energy companies and transportation agencies own and/or manage many different types of land beyond the rights-of-way as well. Similarly, railroad companies often own non-operating properties, which consist of unused portions of railyards, abandoned railroad tracks, or other properties that are not currently in operation, which pose opportune locations for habitat conservation projects where resources are available.

Much like highway rights-of-way, railroad rights-of-way generally consist of an area immediately adjacent to the track where vegetation is routinely managed to control for safety. This area does not present much opportunity for monarch habitat due to its frequent management interval. The remainder of the rail rights-of-way beyond this area adjacent to the track are managed less frequently and therefore could serve as monarch habitat. Current management includes occasional mowing, brush removal, and/or broadcast herbicide use. Adapting these measures through scheduled vegetation removal, or targeted herbicide treatments could improve and expand monarch habitat.

3.3.5.6 Transportation Parcels

In addition to roadsides, state departments of transportation (DOT) may also maintain large parcels that can benefit monarchs. Rest areas, storage and maintenance facilities, and wetland or other mitigation sites all have potential for suitable habitat that can be enhanced to benefit monarchs. These areas often provide opportunities for restoring natural vegetation or enhancing natural vegetation to provide habitat. These areas may have large tracts of land with habitat potential where the public can park without the safety concerns of the roadway. Other lands may have conservation potential, but are less visible, such as excess undeveloped land previously purchased for building or future rights-of-way development, picnic areas, and some mitigation sites.

3.4 STATUS OF THE SPECIES IN THE ACTION AREA

Three distinct populations of the monarch occur in the action area – the migratory population in the central and eastern U.S.; the migratory population in the western U.S.; and, the 'stationary' population in southern Florida (see ***Status of the Species***, above).

3.4.1 Eastern North America Population

Since 1994, when systematic monitoring of monarchs on their Mexican wintering grounds began, the Eastern North American (ENA) population has generally declined (Fig. 4; Vidal and Rendón-Salinas 2014, pp. 167-168). In the winter of 2013-2014, numbers fell to about 14 million after consistently numbering in the hundreds of millions in the 1990s and early 2000s.[5] In the two decades before standardized monitoring, monarch numbers may have been as high or higher than was originally documented in 1994 (Vidal and Rendón-Salinas 2014, p. 172).

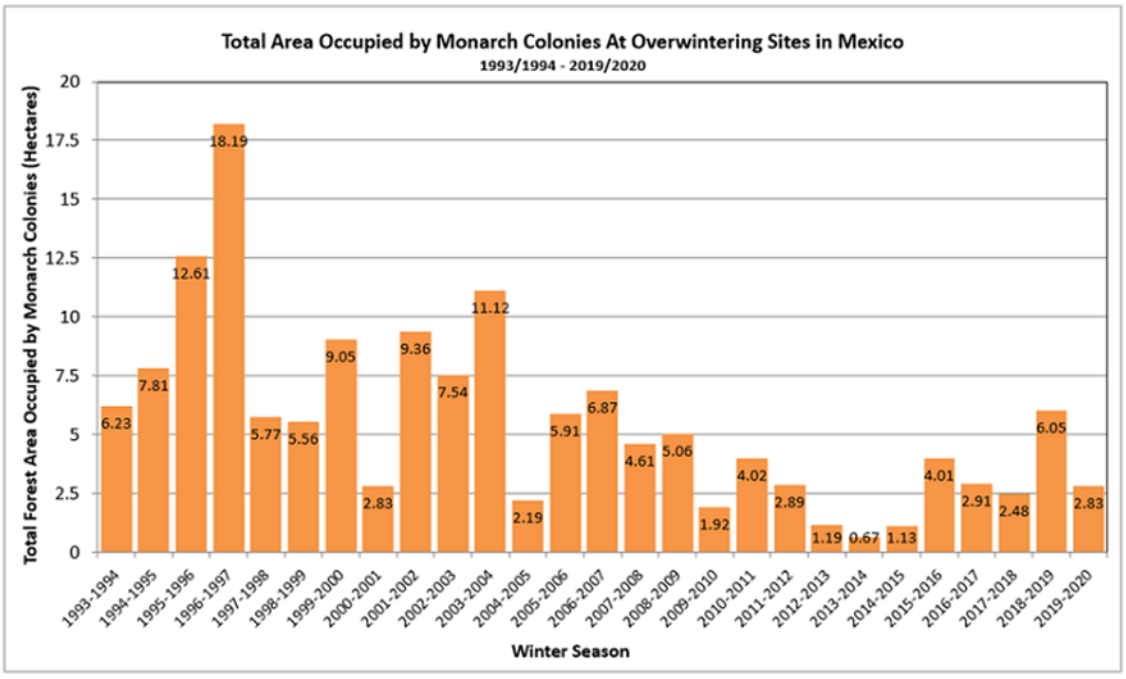

Figure 4. Total area occupied by monarch colonies at overwintering sites in Mexico. Data from 1994-2003 were collected by personnel of the Monarch Butterfly Biosphere Reserve (MBBR) of the National Commission of Protected Natural Areas in Mexico. Data from 2004-2020 were collected by the World Wildlife Fund-Telcel Alliance, in coordination with the Directorate of the MBBR. 2000-01 population number as reported by Garcia-Serrano et. al (2004). Image Source: Monarch Joint Venture.

[5] Population estimates are based on an assumed density of 21.1 million monarchs/hectare occupied on the wintering grounds (Thogmartin et al. 2017a, p. 1).

3.4.2 Western North American Population

Based on annual censuses, the Western North American (WNA) population has been declining generally since 1997 (Fig. 5). Recent work was able to use surveys conducted before 1997 to document a population that consisted of millions of butterflies in the mid-1980s (Schultz et al. 2017, p. 3).

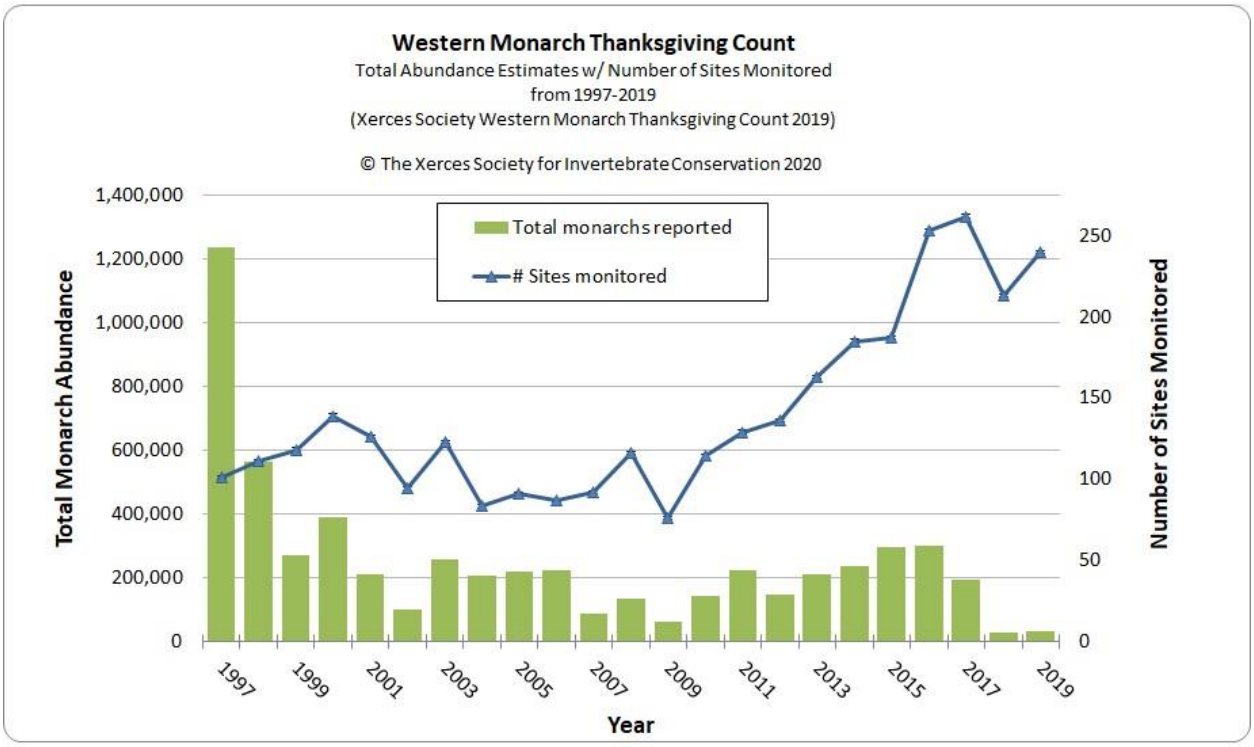

Figure 5. Thanksgiving counts showing the number of western North American monarch butterflies observed at overwintering sites (green bars). Blue line shows the number of sites monitored for a given year. Figure from the Western Monarch Count Resource Center (https://www.westernmonarchcount.org/data/; accessed 3 Feb 2020).

3.4.3 Factors Affecting the Monarch in the Action Area[6]

3.4.3.1 Trends in Milkweed Abundance and Distribution in the Action Area

Monarchs lay eggs on, and larvae feed only on plants in the milkweed family (Asclepiadaceae), primarily those in the genus, *Asclepias* (Zalucki and Brower 1992, p. 81). The density of monarch eggs and larvae in an area may increase with milkweed density up to about 0.6 milkweed stems per m^2 (≈2,428 stems per acre; Kasten et al. 2016, p. 1056). Several authors have pointed to the decline of milkweed on agricultural lands as a primary factor in the decline of the ENA monarch population (Brower et al. 2012, p. 97; Pleasants and Oberhauser 2013, p.7; Waterbury and Potter 2018, pp. 42-44). Although milkweed

[6] This section relies heavily on U.S. Fish and Wildlife Service (2018. Draft Monarch (*Danaus plexippus plexippus*) Species Status Assessment Report. 110 pp.).

conservation alone may not be sufficient to preserve the ENA population and its migration to Mexico (Inamine et al. 2016, p. 1089), the loss of milkweed has been substantial. In the Midwest, milkweed declined by about 40% between 1999 and 2014 (Pleasants 2017, p. 7). Most of the milkweed decline has taken place on agricultural lands due to changes in farming practices – most notably the use of herbicide-tolerant (HT) crop varieties (Fig. 6; Thogmartin et al. 2017, p. 13; USDA 2019[7]).

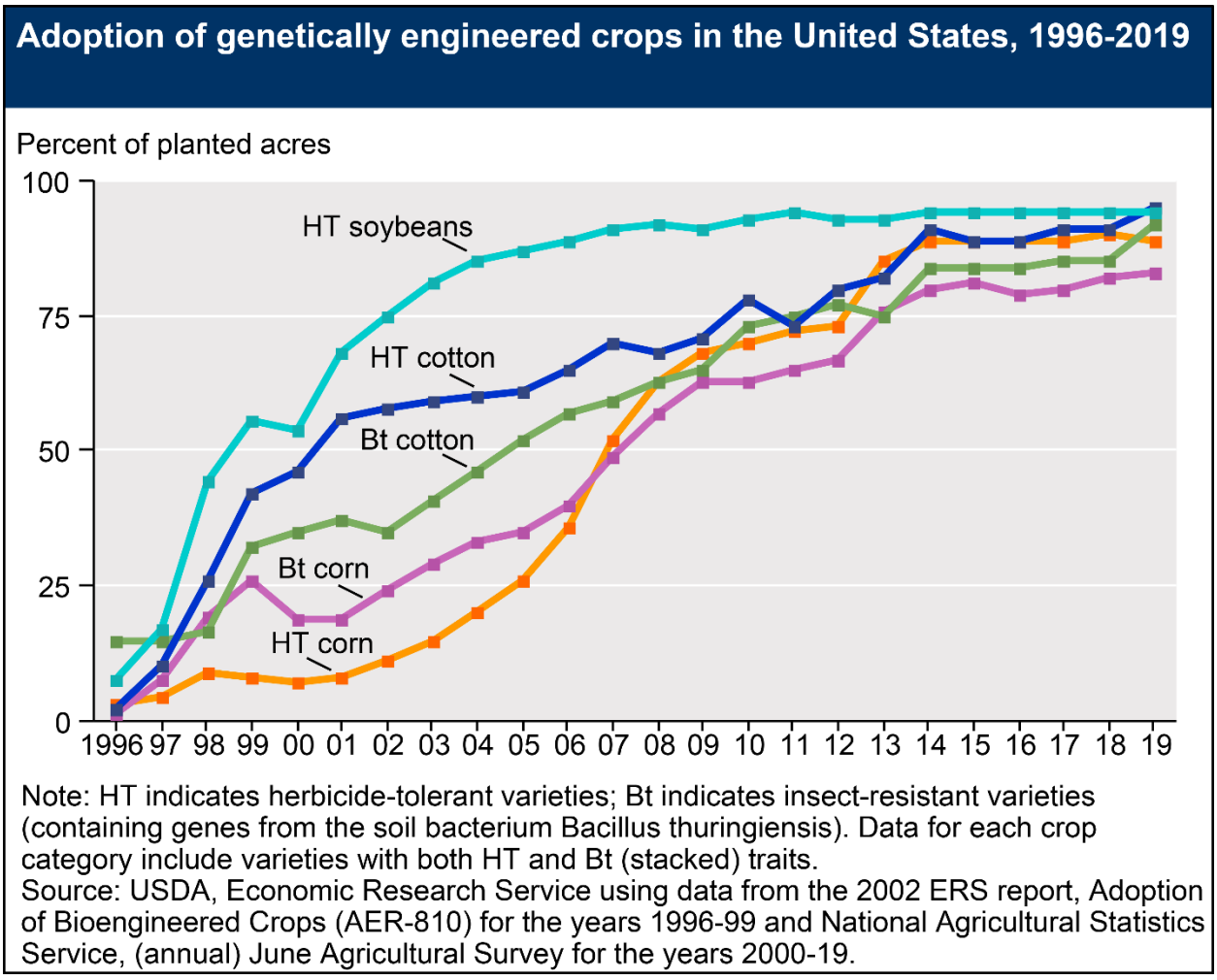

Figure 6. Recent trends in the adoption of genetically engineered crops in the U.S. Adapted from USDA (2019).[8]

[7] "Recent Trends in GE Adoption." United States Department of Agriculture. Economic Research Service. Updated: Wednesday, September 18, 2019. https://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us/recent-trends-in-ge-adoption.aspx. Accessed 23 Oct 2019.

[8] "Recent Trends in GE Adoption." United States Department of Agriculture. Economic Research Service. Updated: Wednesday, September 18, 2019. https://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us/recent-trends-in-ge-adoption.aspx. Accessed 23 Oct 2019.

The loss of milkweed from agricultural lands has likely had a disproportionate effect on monarch numbers in the ENA (Pitman 2017, p. 16; Myers 2019, p. 46). Egg densities per milkweed stem in agricultural fields can be four times greater than in other habitat types (Pleasants and Oberhauser 2013, pp. 5-6). In addition, predation rates on eggs are typically low in agricultural fields (Haan and Landis 2019, p. 3; Myers 2019, p. 46). A 40% decline of milkweed stems in the Midwest between 1999 and 2014, with the majority of that occurring in agricultural lands, may have reduced overall producity for monarchs in the region by about 70% (Pleasants 2017, p. 7). Agricultural lands hold significant potential for monarch production in the Midwest, but that is not being realized due to the general lack of milkweed in fields sown to HT-crops.

Development and conversion of grasslands has also caused a reduction in the extent and abundance of monarch habitat in the action area. Between 2008 and 2012, 5.7 million acres of grassland were converted to new cropland, including up to 3 million acres of Conservation Reserve Program (CRP) land (Lark et al. 2015, p. 5). In the western monarch breeding range, conversion of grasslands for agriculture has been the largest source of land cover change in California's Central Valley, with a loss of approximately 1,054 km^2 (~260,450 acres) between 1980 and 2000 (Sleeter 2016). The Central Valley dominates the center of the state. A loss of milkweed or nectar resources in this area could reduce the number of monarchs that reach overwintering sites on the coast. Availability of nectar resources in breeding and migration habitats is a primary factor influencing viability of the WNA population.

3.4.3.2 Drought

Drought severity and extent may have major influences on the viability of the WNA population. At the overwintering sites, severe drought can kill trees and otherwise degrade their ability to provide overwintering habitat (Pelton et al. 2016, p. 29). Many overwintering groves are dominated by one or a few tree species, especially blue gum eucalyptus (*Eucalyptus globulus*), which are not native to California and are drought sensitive (Marcar et al. 1995, p. 46). Drought stressed eucalyptus trees are also vulnerable to infestation by insect borers, which exacerbates tree loss (Paine and Millar 2002, p. 148). Stressed blue gum eucalyptus may cease flowering, eliminating the main source of nectar available to monarch during the overwintering season at some sites. Other dominant trees, such as Monterey pines (*Pinus radiata*) and Monterey cypress (*Hesperocyparis macrocarpa*), are more resistant to drought, but are the primary species in fewer than 25% of overwintering groves.

The ENA population may also be significantly affected by drought, at least periodically. Inamine et al. (2016, p. 1089) contend that the severe "100-year" drought in Texas (2010–2015) "likely had a strong impact on spring and fall migrants, corresponding to the lowest monarch numbers on record (Fig. 4). The negative effects of drought on monarchs may occur in part due to higher viscosity of latex in water-stressed milkweed, which can affect larvae negatively (Bell 1998). Nectar availability is also likely to be low during droughts (e.g., see Wyatt et al. 1992).

3.4.3.3 Nectar Sources

A reduction in nectar availability is a threat to monarchs during reproductive and migratory periods. Nectar in Great Plains grassland habitats, for example, is important especially to monarchs in the ENA population. This includes habitats in the Texas and Oklahoma migratory corridors and along the coast from Louisiana to Mexico where monarchs nectar extensively and store fat to survive winter (Brower et

al. 2006, p. 1135-1137; Tracy 2018, p. 85). A diversity of nectar resources would help to ensure that areas function as monarch habitat during multiple seasons. During the fall, for example, milkweed is no longer blooming and areas only function as monarch habitat if they contain sufficient amounts of late-blooming species, like members of the aster or sunflower family (Asteraceae/Compositae) (Rudolph et al. 2006; Inamine et al. 2016, p. 1089). In Arkansas, in addition to reductions in the diversity of nectar plant species, drought also decreased nectar availability and the ability of migrating monarchs to accumulate lipid reserves for overwintering (Brower et al. 2015, p. 127).

In many areas, nectar resources may typically be poor for monarch in the absence of management intended to foster their abundance and diversity. Without frequent fire in the forested portions of the Ouachita Mountains Physiographic Region in Arkansas, for example, nectar resources may remain chronically low (Rudolph et al. 2006, p. 168). In areas like this, road and utility rights-of-way also provide nectar resources (Rudolph et al. 2006, p. 168).

In western North America, nectar and milkweed resources are often associated with riparian corridors, and milkweed may function as the principal nectar source for monarchs in more arid regions (Dingle et al. 2005, p. 494; Pelton et al. 2018, p. 18; Waterbury and Potter 2018, p. 38; Dilts et al. 2018, p. 8).

3.4.3.4 Roadkill

Although the presence of nectar resources within a few meters of roads has been implicated as a cause of significant road mortality by some authors (see above, section 2.2.4) careful configuration and management of roadside habitats may reduce mortality. Skorka et al. (2013) studied factors that affected roadkill mortality of butterflies – not including monarch specifically. In contrast to suggestions to move nectaring habitat away from roads, they found that increased plant species richness "seems to be a particularly important factor" in minimizing the negative effects of traffic volume and road width on butterfly mortality; wider rights-of-ways and infrequent mowing were also related to lower roadkill (Skorka et al. 2013, p. 155). They also found that as butterfly abundance increased along the roads, the proportion of the population killed did not increase. In rights-of-way "of the greatest suitability for butterflies", populations may have been affected the least from road mortality (Skorka et al. 2013, p. 154). They concluded that road width increased roadkill due to the longer time it took for butterflies to cross the road, but that that this may be offset by limiting or avoiding management that would "provoke" butterflies to cross (Skorka et al. 2013, p. 155). They recommended that road rights-of-way be mowed only rarely or only partially and that opposite sides of the road should be mowed at different times (Skorka et al. 2013, p. 156).

3.4.4 Current Extent of Milkweed in the Action Area

Because milkweed is required for monarch breeding, we use milkweed abundance as an index of monarch breeding habitat quality and quantity. We base assumptions about the status of milkweed in the action area on studies conducted by Hartzler and Buhler (2000) in Iowa; Kasten et al. (2016) in the Upper Midwest;[9] and Webb (2017) in Oklahoma. To estimate milkweed contributions needed in the Midwest to

[9] Within a 250-mile radius of Minneapolis, Minnesota; included portions of Minnesota, Wisconsin, South Dakota, and Iowa (Kasten et al. 2016, p. 1048).

conserve the monarch ENA population, Thogmartin et al. (2017) also relied on stem density data from Hartzler and Buhler (2000). Flockhart et al. (2015) also used the Hartzler and Buhler (2000) data to estimate the status and potential trends of milkweed abundance among land-use sectors in the eastern U.S.

Information on milkweed stem densities is available almost exclusively from the East and the Midwest, but the Agreement will also include lands in the western and southern U.S. Therefore, our estimates of effects to the abundance of milkweed may be less accurate outside of the East and the Midwest – that is, outside of the area in which we expect at least six milkweed stems per monitoring plot (Fig. 2). The primary objective of our analysis, however, is to compare the relative benefits of proceeding with the Agreement vs. without the Agreement. The magnitude of that difference should not change significantly when applied to parts of the contiguous U.S. where milkweed is less abundant – both the positive and negative effects on milkweed abundance would be lower in similar proportions.

3.4.4.1 Transportation Sector

For both sectors and for a variety of scenarios we estimated milkweed abundance by multiplying milkweed density (stems per unit area) by the area under consideration. Following the methods of Thogmartin et al. (2017, p. 4), we estimated milkweed abundance in distinct land use classes by multiplying (1) the proportion of sites in the land class at which milkweed is likely to be present (based on Hartzler and Buhler 2000) by (2) the expected milkweed coverage (e.g., m^2/ha) at those sites. Finally, to estimate the number of milkweed stems, we multiply by 1.948 stems/m^2 (Flockhart et al. 2015; supporting information p. 23).

For lands in the transportation sector we multiplied the proportion of sites where we expect milkweed to occur currently (0.655)[10] by the average coverage of milkweed patches at roadside sites where milkweed was present (102 m^2/ha, Hartzler and Buhler 2000). We then multiplied by 1.948 stems/m^2 (Flockhart et al. 2015, supporting information p.23) to arrive at an estimate of milkweed stems per acre currently for lands in the transportation sector – i.e., 0.655 × 102 m^2/ha × 1.948 stems/m^2 = 130 stems/ha (52.7 stems/ac).

In the analyses below, we assumed that our estimates of current stem density will persist for the duration of the Agreement on Enrolled Lands in the transportation sector except where permanent habitat loss occurs and on Adopted Acres. On the Adopted Acres, we assume that the Partners will implement conservation measures that will increase milkweed stem density to an average of at least 156 stems per acre in the East and the Upper Midwest. We based this on the suitable habitat criterion for milkweed in the East and the Midwest (6+ stems per 1,500 square foot monitoring plot) and the related adaptive management trigger (6+ stems per plot in at least 90% of plots).

[10] Hartzler and Buhler (2000) found milkweed at 71% of the roadside sites they sampled. Kasten et al. (2016) found milkweed at 60% of the roadside sites that they surveyed in the Upper Midwest. We therefore assumed that the average proportion of roadside sites that contain milkweed was 0.655 (equivalent to 65.5%, the average of the two studies).

3.4.4.2 Energy Sector

Hartzler and Buhler (2000) did not estimate the density of milkweed on lands in the energy sector specifically. Thogmartin et al. (2017, p.4) dealt with this by assuming that current density of milkweed patches in transmission line rights-of-ways would equate to what Hartzler and Buhler (2000) found in pastures – 3.09 stems per acre (7.64 stems per ha). We will adopt this assumption for our analysis. That is, we will assume that the average current milkweed stem density in the energy sector is 3.09 stems per acre and that it will be the same on Enrolled Lands in the sector for the duration of the Agreement, except on Adopted Acres and where permanent habitat loss occurs.

On the Adopted Acres in the energy sector, we assume that the Partners will implement conservation measures that will increase average milkweed stem density to 150 stems per acre in the East and the Upper Midwest and to at least 58 stems per acre elsewhere in the action area. We based these assumptions for the East and the Midwest on the "biologically realistic" estimates for stem denisties within powerline rights of way provided through an expert elicitation conducted by Thogmartin et al. (2017; data supplement, p. 15). For the West and the South, 58 stems per acre is extrapolated from the Agreement's milkweed criterions for those regions (2+ stems per 1,500 square foot monitoring plot).

The low assumed milkweed stem density for the energy sector may be appropriate based on the types of lands that energy rights-of-way cross and due to the nature of traditional vegetation management in the sector. Transmission lines, which make up the largest expected acreage of the energy sector tend to run cross-country through various land covers. As a result, the overall percentage of natural land cover crossed by these corridors may be small compared to the transportation sector. Historically, the energy sector has also used broad-scale herbicide treatments more frequently than the transportation sector. Transportation agencies have historically relied more heavily upon routine mowing practices. This contrast in practices may also have an impact on broadleaf plants across both sectors that has led to low current milkweed densities (D. Salas, Cardno, Fitchburg, WI, pers. comm. 2019).

4 EFFECTS OF THE ACTION

4.1 EFFECTS TO THE MONARCH

In addition to a primary purpose of a conference opinion – to determine whether a proposed action is likely to jeopardize a proposed species – in this opinion we also structured our analysis to determine whether the proposed action would provide a net conservation benefit to the monarch, a requirement for Candidate Conservation Agreements with Assurances [50 CFR 17.22(d)(2)].

4.1.1 Anticipated Extent, Timing, and Duration of Enrollment

To estimate the effects of the Agreement, it is important to clarify the likely extent of lands that Partners will enroll. The Service and the other potential parties to the Agreement assume that if it reaches its presumed "conservation potential", Partners might enroll up to 26 million acres – about 15,860,000 acres

in the energy sector and another 10,140,000 acres in the transportation sector (Table 3).[11] We refer to this as the High Enrollment scenario. Enrollment is voluntary and potential Applicants' perceptions as to whether the monarch may be listed as endangered or threatened – and how soon a listing could occur – may have an important influence on enrollment.[12] In the absence of a listing proposal in the next few years, enrollment could be limited to potential Partners that have already expressed strong interest. This could result in a lower enrollment of about 6,500,000 acres – 3,950,000 acres and 2,550,000 acres in the energy and transportation sectors, respectively – the Low Enrollment scenario (Table 3).

Table 3. Summary of certain factors that will influence the extent of milkweed in the action area. The basis for the annual rate of potentially adverse vegetation management outside of Adopted Acres is based on input from 18 potential Partners and is explained in section 4.1.4.3.1, Extent of Vegetation Management on Enrolled Lands. Our milkweed stems/acre assumptions for the adopted acres are based on the minimum criterion for milkweed in the Agreements suitable habitat criteria – six and two stems per 1,500 square-foot plot in the Midwest/East and South/West, respectively.

Sector/Enrollment Scenario	Enrolled Lands (acres)	Anticipated Adoption Rate	Average Expected Milkweed Stems/Acre		Rate of Permanent Habitat Loss	% of Natural Land Cover Exposed to Vegetation Management Each Year
			Adopted Acres (Midwest & East/South & West)	Pre-Agreement and Outside Adopted Acres – Midwest and East [13]		
Transportation/High	10,140,000	6.0%	156/60	52.67	1%	57
Energy/High	15,860,000	9.3%	150/60	3.09	0.5%	36
Transportation/Low	2,550,000	6.0%	156/60	52.67	1%	57
Energy/Low	3,950,000	9.3%	150/60	3.09	0.5%	36

Under each scenario, we would anticipate the assumed levels of enrollment would be met within one year of signing the Agreement and issuing the Permit. We also anticipate attrition in enrollment as some Partners withdraw due to changing company practices, company mergers, or other factors (Fig. 7; D. Salas, Cardno, Fitchburg, WI, pers. comm. 2019). Under each scenario, we assume that enrollment would remain at expected and original levels over the first five years of the Agreement, but would decline at similar rates for the duration of the Agreement (Fig. 7).

[11] See Appendix C (Supplemental Information) in the Agreement for additional details regarding development of this estimate.

[12] If the monarch is listed, Partners will not be able to enroll lands in the Agreement after the listing becomes effective.

[13] Current milkweed stem densities are likely lower in the South and West due to the lack of clonal milkweed species and low precipitation, respectively.

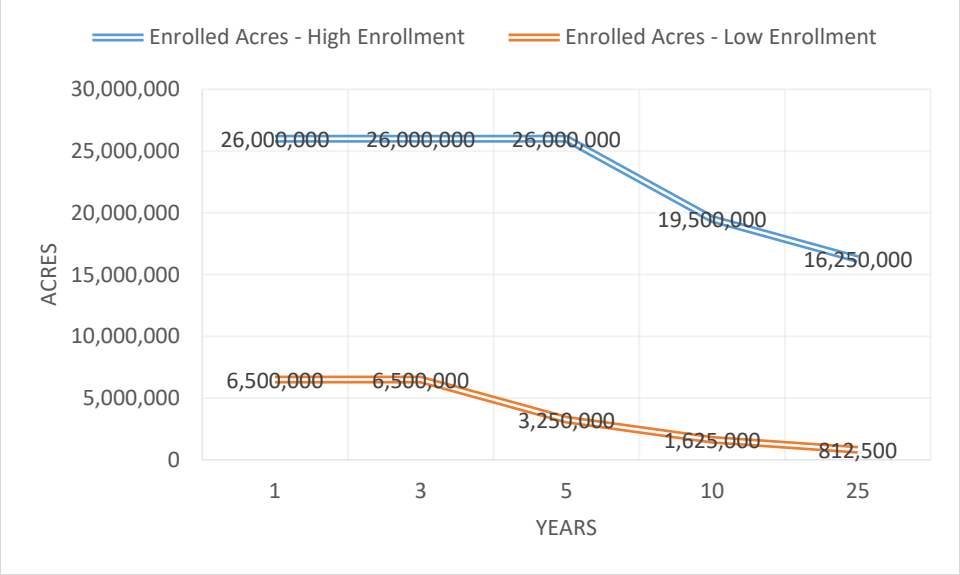

Figure 7. Two scenarios of anticipated enrollment amount and attrition over the duration of the Agreement.

4.1.2 Effects on Milkweed Abundance

To understand the proposed action's effects to the monarch, we compared the effects of implementing the Agreement to a 'no action' alternative of not implementing the Agreement. We focus our analysis of effects primarily on how the Partners' activities will affect the abundance of milkweed stems. Implicit in these analyses is our assumption that effects to milkweed will include actions that interact directly with monarchs in ways that result in the death or injury of monarchs – e.g., by crushing individuals that are on or near milkweed plants. Actions that affect milkweed will also affect the species indirectly by introducing stressors. These include primarily broadcast application of herbicides, mowing, and other activities in monarch habitat that removes or reduces the availability of larval foods and nectar.

4.1.2.1 Permanent Habitat Loss Due to Ongoing Maintenance and Modernization

Permanent habitat loss caused by ongoing maintenance and modernization activities will affect the extent of milkweed outside of the Adopted Acres on the Enrolled Lands. To determine an appropriate rate of permanent habitat loss, we requested input from 18 potential Partners – eleven in the energy sector and seven in the transportation sector. Each predicted the maximum percentage of natural cover that would be permanently lost each year and rated the level of their confidence in their estimate on a scale of 1-10. We weighted the responses based on the corresponding degree of confidence. The weighted averages indicate that ongoing maintenance and modernization activities could result in the permanent loss of 0.5% and 1.0% of natural cover on Enrolled Lands each year in the energy and transportation sectors, respectively (Table 3).

4.1.2.2 Density of Milkweed on the Adopted Acres

A key component of our 'with Agreement' and 'without Agreement' comparison is the likely density of milkweed that will be achieved on the Adopted Acres. The Adopted Acres constitute the proportion of Enrolled Acres where the Partners' will implement measures to benefit the monarch. We expect Partners

will increase the occurrence and density of milkweed on the Adopted Acres above current levels. Outside of the Adopted Acres we expect densities of milkweed patches to remain at current assumed levels except where habitat is permanently destroyed (Table 3).

For our analyses that examine the effects of the Agreement on the number of milkweed stems in the action area, we will focus only on the East and the Midwest (Fig. 2). Outside of this area – in the South and West – there is inadequate available information on current milkweed stem densities and on the degree to which conservation measures may enhance those densities to make reasonable predictions regarding the effects of the Agreement.

For the East and the Midwest, we will assume that the average density of milkweed across the Adopted Acres would equal 156 and 150 stems/acre for the transportation and energy sectors, respectively (Table 3). These reflect the 'biologically reasonable' milkweed stem densities anticipated by Thogmartin et al. (2017) based on information they elicited from subject matter experts.

Our assumptions for milkweed stem densities on the Adopted Acres in the East and the Midwest is reasonable. Thogmartin et al. (2017, p. 4; Supplement S3) anticipated measures to increase milkweed – milkweed amendments – would result in varying stem densities among sectors and subsectors in the Midwest. Based on expert input, they assumed that milkweed amendments on transmission line rights-of-way, for example, could reasonably increase milkweed density from 3.09 to 150 stems per acre in the adopted areas (Thogmartin et al. 2017 Supplement S3). For roadsides, experts' estimates of what was biologically reasonable ranged from 100 to 175 stems/acre (Thogmartin et al. 2017, Supplement S3).

The experts interviewed by Thogmartin et al. (2017) may have conservatively underestimated the milkweed densities that Partners may achieve via implementation of conservation measures on the adopted acres in the East and the Midwest. In a recent study in Minnesota, for example, Cariveau et al. (2019, p. 12)[14] found an average of 620 and 834 milkweed stems per acre, respectively. In another study conducted in the Upper Midwest,[15] Kasten et al. (2016 as cited in Cariveau et al. 2019, p. 12) found an estimated 206 stems per acre in roadside habitats. Among 46 roadside sites where milkweed and other native species had been planted in Iowa, Kaul and Wilsey (2019, p. 1275-1278) found an average of 1,319 milkweed stems per acre. Along rural unpaved roads in central Iowa where milkweed had been allowed "to propagate in roadsides without spraying for the last 30 years", Blader (2018, p. 83) found an average of 547 stems per acre. These high stem densites indicate that Partners to the Agreement may generate milkweed densities on Adopted Acres in some parts of the East and Midwest that are higher than we assume in our analysis.

Partners may boost milkweed densities in some areas by sowing milkweed seed, although milkweed is also likely to increase due to natural seed drift. In pollinator plantings in Iowa that were in their third

[14] Sample size was small and study "did not sample all types of roads, such as those in developed areas that do not typically provide habitat or those that appeared to be <4 m wide when previewed online" (Cariveau et al. 2019, p. 12).

[15] Study included 212 roadside sites within a 250-mile radius of Minneapolis, Minnesota, an area that included portions of Minnesota, Wisconsin, South Dakota, and Iowa (Kasten et al. 2016, p. 1048).

growing season, common milkweed density was about 566 stems per acre where the species was included in the original seed mix, but at only about 162 stems per acre where the seed mix did not include the species (Sinnott et al. 2019). This suggests that the Partners should consider the option of seeding milkweed, especially where they plan to establish new pollinator plantings and where stem densities are below anticipated levels. Natural seed drift will occur in some areas and will likely be sufficient to raise milkweed to suitable densities. In conservation fields, for example, Lukens et al. (2020, p. 5) found common milkweed at high proportions of sites (96-100%) whether or not it was included in seed mixes; stem densities of the species were also high – 493 and 618 stems per acres at unplanted and planted sites, respectively. Two species of milkweed – swamp milkweed (*A. incarnata*) and butterflyweed (*A. tuberosa*) – were present at a significantly greater number of sites at which they were included in the seed mix and were also present at significantly higher densities – mean densities at sites where they were seeded were 149 and 53 stems per acre for the two species, respectively (Lukens et al. 2020, p. 6).

4.1.2.3 Anticipated Increases in Milkweed in Each Enrollment Scenario

In this section, we compare the relative extents of milkweed stems that may occur on the Enrolled Lands in the East and the Midwest (1) without the Agreement and (2) with the Agreement under the High Enrollment scenario. We restrict the analyses that focus on milkweed stem numbers to the East and the Midwest. Therefore, these may overestimate the effects on milkweed numbers in these areas because some proportion of the Enrolled Lands will be in the South and the West, where milkweed densities will likely be comparatively low.

Over the 30-year duration of the Agreement, the following will influence the number of milkweed stems on Enrolled Lands:

- The extent of the Enrolled Lands;
- The adoption rates for each sector;
- The effects of conservation measures that will establish and maintain milkweed on the Adopted Acres;
- The geographic location of Enrolled Lands and Adopted Acres
- The extent of milkweed present on Enrolled Lands outside the Adopted Acres;
- Permanent loss of natural cover caused by ongoing maintenance and modernization activities outside of Adopted Acres; and,
- Gradual declines in the extent of Enrolled Lands (Fig. 7).

Based on our assumptions and inputs (Table 3), implementation of the Agreement would result in greater average milkweed abundance on the Enrolled Lands over its 25-year duration (Fig. 8).

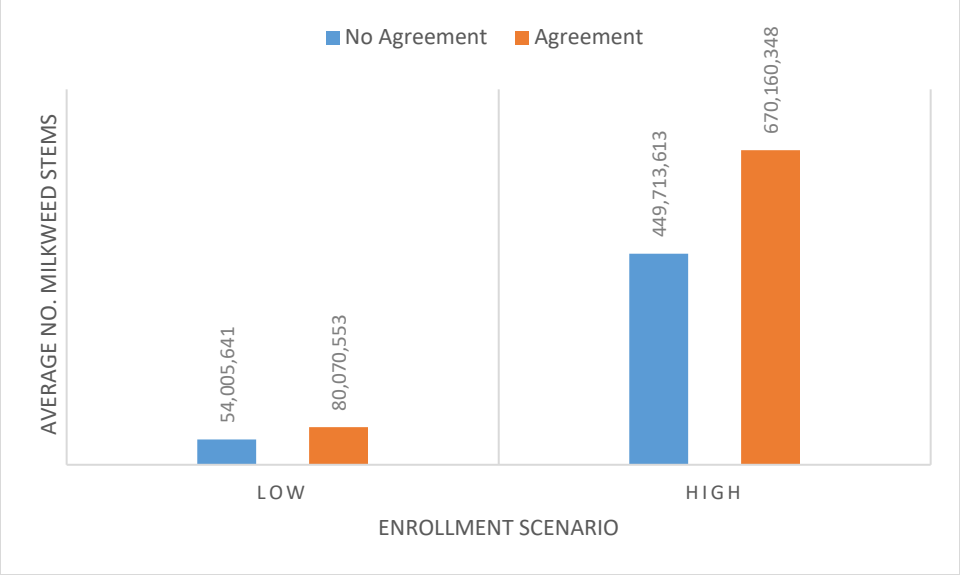

Figure 8. Estimated number of milkweed stems under each scenario on Enrolled Lands with the Agreement and on those same lands if the Agreement were not put into effect. Note that this likely overestimates actual milkweed stem numbers for both with- and without Agreement scenarios because it assumes that stem densities will be 150 and 156 stems per acre on Adopted Acres in the energy and transportation sectors, respectively. Those densities may be conservative for the East and the Midwest, but milkweed densities may not exceed about 58 stems per acre in the West and South. Despite lower average milkweed numbers in the West and the South, we expect similar proportional gains in milkweed in those regions due to the implementation of conservation measures on the Adopted Acres.

Actual gain is likely to be lower than that depicted in Fig. 8 because our assumptions for current and anticipated milkweed stem densities are based predominantly on studies conducted in the Midwest. Milkweed densities will be lower in the West and the South. The expected proportional gain in milkweed that we expect due to the Agreement, however, is not sensitive to specific stem densities. If ecological factors place inherent limitations on milkweed density in some parts of the action area compared to the Midwest and the East, both with- and without Agreement milkweed abundance are likely to be reduced to a similar degree by those factors and the proportional increase in milkweed could be similar across the action area. For example, if we were to cut the current and expected milkweed density on Adopted Acres to 50% of what we expect in the Midwest and the East, the absolute gain in milkweed stems would also be less, but we expect that it would be proportionally consistent to the gains shown in Fig. 8.

Under the Low Enrollment Scenario, the gains in the extent of milkweed would be less than under the High Enrollment scenario, but we would still predict an overall gain due to the Agreement (Fig. 8).

4.1.3 Effects to Nectaring Habitat

To meet the Agreement's criteria for suitable habitat on the Adopted Acres in the South and the West (Fig. 3), milkweed must be present at stem densities of 2+ stems per monitoring plot, depending on the geographic location, or potentially flowering nectar plants must be present across more than 10 percent of the sample area. Cariveau et al. (2019, p. 3) adopted a term similar to that used for this criterion – "Potentially Blooming Nectar Plants" – "to describe forbs and shrubs that could provide nectar to pollinators (e.g., excluding grasses), whether or not blooming on the date of assessment."

Enhancement of vegetation through seeding and planting could reintroduce native plant species not currently present in many locations. In doing so, we anticipate an increase in the abundance of milkweed and other blooming nectar plants, which would increase breeding and foraging habitat for the monarch. An increase in diversity of nectar resources might also reduce roadkill, especially where rights-of-ways are wide and where mowing does not provoke monarchs to cross roads due to direct disturbance or removal of plant resources (Skorka et al. 2013).

The precise benefits to the monarch of having at least 10% coverage of nectar plants is difficult to gauge without some understanding of the current conditions in the areas that will become the Partners' Adopted Acres. At the scale of the proposed action, we think that the current cover of nectar plants varies based on continental, regional, local, and site-specific factors. We found few studies in the peer-reviewed literature, however, that would help us to understand the current coverage of nectar plants in the action area. For example, we found one study of highway rights-of-way in Mississippi, where coverage of flowering herbaceous plants was about 24% and 11% in spring and fall, respectively (Entsminger et al. 2017, p. 130). Other studies looked at nectar resources, but measured them in a way that was not comparable to the Agreement's nectar criterion. Rudolph et al. (2006), for example, looked at nectar resources for monarch specifically, but counted flowers in study plots instead of estimating their cover. Methods used in other studies included factors that would not allow for an unbiased estimate of nectar coverage – e.g., they selected sites where they knew larval food plant species were present.

Under the Agreement, Partners would agree to implement measures that include vegetation management intended to enhance or expand the presence of blooming nectar plants. They may do this by introducing or modifying mowing; seeding certain species; or, replacing broadcast herbicide applications with targeted applications. We expect Partners to adopt measures to increase nectar based on regional and site-specific factors and the conditions of the area in which they are working. This may include, for example, the introduction or maintenance of mowing regimes in some areas and reductions in its frequency in others (e.g., see Leston and Koper 2017, p. 61).

The location of the Adopted Acres where the Partners will implement those measures may have a significant influence on the degree to which they benefit monarchs. During migration, for example, conservation of nectar resources may be especially important "in grassland habitats of the Great Plains, including throughout the Central Funnel of Oklahoma and Texas" (Tracy et al. 2019, p. 455).

4.1.4 Mowing

Mowing methods can be manipulated to benefit monarchs, but as Cariveau et al. (2019, p. 14) state with respect to monarchs, "(M)owing, in particular, is a complex topic." Several authorities have identified it as a tool that can benefit the species. Factors that determine whether it benefits or harms monarch overall

include its timing, frequency, and extent (e.g., Webb 2017, p. iv). Thogmartin et al. (2017, p. 5) identified 'pollinator-friendly mowing practices, especially on the backslope of roadside ditches and within powerline corridors' as a possible action to increase milkweed and nectar sources in rights-of-way. Daniels et al. (2018, p. 6) also documented some benefits of mowing to monarchs and provided recommendations that could further enhance habitat for the species in Florida.

If they know the time of peak egg-laying for their area, managers may be able to use mowing to increase monarch egg densities and to decrease subsequent predation pressure on the eggs and resulting larvae. Knight et al. (2019, p. 187) found that mowing conducted about two weeks before peak egg-laying led to significantly greater increases in eggs per stem than mowing conducted earlier – about seven weeks before peak egg-laying. Female monarchs preferred to lay eggs on regenerating monarch stems in the recently mowed plots. Although less effective than the later mowing, the earlier mowing also produced modest increases in egg densities relative to controls. These effects could be related to reduced abundance of predators on regenerating milkweeds. In their study, Haan and Landis (2019, p. 188) found that "(M)owing reduced predator abundance on regenerating milkweeds, with predators almost entirely absent in the weeks immediately after mowing and requiring 2–4 weeks to recolonize milkweed stems after they re-emerged."

To benefit the monarch, managers must attune mowing plans to local conditions, which often reflect management history. Mowing without planning for impacts to monarch can have adverse effects to the species. Mowing can increase roadkill, for example, by causing butterflies to cross roads (Skórka et al. 2013 – next section). In addition, mid-season mowing that may benefit the monarch in the short-term (see previous paragraph) could reduce milkweed seed production (Fischer et al. 2015, p. 238). In some cases, simply ceasing frequent mowing and spraying can increase milkweed abundance (Leston and Koper 2019, p. 9).

See also **Impacts of Vegetation Management – With and Without Agreement**, below.

4.1.5 Vehicle Mortality and Other Roadside Effects

4.1.5.1 Roadkill

Increased monarch abundance near roadways could carry with it the risk of increasing roadkill mortality, but high nectar plant availability, wider rights-of-ways, and careful use of mowing may help to reduce those effects (McKenna et al. 2001; Skorka et al. 2013; Kantola et al. 2019, p. 154). As discussed above, roadkill mortality during autumn migration may be concentrated at certain hotspots and locating these hotspots is necessary to facilitate effective mitigation (Kantola et al. (2019, p. 159; Tracy et al. 2019). In the coastal portions of the Eastern Flyway, Tracy et al. (2019, p. 454) suggest that wildflower plantings be placed away from roads to reduce the impacts of roadkill. Other measures to reduce roadkill in these hotspots could include placing nets to induce monarchs to fly above traffic or closing lanes (Haan and Landis 2019; Kantola et al. 2019, p. 159). McKenna et al. (2001, p. 68) stated that migrating monarchs typically fly "…high enough to avoid collision with vehicles, but during mid-morning and during windy weather, they generally fly lower to the ground (Orley Taylor pers. comm. cited therein).

It is important to note that the hotspots of monarch roadkill exist prior to the Agreement and that we need to consider whether – and to what degree – the Agreement will influence roadkill in these areas. Skorka

et al. (2013) did not study monarchs or other large butterfly migrations, but found that the effects of roadkill on butterfly populations were lower in areas with high numbers of plant species in rights-of-way; where rights-of-way were wide; and where mowing was rare or affected only part of the roadside habitat. Tracy (2018, p. 108) suggested that time spent in flight low to the ground in search of nectar may increase incidence of roadkill. Therefore, the net effects of the Partners' activities to improve monarch habitats along roadways may be influenced by the location of projects relative to migration pathways; the degree to which nectar availability is increased; and the timing and frequency of mowing.

4.1.5.2 Other Factors that may Affect Monarchs in Roadside Habitats

4.1.5.2.1 Egg Densities, Parasitoids, and Parasites in Roadside Milkweed

Before habitat improvements, monarch egg densities in roadside milkweed patches may typically be low compared to agricultural and non-road side habitats, such as open fields. Pitman et al. (2018, p. 58) found this to be the case in Ontario roadside habitats that were typically comprised of planted nonnative grasses and common roadside flowering species (e.g. clover and other non-native legumes and chicory, *Cichorium intybus*). Many of the species at their roadside sites were invasive and may not have supported sufficient food sources for monarchs. We know from above, however, that managers can modify mowing practices and implement other measures to increase monarch egg densities and overall habitat quality.

Changes in habitat conditions along roadsides could also have consequences for parasitoids and parasites of monarchs. Pitman et al. (2018, p. 60) found lower parasitoid abundance and higher parasitism by a protozoan parasite in roadsides than in agricultural and other non-agricultural sites. Female parasitoids lay one or more eggs on, or near, their host, usually an immature stage of an insect, which is then consumed by the feeding parasitoid larva (Hassell 2000, p. 543). Parasitoids are an important source of mortality for monarchs (Oberhauser 2012, p. 21). It is unclear whether parasitoid numbers would remain low in roadside habitats that the Partners improve for monarchs. Improved plant diversity in the Adopted Acres, for example, could increase the abundance and diversity or all types of insects. Conversely, the results of Pitman et al. (2018) suggest that parasitism levels may be lower in roadside habitats that are improved to resemble the open fields that they studied, but that may require further study.

4.1.5.2.2 Sodium Concentrations in Roadside Milkweed

Effects of salt application to roads could also have implications for the value of roadside monarch habitats. In Minnesota, Snell-Rood et al. (2014) found that average concentrations of sodium was about 33 times higher in milkweed collected within 5 meters of paved county road than in control samples collected at least 100 meters away. In addition, monarchs reared on plants collected near the roadside differed in certain physiological traits, including smaller flight muscle and greater relative eye size in females, and had more sodium in their gut than those that fed on control milkweed (Snell-Rood et al. 2014, p. 10223). Perhaps more significantly, however, survival of larvae was lower among the group that fed on milkweed collected along roadsides (Snell-Rood et al. 2014, p. 10223). The authors caution that it was unclear whether elevated sodium caused the reduced survival and that some other factor, such as car exhaust contamination, could be at play (Snell-Rood et al. 2014, p. 10223). Pitman et al. (2018, p. 61) cited heavy metal contamination from cars that leaches into soil and vegetation could also negatively affect developing larvae.

The effects of salt applications on monarchs could affect the species to varying degrees throughout the U.S., especially in the northern and eastern parts of the country (Fig. 9). Moreover, sodium is likely to concentrate more readily in clay and poorly drained soils than in the sandy soils that at the Minnesota study site (Snell-Rood et al. 2014, p. 10222; Malcolm 2018, p. 292). Monarchs do not appear to have the capacity to select against plants with "potentially toxic" levels of sodium (Mitchell et al. 2019, p. 127).

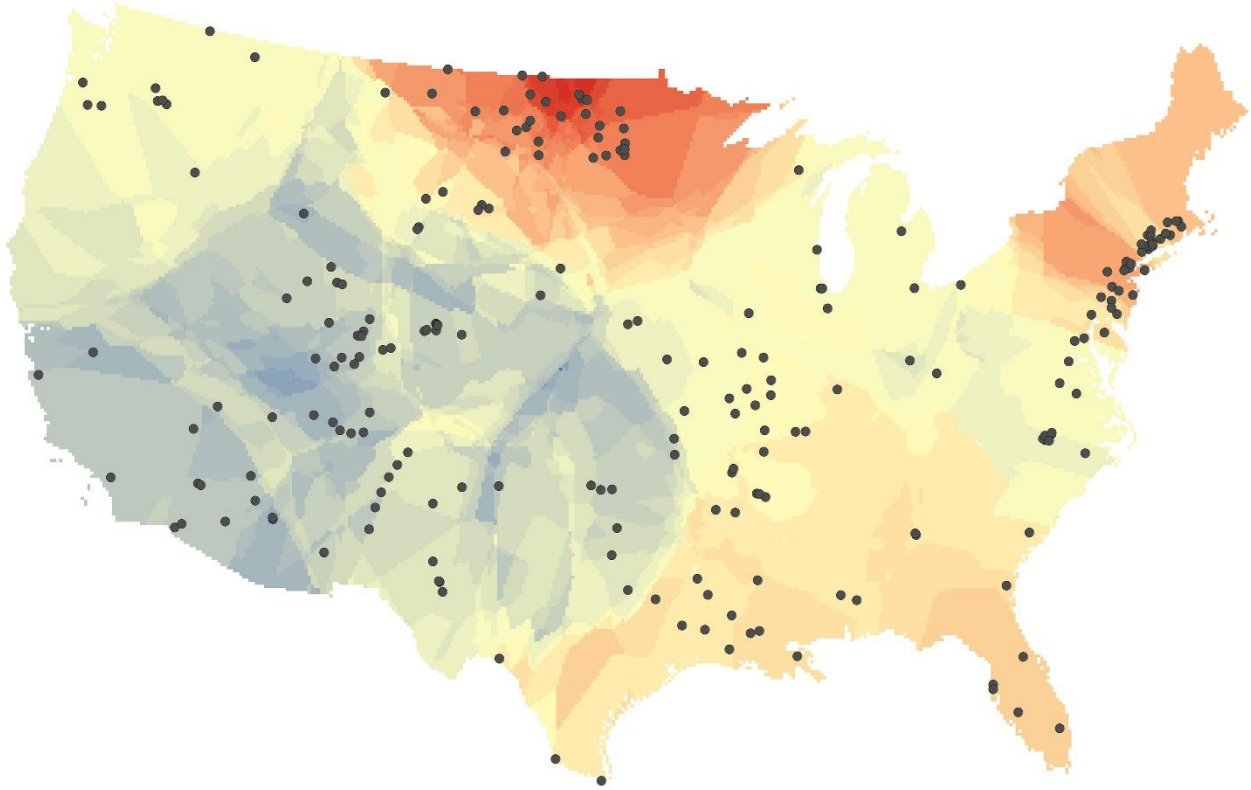

Figure 9. This map shows changes in the salt content of fresh water in rivers and streams across the U.S. over the past half century. Warmer colors indicate increasing salinity while cooler colors indicate decreasing salinity. The black dots represent the 232 U.S. Geological Survey monitoring sites that provided the data for the study Image credit: Ryan Utz/Chatham University. Adapted from https://cmns.umd.edu/news-events/features/4059; accessed 25 November 2019.

4.1.6 Impacts of Vegetation Management – With and Without Agreement

4.1.6.1 Extent of Vegetation Management on Enrolled Lands

We assume that vegetation management will affect 36% and 57% of of natural cover that could contain monarch habitat each year in the energy and transportation sectors, respectively. To develop this assumption, we asked 18 potential Partners to estimate the percent of natural cover in their systems that is likely to be exposed to vegetation management each year. Our assumed rates of vegetation management – 36% and 57% in the two sectors – reflect the averages of estimates provided by potential Partners within each sector (Table 3). To ensure their responses would reflect potential impacts to monarch habitat, we asked them to exclude from their estimates management of "mowed lawn, clear-zone in

roadsides, or other areas regularly mowed, unless conservation measures could be implemented in these areas."

If the Agreement is adopted, we would expect this vegetation management to result in a net benefit to the monarch within the Adopted Acres due to the Partners' implementation of certain conservation measures. Outside of the Adopted Acres, the Partners'vegetation management would not necessarily include any measures to reduce or offset impacts to the monarch. Therefore, management could result in net adverse effects to the species outside of the Adopted Acres. We expect milkweed stems and nectar sources to be present at higher densities in the Adopted Acres. Therefore, the Partners' application of management intended to benefit the monarch within the Adopted Acres – certain mowing practices, for example – is likely to have an outsized beneficial impact to the species. We explain this further in the next section.

4.1.6.2 The Role of the Agreement in Reducing the Overall Impact of Vegetation Management

In addition to increasing the abundance of milkweed in the action area, the Agreement is likely to decrease the extent of monarch habitat that is exposed to potentially adverse management each year. This is also likely to be the case with regard to nectar because it is also likely to be present at greater densities inside the Adopted Acres than across the rest of the Partners' enrolled acres. On the Adopted Acres, Partners will incorporate conservation measures to ensure that vegetation management results in a net benefit to the monarch. For example, they will alter the timing or other aspects of their vegetation management to avoid or minimize adverse effects to monarchs while maintaining or improving resources important to the species. Without the Agreement, we would assume that Partners would neither enhance milkweed coverage in areas that would have become Adopted Acres nor modify vegetation management to ensure that it has a net benefit to the monarch.

Our analyses indicate that, under the Agreement, about 35% of the milkweed stems on the Enrolled Acres are likely to be exposed each year to vegetation management that could have negative consequences for the monarch. Without the Agreement, there would be less milkweed (Fig. 8) and a greater proportion of it – about 55% – would be exposed to potentially adverse management. The term *potentially* adverse management applies in both the with- and without Agreement scenarios. It refers to management that the Partners would implement outside of the Adopted Acres or, without the Agreement, anywhere on what would have been their Enrolled Acres. It would include vegetation management that has a net negative impact to the monarch – for example, mowing during peak egg-laying periods – but also some that by chance is beneficial to the species.

In addition to reducing the proportion of monarch breeding habitat that could be exposed to adverse management, the Agreement will also foster management that is intended to result in a net conservation benefit to the species across the Adopted Acres. In some years, Partners will not actively manage parts of the Adopted Acres, but will instead forego management there to facilitate the maintenance or improvement of conditions favorable to the monarch. Some management favorable to the species may occur if the Agreement is not implemented. We expect that under both the Low Enrollment and the High Enrollment scenarios that the extent of monarch breeding habitat that will be managed for the benefit of monarchs will exceed the area in which potentially adverse management will be carried out (Figs. 10-11).

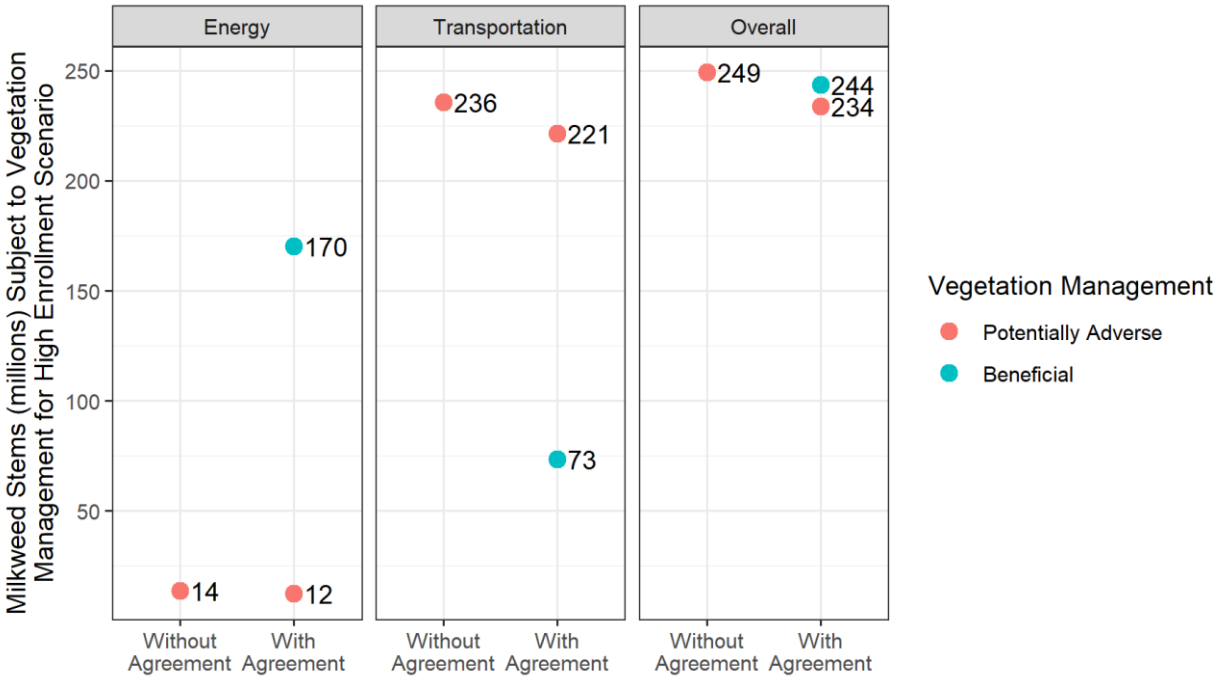

Figure 10. The number of milkweed stems – an index for monarch breeding habitat – that could be exposed to vegetation management detrimental to monarch conservation each year and the number of stems that could occur in areas where the Partners implement management designed to benefit the species – High Enrollment Scenario. Some 'potentially adverse' management is likely to be neutral or beneficial for the monarch, so the data shown in the figure (red dots) may exaggerate the adverse effects that that would occur without the Agreement and outside of the Adopted Acres, respectively.

Figure 11. The number of milkweed stems – an index for monarch breeding habitat – that could be exposed to vegetation management detrimental to monarch conservation each year and the number of stems that could occur in areas where the Partners implement management designed to benefit the species – Low Enrollment Scenario. Some 'potentially adverse' management is likely to be neutral or beneficial for the monarch, so the data shown in the figure (red dots) may exaggerate the adverse effects that that would occur without the Agreement and outside of the Adopted Acres, respectively.

These proportions of milkweed stems likely to be exposed to potentially adverse management are different than the fractions of natural land cover on which vegetation management is likely to be carried out each year within each sector (see Extent of Vegetation Management on Enrolled Lands above; Table 3). This is due to differences in milkweed densities, expected enrollment rates, and adoption rates between the two sectors.

4.1.7 Potential Effects of Reduced Milkweed Abundance in Parts of the Adopted Acres

In the West and the South, the Agreement's suitable habitat criteria are based on the density of milkweed stems *and* the coverage of nectar plants in monitoring plots. To meet the suitable habitat criterion, at least 90% of monitoring plots would have to contain the minimum milkweed stem density *or* the minimum coverage of nectar plants. A plot that contained no milkweed would be considered to contain suitable for the monarch if nectar plants covered more than 10 percent of the plot.

To help minimize the chances that milkweed densities will fall below that anticipated in our analysis, the Agreement includes an adaptive management trigger for the East and the Midwest, where we expect most of the gains in milkweed. If more than 10% of the program's cumulative sample plots located within the Eastern and Midwest sampling region (Fig. 2 – Fig. 6-1 in the Agreement) demonstrate a lack of milkweed at the minimum threshold (6+ stems per 1,500 square foot monitoring plot), the Program Administrator and the USFWS will evaluate the monitoring results to determine the potential cause of the

shortfall and its implications for monarch conservation in the program area. (See section 1.8.1 – Suitable Habitat Criteria).

If the data from the monitoring plots is representative of the Adopted Acres and if the adaptive management response described above is not triggered, milkweed densities on the Adopted Acres would exceed the levels we assumed in our analyses above. If 90% of the monitoring plots in the East and the Midwest contain six stems – the minimum proportion of plots and the minimum number of stems in those plots that would avoid triggering the response described above – the extrapolated milkweed density on the Adopted Acres would be 157 stems per acre. This would exceed by a small amount the milkweed densities that we assumed in our analyses – 150 and 156 stems per acre for the energy and transportation sectors, respectively. Some of the plots in which six stems are counted – if not all of them – are likely to contain more milkweed stems. That is, few plots are likely to contain exactly six stems per plot. Therefore, when this adaptive management response is *not triggered*, stem densities are likely to be higher than 157 stems per acre.

4.1.8 Potential Effects of Coordination and Program Oversight on the Monarch

We have based much of our analysis of the likely impacts and benefits of the Partners' activities under the Agreement on the suitable habitat criterion, which includes a milkweed and, in some parts of the range,a nectar component, and the biologically reasonable milkweed stem densities reported by Thogmartin et al. (2017; data supplement). The Agreement is likely to benefit the monarch in additional ways that are difficult to describe precisely. Under the Agreement, the Program Administrator will share information with the Partners on the effectiveness of conservation measures and emerging technologies or science and will help to connect Partners "who have potential to collaborate on conservation measures." The Service will provide technical assistance, as needed, to ensure the best information is available to inform ongoing implementation of the Agreement. This communication of the best available science to the Partners is also a component of the adaptive management program within the Agreement. The Agreement would not require the Partners to modify their actions in response to emerging science, but we think that they often will do so.

4.1.9 Buffer Zones

In their paper "Restoring monarch butterfly habitat in the Midwestern US: 'all hands on deck'", Thogmartin et al. (2017) point out that agricultural lands are essential to reaching monarch conservation habitat restoration and population goals. So, agricultural landowners' interest in applying conservation measures adjacent to areas where CCAA participants are applying conservation measures is expected to result in additional benefits, especially if applied at a level that more than offsets the amount of take occurring in the Buffer Zones. As with CCAA participants, we will expect adjacent landowners whose incidental take of monarchs is covered under the EOS permit to address key threats to monarchs posed by covered activities within the buffer zones, including: 1. loss of habitat resulting from land conversion, 2. loss of habitat resulting from herbicide use, and 3. loss of habitat resulting from mowing (section 6.1 of the CCAA).

4.2 EFFECTS TO LISTED AND PROPOSED ANIMAL SPECIES

The Agreement and Permit is reasonably certain to cause Partners to carry out activities that will affect animals that are listed as endangered or threatened under the ESA or that are proposed for such listing (Appendix A).[16] Although activities implemented in pursuit of the Agreement or under the authority of the Permit may affect these species, Partners will be required to ensure that the activities do not cause unauthorized and otherwise prohibited take of any listed or proposed species other than monarch.

Partners may carry out activities pursuant to the Agreement that result in incidental take of listed or proposed animal species only if that take is authorized by (1) a separate ESA section 10 permit from the Service or (2) is the subject of an incidental take statement provided by the Service along with a biological opinion under section 7. Some Partners, for example, may hold ESA §10(a)(1)(B) incidental take permits from the Service for specific actions or programs. In those cases, the Service would have determined that it could authorize the take while ensuring that it would not jeopardize the continued existence of the species. In other cases, Partners may have been required to obtain formal approval or authorization for an action from a Federal agency. Before granting such approval, the Federal agency would have had to complete consultation with the Service to ensure compliance with section 7. In these cases, the Service would provide with its biological opinion an incidental take statement if the action was reasonably certain to cause incidental take. As long as the relevant agency or the applicant complies with the terms and conditions of the incidental take statement, the take described in the statement would not be prohibited.

We think that the preclusion from the proposed action of any activity that would result in unauthorized take of a species of listed or proposed wildlife is sufficient to ensure that it will not jeopardize any of these species. Precluding any activity likely to cause take would effectively prevent under the Agreement any significant environmental modification or degradation that would kill or injure even a single individual of a listed or proposed animal species. If a Partner proposes to engage in such an activity, they could not do so in pursuit of the Agreement or under the authority of the Permit.

The Service will require that, as part of their application for a CI, potential Partners submit a list of listed or proposed animal species that may be present on their Enrolled Lands. They will not be required to provide specific corresponding measures to avoid or minimize effects to these species.

Incidental take of monarch butterfly by landowners (or their designees) within the 100-foot buffer is only authorized provided that the activity will not result in the take of listed or proposed animals.

[16] Listed in Appendix A are animal species whose current distribution includes at least one state in the contiguous U.S. and that are listed or proposed for listing as Endangered; Threatened; Emergency Listing, Endangered; Emergency Listing, Threatened; and Experimental Population, Essential; Experimental Population, Non-Essential. We eliminated marine species from the list in the Appendix A.

4.3 EFFECTS TO LISTED AND PROPOSED PLANTS AND CRITICAL HABITAT

The Agreement and Permit will also cause Partners to carry out activities that may interact directly with listed and proposed plant species that occur in the contiguous U.S. (App. B) or that produce stressors to which these species may be exposed. Likewise, these activities may affect critical habitat that has been designated for plant or animal species and critical habitat that has been proposed for such designation (App. C). As stated above in the description of the enrollment process, Applicants for certificates of inclusion must provide a list of specific avoidance and minimization measures (AMM) that they will use when implementing covered activities and conservation measures. The intent of the AMMs will be to avoid or minimize effects of these actions on (1) listed and proposed plant species that are likely to be present on their enrolled lands and (2) any designated or proposed critical habitats that overlap with their Enrolled Acres.

Before the Program Administrator may issue a certificate of inclusion to a potential Partner, the Service will review the AMMs to ensure that they are adequate. AMMs will be adequate if they are sufficient to ensure that activities implemented under the Agreement or the Permit by the Applicant would neither (1) jeopardize the continued existence of any listed or proposed plant species or any experimental populations of a plant species nor (2) destroy or adversely modify any proposed or designated critical habitat. The Service will document its finding before the Programmatic Administrator issues a certificate of inclusion.

This tiered review process will facilitate the avoidance and minimization of effects to listed and proposed plant species to ensure that activities implemented pursuant to the Agreement or as authorized by the Permit do not appreciably reduce their likelihood of survival and recovery. Likewise, it will ensure that Partners' activities conducted pursuant to the Agreement will not destroy or adversely modify designated or proposed critical habitat.

Incidental take of monarch butterfly by landowners (or their designees) within the 100-foot buffer is only authorized provided that the activity will not result in take of listed or proposed plant species and will not destroy or adversely modify designated or proposed critical habitat (plant or animal).

4.4 CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological and conference opinion. We do not consider future Federal actions that are unrelated to the proposed action in this section because they require separate consultation pursuant to section 7 of the Act.

The parts of the contiguous United States that Partners will enroll in the Agreement comprise the action area. It will contain a mix of lands owned by the Partners and lands on which they have obtained easements. Landowners granting easements may continue to operate the property at their discretion in accordance with the easement document. In some cases, restoration and maintenance of natural land cover supporting pollinators may not align with landowners' interests and easement restrictions may affect which key threats to monarchs are within the control of Partners. For the purposes of this Agreement, however, Partners would be expected to implement conservation measures, to the extent they

can anticipate, in areas where Adopted Acres will persist. Therefore, cumulative effects may largely be limited to the portions of the Enrolled Lands that are outside of the Adopted Acres.

Transportation rights-of-way and their associated lands are comprised of fee-owned lands, easements, and other access agreements across road and rail networks of various sizes. In states where rural highways are typically not fenced, those areas are often subject to 'volunteer' mowing by others. If properly signed and maintained, those areas are primarily maintained by the transportation agency, and the potential for viable habitat is more likely. Managed areas (signed and protected remnant vegetation, threatened and endangered species areas, waysides, and excess rights-of-way) already exist along rural, non-access controlled highways. These locations may be signed to identify the asset and to prohibit mowing or spraying. These areas are typically mapped and protected by policy within all sectors of transportation agencies.

Mosquito truck ultra-low volume (ULV) spraying of insecticides (e.g., resmethrin and permethrin) for adult mosquito control could have significant effects on migrating monarchs in coastal portions of the Eastern Flyway (Fig. 1; Tracy et al. 2019, p. 454). The authors suggest that wildflower plantings might best be placed away from roads where mosquito truck ULV spraying could expose monarchs to insecticides.

5 SUMMARY OF EFFECTS OF THE ACTION

We expect the proposed action – the Agreement and the associated Permit – to increase the amount of milkweed in the action area and to reduce the extent of monarch habitat that will be exposed to management detrimental to the species. The Agreement will not prevent adverse effects to the monarch due to the Partners' activities. Instead, it will ensure that the Partners' implementation of conservation measures on the Adopted Acres will more than offset the adverse effects of their activities.

Under the Agreement, the Partners will implement actions on the Adopted Acres to improve habitat conditions for monarch. These measures will include seeding and other actions intended to increase native plant diversity and abundance. They will also include modifications to mowing practices, herbicide use, and other activities. We think that implementation of these measures will increase the extent of milkweed coverage and milkweed stem density on the Adopted Acres. In some areas, we think that implementation of these practices will lead to milkweed densities that exceed significantly the minimum standards in the Agreement's criteria and the density that we have assumed in our analyses for the Adopted Acres. The likelihood that anticipated levels of milkweed abundance will be achieved in the East and the Midwest is further support by one of the adaptive management triggers and responses.

The Agreement will lead the Partners to undertake extensive efforts to increase nectar abundance on Adopted Acres to ensure that coverage of nectar plants there will equal or exceed ten percent. The scarcity of information available to estimate current coverage of nectar plants in the action area or to predict what nectar coverage is likely to be on the Adopted Acres hindered our ability to analyze effects of the Agreement on nectar availability. Nectar availability is likely high in a few areas in the action area currently, but there is little reason to think that it is generally high. Rights-of-way are often planted to nonnative species and are typically lacking in native nectar sources (e.g., Pitman et al. 2018). Coverage

of potentially blooming nectar plants appears to often be less than 10% on roadsides, but can also exceed 40%, at least in the Midwest (e.g., Cariveau et al. 2019, p. 11). As with milkweed, we think that the conservation measures that the Partners will implement on Adopted Acres – seeding of native species, the use of spot-spraying to replace broadcast application of herbicides, targeted mowing practices, etc. – will increase both milkweed and nectar in substantial portions of the Adopted Acres and that, in some areas, increases in nectar will be especially high.

Some authors have raised concerns about focusing milkweed conservation efforts along roads due to potential increases in roadkill and other issues, including high concentrations of sodium, increased exposure to pollutants, and spraying along roadsides to control mosquitoes. The Agreement could lead to increased roadkill if implementation of conservation measures increases the time that monarchs spend flying at vehicle heights across roads, especially where they are concentrated during autumn migration. High levels of monarch roadkill are already occurring in these areas, however, and the Agreement may provide a means by which the Service and its Partners will address significant issues like this. The other issues related to the value of roadside habitats to monarchs, especially sodium, is emerging and we should acknowledge that they could dampen the benefits of these areas to monarchs.

The proposed action could affect species and critical habitats across up to 26 million acres. The potential scope and uncertainty about the locations of those affected areas precludes an in-depth analysis of effects to species other than monarch and for critical habitat. Therefore, the Service's review of the activities that Partners propose to carry out when they apply for certificates of inclusion will be critical to ensure that the conclusions reached in this biological and conference opinion are correct.

6 CONCLUSION

The Agreement and the Permit will result in a net benefit to the monarch. Based on the overall net benefit, it is also our conclusion that the proposed action is not likely to jeopardize the species' continued existence. The measures that Partners will implement under the Agreement and in accordance with the Permit will also ensure that consequences caused by the Agreement or Permit are not likely to jeopardize the continued existence of any endangered or threatened species and will not destroy or adversely modify critical habitat. Actions caused by the Agreement or Permit that are not already subject to section 7 review in relationship to other Federal actions will be subject to specific avoidance and minimization measures for listed and proposed plants and for designated and proposed critical habitat. The Partners will also be required to review each activity that they implement under the Agreement to ensure that they will not result in the take of any species of animal listed as endangered or threatened or proposed for such listing. The Service's ongoing participation in the implementation of the Agreement will include technical assistance and review of the Partners' actions, as needed, to ensure that these requirements are met.

7 INCIDENTAL TAKE STATMENT

ESA §9(a)(1) and regulations issued pursuant to §4(d) prohibit the take of endangered and threatened fish and wildlife species without special exemption. The term "take" in the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (ESA §3(19)). In regulations, the Service further defines:

- "harm" as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering;" (50 CFR §17.3) and
- "incidental take" as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant" (50 CFR §402.02).

Under the terms of ESA §7(b)(4) and §7(o)(2), taking that is incidental to a Federal agency action that would not violate ESA §7(a)(2) is not considered prohibited, provided that such taking is in compliance with the terms and conditions of an incidental take statement (ITS).

The incidental take statement provided in this conference opinion does not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the monarch has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect that take. No take of the monarch may occur between the listing of the monarch and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation.

7.1 RELATIONSHIP TO ENHANCEMENT OF SURVIVAL PERMIT & THE CCAA

Under ESA §10(a)(1)(A), the Service may authorize incidental take of endangered or threatened wildlife that is caused by otherwise lawful non-Federal actions through an Enhancement of Survival (EOS), provided that such authorization satisfies all permit issuance criteria. In this case, the Service proposes to issue an EOS permit to the Program Administrator to accompany the Candidate Conservation Agreement with Assurances (CCAA). The EOS permit would authorize the Program Administrator – and the parties to which it will issue Certificates of Inclusion (collectively, the Permittees) – to incidentally take monarchs (*Danaus plexipus plexipus*) in accordance with the permit conditions and the associated CCAA. This EOS permit applies only to incidental take that the Permittees cause on lands outside of Federal jurisdiction.

Under an ESA §10(a)(1)(A) EOS permit, the Federal action itself includes the authorization for incidental taking of listed wildlife species. In addition, the EOS permit specifies all of the necessary and appropriate measures – in addition to those proposed in the CCAA – that the Permittees must implement to minimize and mitigate to the maximum extent practicable the impacts of the anticipated incidental taking. These measures include reporting requirements.

Therefore, with respect to activities that will be implemented in accordance with the proposed CCAA on non-Federal lands, we incorporate by reference from any §10(a)(1)(A) permit(s) issued with respect to the proposed CCAA all required (non-discretionary):

- conservation measures;
- terms and conditions;
- monitoring and reporting requirements; and,
- provisions for the disposition of dead or injured animals.

7.2 RELATIONSHIP TO CANDIDATE CONSERVATION AGREEMENT

The rest of this incidental take statement (ITS) addresses only actions that the Permittees would carry out pursuant to the Candidate Conservation Agreement on Federal lands. As stated above, the EOS permit authorizes incidental take that occurs on non-Federal lands.

For the exemption in ESA §7(o)(2) to apply to the Action considered in this opinion, the Service and the Applicant must undertake the non-discretionary measures described in this ITS, and these measures must become binding conditions of any permit, contract, or grant issued for implementing the Action. Consistent with ESA section 7(b)(4)(C)(iv), the Services has a continuing duty to regulate the activities covered by this ITS that are under its jurisdiction. The Applicant is responsible for the activities covered by this ITS that are under its control and are not under the Service's jurisdiction. The protective coverage of §7(o)(2) may lapse if the Service or Applicant fails to:

- assume and implement the terms and conditions; or
- require a permittee, contractor, or grantee to adhere to the terms and conditions of the ITS through enforceable terms that are added to the permit, contract, or grant document.

To monitor the impact of incidental take, the Service and the Applicant must report the progress of the Action and its impact on the species to the Service as specified in this ITS.

7.3 AMOUNT OR EXTENT OF TAKE

This section specifies the amount or extent of incidental take of the monarch that the Action is reasonably certain to cause. As we explain below, we rely on a surrogate – the number of Adopted Acres as determined by sector-specific Enrolled Acres and adoption rates – to describe, measure and monitor the extent of incidental take.

7.3.1 Use of a Surrogate to Express the Extent of Anticipated Take of Monarchs

When it is not practical to monitor take in terms of individuals of the listed species, the regulations at 50 CFR §402.14(i)(1)(i) indicate that an ITS may express the amount or extent of take using a surrogate (*e.g.*, a similarly affected species, habitat, or ecological conditions), provided that the Service also:

- describes the causal link between the surrogate and take of the listed species; and
- sets a clear standard for determining when the level of anticipated take has been exceeded.

7.3.2 Causal Link between the Surrogate and Incidental Take of the Monarch

The number of Adopted Acres, as determined by both the sector-specific Enrolled Acres and anticipated adoption rates, will have a causal link to the anticipated incidental take of the monarch. Adoption rates are the minimum percentage of Enrolled Lands in each sector on which Partners must apply conservation measures to enhance, restore, and maintain monarch butterfly habitat each year. The adoption rate will determine the extent of Adopted Acres relative to the total extent of Enrolled Lands in each sector. The minimum number of Adopted Acres will be determined by multiplying the number of Enrolled Acres in each sector by the sector-specific adoption rates (Tables 1 and 3).

Incidental take is likely to occur both inside and outside of Adopted Acres, but to a significantly lesser degree on Adopted Acres. On the Adopted Acres, the Permittees will implement conservation measures that are designed to provide a net benefit to the monarch. Outside of the Adopted Acres, Permittees may implement covered activities in monarch habitat without any modification to reduce effects to the monarch.

7.3.3 Amount of Anticipated Take as Reflected by the Surrogate Measure – Adopted Acres

To meet the minimum standard for incidental take established for this ITS, the total number of Adopted Acres each year must equal or exceed the number that should be present based on the anticipated sector-specific adoption rates (Table 4). It will not be necessary for the minimum adoption rate or Adopted Acres to be met within each sector. If the collective number of acres that Partners adopt in any year is less than what should have been adopted based on 1) the number of enrolled acres and 2) the anticipated sector-specific adoption rates, then the level of anticipated incidental take will have been exceeded. For example, if Permittees were to enroll 26,000,000 acres divided between the two major sectors as shown in Table 4, the *total* Adopted Acres must be at least 2,083,380 (Table 4). If the total number of Adopted Acres were less than 2,083,380 in this example, the level of incidental take would have been exceeded.

Table 4. An example scenario – equivalent to the High Enrollment scenario analyzed in the opinion – in which 26,000,000 acres are enrolled in the Agreement and divided between the two major sectors, as shown. In this scenario, the anticipated level of incidental take would not be exceeded as long as there are at least 2,083,380 Adopted Acres for the entire Agreement.

Major Sector	Enrolled Lands (acres)	Anticipated Adoption Rate	Adopted Acres
Transportation	10,140,000	6.0%	608,400
Energy	15,860,000	9.3%	1,474,980
Total	*26,000,000*		*2,083,380*

7.3.4 Why it is not practical to Monitor Take-Related Impacts in Terms of Individual Monarchs

For the monarch, detecting take that occurs incidental to the action is not practical. Monarchs are small and hard to detect, except as adults. Most incidental take of monarchs will affect the small and cryptic eggs, larvae, and pupae.

7.4 REASONABLE AND PRUDENT MEASURES

The Service believes the reasonable and prudent measures (RPMs) we describe in this section for the monarch are necessary or appropriate to minimize the impact, *i.e.*, the amount or extent, of incidental take caused by the Action.

We indicate whether the Service or the Applicant is responsible for each RPM described in the remainder of this section, for the terms and conditions that implement the RPMs described in section 7.5, and for the monitoring and reporting requirements.

RPM #1. Coordinate with affected Federal land management agencies.

At times, the Permittees will carry out activities that will affect monarchs on Federal lands. The relevant Federal land management agencies are likely to have their own objectives for monarch conservation on their lands and to be planning and implementing actions to conserve the species. In addition, they are likely to hold special expertise with regard to the status and trends of the species and its habitat in the areas where Permittees will propose to implement covered activities, conservation measures, or both. Therefore, Permittees shall coordinate with the relevant land management agencies to reduce negative effects to monarchs and to minimize the extent of incidental take. This coordination will also allow Permittees to ensure that Federal land management agencies are aware of their enrollment in the CCA and of this incidental take statement.

7.5 TERMS AND CONDITIONS

In order for the exemption from the take prohibitions of §9(a)(1) and of regulations issued under §4(d) of the ESA to apply to the Action, the Service and the Applicant must comply with the terms and conditions (T&Cs) of this statement, provided below, which carry out the RPMs described in the previous section. These T&Cs are mandatory. We identify whether the Service, the Applicant, or both are responsible. As necessary and appropriate to fulfill this responsibility, the Service must require any permittee, contractor, or grantee to implement the T&Cs that apply to Action activities under its jurisdiction through enforceable terms that the Service includes in the permit, contract, or grant document. The Applicant must implement, or ensure that any agent or contractor implement, the T&Cs that apply to Action activities that are not under the Service's jurisdiction.

7.5.1 T&C #1 (RPM #1). Notify and coordinate with Federal land management agencies.

Before carrying out covered activities or conservation measures for the monarch on Federal lands in pursuit of the Agreement, holders of Certificates of Inclusion (Partners) shall provide the relevant Federal land management agency with an explanation of the proposed activities and their objectives. This notification shall include all activities that the Partner will carry out on lands under the jurisdiction of the land management agency that are included in their Certificate of Inclusion. This notification may be conducted programmatically for all activities undertaken by a Partner on Federal lands. As part of this notification, the Permittees shall request the agency's input on any aspect of the activities that could affect monarchs and that could avoid or minimize effects to the monarch or further enhance the benefits of proposed conservation measures.

This term and condition does not alter any existing notification requirements and timeframes already in place on the Permittee's easements or permits across Federal lands. It requires Partners only to notify relevant agencies, but does not require additional permissions or approvals beyond those already required under existing easements or permits from the agencies. For example, if a Partner has notified relevant agencies, but does not receive a response, this requirement is considered as fulfilled for the purposes of this term and condition.

To ensure that agency staff at the appropriate level are aware of activities that affect monarchs on the lands for which they have primary management responsibility, a Partner shall contact specific Federal land managers when acquiring special use permits, access permits, or other authorization notices. Notification is intended to be conducted at this local level, rather than contacting regional or national headquarters offices. The Program Administrator will provide assistance to the Partners if they are uncertain of the appropriate agency contacts.

7.6 MONITORING AND REPORTING REQUIREMENTS

To monitor the impacts of incidental take, the Service and the Applicant must report the progress of the Action and its impact on the species to the Service as specified in the incidental take statement (50 CFR §402.14(i)(3)). This section provides the specific instructions for such monitoring and reporting (M&R), including procedures for handling and disposing of any individuals of a species actually killed or injured. These M&R requirements are mandatory. We identify whether the Service, the Applicant, or both are responsible.

As necessary and appropriate to fulfill this responsibility, the Service must require any permittee, to accomplish the monitoring and reporting requirements that apply to Action activities under its jurisdiction through enforceable terms that the Service includes in the permit. Such enforceable terms must include a requirement to immediately notify the Service if the amount or extent of incidental take specified in this ITS is exceeded during Action implementation.

The Applicant (the Program Administrator) must accomplish, or ensure that any agent or contractor accomplish, the monitoring and reporting requirements that apply to Action activities. The Applicant must immediately notify the Service if the amount or extent of incidental take specified in this ITS is exceeded during Action implementation. To determine whether the amount or extent of incidental take has been exceeded, see the section 7.3.3 Amount of Anticipated Take as Reflected by the Surrogate Measure – Adopted Acres, above.

M&R #1. Annual summary of acres enrolled by major sector and Adopted Acres.

As part of its annual reporting to the Service, the Program Administrator will compile information from the Certificate of Inclusion holders and will report to the Service the acres enrolled by major sector (energy and transportation) and the Adopted Acres in the Agreement as a whole.

M&R#2. Disposition of Dead or Injured Specimens

We will not require the collection or recording of dead or injured monarchs encountered by personnel in the field. Monarchs killed or injured by activities covered under the CCA will seldom be detected due to

the small size and cryptic nature of most life stages. Individuals injured are unlikely to be in a condition that would warrant attempts to provide aid.

8 REINITIATION NOTICE

This concludes formal consultation on the action outlined above under Description of the Action. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) may have lapsed and any further take could be a violation of section 4(d) or 9.

9 CONSERVATION RECOMMENDATIONS

1. Adopt the rapid assessment protocol described by Cariveau et al. (2019, p. 13) to determine habitat suitability at sample sites. Include their recommendation that "that surveys be conducted in peak blooming season within the period(s) of time when monarchs are present (usually mid- to late-summer), to facilitate identification, or at least differentiation, of plant species."
2. Support studies that address key questions regarding the extent of roadkill's effect on monarchs and the factors that the Partners may manage to reduce roadkill.
3. Increase the number of milkweed stems counted in monitoring plots in which milkweed is present to improve our understanding of the minimum stem densities on the Adopted Acres.

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Appendix A. Animal species listed under the Endangered Species Act with the designations of Endangered, Threatened, or Experimental Population, Non-Essential as of March 11, 2020 and species proposed for listing as Endangered or Threatened. This includes all species that are likely to be present in the Contiguous U.S. whose habitats are not entirely marine.

Scientific Name	Common Name	Federal Listing Status
Acipenser brevirostrum	Shortnose sturgeon	Endangered
Acipenser medirostris	green sturgeon	Threatened
Acipenser oxyrinchus (=oxyrhynchus) desotoi	Atlantic sturgeon (Gulf subspecies)	Threatened
Acipenser oxyrinchus oxyrinchus	Atlantic sturgeon	Endangered
Acipenser oxyrinchus oxyrinchus	Atlantic sturgeon	Endangered
Acipenser oxyrinchus oxyrinchus	Atlantic sturgeon	Endangered
Acipenser oxyrinchus oxyrinchus	Atlantic sturgeon	Endangered
Acipenser oxyrinchus oxyrinchus	Atlantic sturgeon	Threatened
Acipenser transmontanus	White sturgeon	Endangered
Alasmidonta atropurpurea	Cumberland elktoe	Endangered
Alasmidonta heterodon	Dwarf wedgemussel	Endangered
Alasmidonta raveneliana	Appalachian elktoe	Endangered
Amblema neislerii	Fat threeridge (mussel)	Endangered
Amblyopsis rosae	Ozark cavefish	Threatened
Ambrysus amargosus	Ash Meadows naucorid	Threatened
Ambystoma bishopi	Reticulated flatwoods salamander	Endangered
Ambystoma californiense	California tiger Salamander	Endangered
Ambystoma californiense	California tiger Salamander	Endangered
Ambystoma californiense	California tiger Salamander	Threatened
Ambystoma cingulatum	Frosted Flatwoods salamander	Threatened
Ambystoma macrodactylum croceum	Santa Cruz long-toed salamander	Endangered
Ambystoma tigrinum stebbinsi	Sonora tiger Salamander	Endangered
Ammodramus maritimus mirabilis	Cape Sable seaside sparrow	Endangered
Ammodramus savannarum floridanus	Florida grasshopper sparrow	Endangered
Amphispiza belli clementeae	San Clemente sage sparrow	Threatened
Anaea troglodyta floridalis	Florida leafwing Butterfly	Endangered
Anaxyrus californicus	Arroyo (=arroyo southwestern) toad	Endangered
Anaxyrus canorus	Yosemite toad	Threatened
Anguispira picta	Painted snake coiled forest snail	Threatened
Antilocapra americana sonoriensis	Sonoran pronghorn	Experimental Population, Non-Essential
Antilocapra americana sonoriensis	Sonoran pronghorn	Endangered
Antrobia culveri	Tumbling Creek cavesnail	Endangered
Antrolana lira	Madison Cave isopod	Threatened
Aphelocoma coerulescens	Florida scrub-jay	Threatened
Aplodontia rufa nigra	Point Arena mountain beaver	Endangered
Apodemia mormo langei	Lange's metalmark butterfly	Endangered
Arkansia wheeleri	Ouachita rock pocketbook	Endangered
Assiminea pecos	Pecos assiminea snail	Endangered
Athearnia anthonyi	Anthony's riversnail	Endangered
Athearnia anthonyi	Anthony's riversnail	Experimental Population, Non-Essential
Athearnia anthonyi	Anthony's riversnail	Experimental Population, Non-Essential
Batrachoseps aridus	Desert slender salamander	Endangered

Scientific Name	Common Name	Federal Listing Status
Batrisodes texanus	Coffin Cave mold beetle	Endangered
Batrisodes venyivi	Helotes mold beetle	Endangered
Boloria acrocnema	Uncompahgre fritillary butterfly	Endangered
Bombus affinis	Rusty patched bumble bee	Endangered
Bombus franklini	Franklin's bumblebee	Proposed Endangered
Brachylagus idahoensis	Columbia Basin Pygmy Rabbit	Endangered
Brachyramphus marmoratus	Marbled murrelet	Threatened
Branchinecta conservatio	Conservancy fairy shrimp	Endangered
Branchinecta longiantenna	Longhorn fairy shrimp	Endangered
Branchinecta lynchi	Vernal pool fairy shrimp	Threatened
Branchinecta sandiegonensis	San Diego fairy shrimp	Endangered
Brychius hungerfordi	Hungerford's crawling water Beetle	Endangered
Bufo hemiophrys baxteri	Wyoming Toad	Endangered
Bufo houstonensis	Houston toad	Endangered
Calidris canutus rufa	Red knot	Threatened
Callophrys mossii bayensis	San Bruno elfin butterfly	Endangered
Cambarus aculabrum	Benton County cave crayfish	Endangered
Cambarus callainus	Big Sandy crayfish	Threatened
Cambarus cracens	Slenderclaw crayfish	Proposed Threatened
Cambarus veteranus	Guyandotte River crayfish	Endangered
Cambarus zophonastes	Hell Creek Cave crayfish	Endangered
Campeloma decampi	Slender campeloma	Endangered
Campephilus principalis	Ivory-billed woodpecker	Endangered
Canis lupus	Gray wolf	Endangered
Canis lupus	Gray wolf	Threatened
Canis lupus baileyi	Mexican wolf	Endangered
Canis lupus baileyi	Mexican wolf	Experimental Population, Non-Essential
Canis rufus	Red wolf	Endangered
Canis rufus	Red wolf	Experimental Population, Non-Essential
Catostomus discobolus yarrowi	Zuni bluehead Sucker	Endangered
Catostomus santaanae	Santa Ana sucker	Threatened
Catostomus warnerensis	Warner sucker	Threatened
Centrocercus minimus	Gunnison sage-grouse	Threatened
Centrocercus urophasianus	Greater sage-grouse	Proposed Threatened
Charadrius melodus	Piping Plover	Threatened
Charadrius melodus	Piping Plover	Endangered
Charadrius nivosus nivosus	Western snowy plover	Threatened
Chasmistes brevirostris	Shortnose Sucker	Endangered
Chasmistes cujus	Cui-ui	Endangered
Chasmistes liorus	June sucker	Endangered
Chrosomus saylori	Laurel dace	Endangered
Cicindela dorsalis dorsalis	Northeastern beach tiger beetle	Threatened
Cicindela nevadica lincolniana	Salt Creek Tiger beetle	Endangered
Cicindela ohlone	Ohlone tiger beetle	Endangered
Cicindela puritana	Puritan tiger beetle	Threatened
Cicindelidia floridana	Miami tiger beetle	Endangered
Cicurina baronia	Robber Baron Cave Meshweaver	Endangered

Scientific Name	Common Name	Federal Listing Status
Cicurina madla	Madla Cave Meshweaver	Endangered
Cicurina venii	Braken Bat Cave Meshweaver	Endangered
Cicurina vespera	Government Canyon Bat Cave Meshweaver	Endangered
Clemmys muhlenbergii	bog turtle	Threatened
Coccyzus americanus	Yellow-billed Cuckoo	Threatened
Colinus virginianus ridgwayi	Masked bobwhite (quail)	Endangered
Corynorhinus (=Plecotus) townsendii ingens	Ozark big-eared bat	Endangered
Corynorhinus (=Plecotus) townsendii virginianus	Virginia big-eared bat	Endangered
Cottus paulus (=pygmaeus)	Pygmy Sculpin	Threatened
Cottus specus	Grotto Sculpin	Endangered
Crenichthys baileyi baileyi	White River springfish	Endangered
Crenichthys baileyi grandis	Hiko White River springfish	Endangered
Crenichthys nevadae	Railroad Valley springfish	Threatened
Crocodylus acutus	American crocodile	Threatened
Crotalus willardi obscurus	New Mexican ridge-nosed rattlesnake	Threatened
Cryptobranchus alleganiensis alleganiensis	Eastern Hellbender Missouri DPS	Proposed Endangered
Cryptobranchus alleganiensis bishopi	Ozark Hellbender	Endangered
Crystallaria cincotta	diamond Darter	Endangered
Cumberlandia monodonta	Spectaclecase (mussel)	Endangered
Cyclargus (=Hemiargus) thomasi bethunebakeri	Miami Blue Butterfly	Endangered
Cynomys parvidens	Utah prairie dog	Threatened
Cyprinella caerulea	Blue shiner	Threatened
Cyprinella formosa	Beautiful shiner	Threatened
Cyprinodon bovinus	Leon Springs pupfish	Endangered
Cyprinodon diabolis	Devils Hole pupfish	Endangered
Cyprinodon elegans	Comanche Springs pupfish	Endangered
Cyprinodon macularius	Desert pupfish	Endangered
Cyprinodon nevadensis mionectes	Ash Meadows Amargosa pupfish	Endangered
Cyprinodon nevadensis pectoralis	Warm Springs pupfish	Endangered
Cyprinodon radiosus	Owens pupfish	Endangered
Cyprogenia stegaria	Fanshell	Endangered
Cyprogenia stegaria	Fanshell	Experimental Population, Non-Essential
Deltistes luxatus	Lost River sucker	Endangered
Dendroica chrysoparia	Golden-cheeked warbler (=wood)	Endangered
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	Threatened
Dinacoma caseyi	Casey's June Beetle	Endangered
Dionda diaboli	Devils River minnow	Threatened
Dipodomys heermanni morroensis	Morro Bay kangaroo rat	Endangered
Dipodomys ingens	Giant kangaroo rat	Endangered
Dipodomys merriami parvus	San Bernardino Merriam's kangaroo rat	Endangered
Dipodomys nitratoides exilis	Fresno kangaroo rat	Endangered
Dipodomys nitratoides nitratoides	Tipton kangaroo rat	Endangered
Dipodomys stephensi (incl. D. cascus)	Stephens' kangaroo rat	Endangered
Discus macclintocki	Iowa Pleistocene snail	Endangered
Dromus dromas	Dromedary pearlymussel	Endangered

Scientific Name	Common Name	Federal Listing Status
Dromus dromas	Dromedary pearlymussel	Experimental Population, Non-Essential
Dromus dromas	Dromedary pearlymussel	Experimental Population, Non-Essential
Drymarchon corais couperi	Eastern indigo snake	Threatened
Elaphrus viridis	Delta green ground beetle	Threatened
Elassoma alabamae	Spring pygmy sunfish	Threatened
Elimia crenatella	Lacy elimia (snail)	Threatened
Elliptio chipolaensis	Chipola slabshell	Threatened
Elliptio lanceolata	Yellow lance	Threatened
Elliptio spinosa	Altamaha Spinymussel	Endangered
Elliptio steinstansana	Tar River spinymussel	Endangered
Elliptoideus sloatianus	Purple bankclimber (mussel)	Threatened
Empetrichthys latos	Pahrump poolfish	Endangered
Empidonax traillii extimus	Southwestern willow flycatcher	Endangered
Epioblasma brevidens	Cumberlandian combshell	Endangered
Epioblasma brevidens	Cumberlandian combshell	Experimental Population, Non-Essential
Epioblasma brevidens	Cumberlandian combshell	Experimental Population, Non-Essential
Epioblasma capsaeformis	Oyster mussel	Endangered
Epioblasma capsaeformis	Oyster mussel	Experimental Population, Non-Essential
Epioblasma capsaeformis	Oyster mussel	Experimental Population, Non-Essential
Epioblasma florentina curtisii	Curtis pearlymussel	Endangered
Epioblasma florentina florentina	Yellow blossom (pearlymussel)	Experimental Population, Non-Essential
Epioblasma florentina florentina	Yellow blossom (pearlymussel)	Endangered
Epioblasma florentina walkeri (=E. walkeri)	Tan riffleshell	Endangered
Epioblasma metastriata	Upland combshell	Endangered
Epioblasma obliquata obliquata	Purple Cat's paw (=Purple Cat's paw pearlymussel)	Experimental Population, Non-Essential
Epioblasma obliquata obliquata	Purple Cat's paw (=Purple Cat's paw pearlymussel)	Endangered
Epioblasma obliquata perobliqua	White catspaw (pearlymussel)	Endangered
Epioblasma othcaloogensis	Southern acornshell	Endangered
Epioblasma penita	Southern combshell	Endangered
Epioblasma torulosa gubernaculum	Green blossom (pearlymussel)	Endangered
Epioblasma torulosa rangiana	Northern riffleshell	Endangered
Epioblasma torulosa torulosa	Tubercled blossom (pearlymussel)	Experimental Population, Non-Essential
Epioblasma torulosa torulosa	Tubercled blossom (pearlymussel)	Endangered
Epioblasma triquetra	Snuffbox mussel	Endangered
Epioblasma turgidula	Turgid blossom (pearlymussel)	Experimental Population, Non-Essential
Epioblasma turgidula	Turgid blossom (pearlymussel)	Endangered
Eremichthys acros	Desert dace	Threatened
Eremophila alpestris strigata	Streaked Horned lark	Threatened
Erimonax monachus	Spotfin Chub	Threatened
Erimonax monachus	Spotfin Chub	Experimental Population, Non-Essential

Scientific Name	Common Name	Federal Listing Status
Erimonax monachus	Spotfin Chub	Experimental Population, Non-Essential
Erimonax monachus	Spotfin Chub	Experimental Population, Non-Essential
Erimystax cahni	Slender chub	Threatened
Erimystax cahni	Slender chub	Experimental Population, Non-Essential
Etheostoma akatulo	bluemask darter	Endangered
Etheostoma boschungi	Slackwater darter	Threatened
Etheostoma chermocki	Vermilion darter	Endangered
Etheostoma chienense	Relict darter	Endangered
Etheostoma etowahae	Etowah darter	Endangered
Etheostoma fonticola	Fountain darter	Endangered
Etheostoma moorei	Yellowcheek Darter	Endangered
Etheostoma nianguae	Niangua darter	Threatened
Etheostoma nuchale	Watercress darter	Endangered
Etheostoma okaloosae	Okaloosa darter	Threatened
Etheostoma osburni	Candy darter	Endangered
Etheostoma percnurum	Duskytail darter	Endangered
Etheostoma percnurum	Duskytail darter	Experimental Population, Non-Essential
Etheostoma percnurum	Duskytail darter	Experimental Population, Non-Essential
Etheostoma phytophilum	Rush Darter	Endangered
Etheostoma rubrum	Bayou darter	Threatened
Etheostoma scotti	Cherokee darter	Threatened
Etheostoma sellare	Maryland darter	Endangered
Etheostoma spilotum	Kentucky arrow darter	Threatened
Etheostoma susanae	Cumberland darter	Endangered
Etheostoma trisella	Trispot darter	Threatened
Etheostoma wapiti	Boulder darter	Endangered
Etheostoma wapiti	Boulder darter	Experimental Population, Non-Essential
Euchloe ausonides insulanus	Island marble Butterfly	Proposed Endangered
Eucyclogobius newberryi	Tidewater goby	Endangered
Eumeces egregius lividus	Bluetail mole skink	Threatened
Eumops floridanus	Florida bonneted bat	Endangered
Euphilotes battoides allyni	El Segundo blue butterfly	Endangered
Euphilotes enoptes smithi	Smith's blue butterfly	Endangered
Euphydryas editha bayensis	Bay checkerspot butterfly	Threatened
Euphydryas editha quino (=E. e. wrighti)	Quino checkerspot butterfly	Endangered
Euphydryas editha taylori	Taylor's (=whulge) Checkerspot	Endangered
Euproserpinus euterpe	Kern primrose sphinx moth	Threatened
Eurycea chisholmensis	Salado Salamander	Threatened
Eurycea nana	San Marcos salamander	Threatened
Eurycea naufragia	Georgetown Salamander	Threatened
Eurycea sosorum	Barton Springs salamander	Endangered
Eurycea tonkawae	Jollyville Plateau Salamander	Threatened
Eurycea waterlooensis	Austin blind Salamander	Endangered

Scientific Name	Common Name	Federal Listing Status
Falco femoralis septentrionalis	Northern Aplomado Falcon	Experimental Population, Non-Essential
Falco femoralis septentrionalis	Northern Aplomado Falcon	Endangered
Fundulus julisia	Barrens topminnow	Endangered
Fusconaia burkei	Tapered pigtoe	Threatened
Fusconaia cor	Shiny pigtoe	Endangered
Fusconaia cor	Shiny pigtoe	Experimental Population, Non-Essential
Fusconaia cor	Shiny pigtoe	Experimental Population, Non-Essential
Fusconaia cuneolus	Finerayed pigtoe	Endangered
Fusconaia cuneolus	Finerayed pigtoe	Experimental Population, Non-Essential
Fusconaia cuneolus	Finerayed pigtoe	Experimental Population, Non-Essential
Fusconaia escambia	Narrow pigtoe	Threatened
Fusconaia masoni	Atlantic pigtoe	Proposed Threatened
Fusconaia rotulata	Round Ebonyshell	Endangered
Gambelia silus	Blunt-nosed leopard lizard	Endangered
Gambusia gaigei	Big Bend gambusia	Endangered
Gambusia georgei	San Marcos gambusia	Endangered
Gambusia heterochir	Clear Creek gambusia	Endangered
Gambusia nobilis	Pecos gambusia	Endangered
Gammarus acherondytes	Illinois cave amphipod	Endangered
Gammarus desperatus	Noel's Amphipod	Endangered
Gammarus hyalleloides	Diminutive Amphipod	Endangered
Gammarus pecos	Pecos amphipod	Endangered
Gasterosteus aculeatus williamsoni	Unarmored threespine stickleback	Endangered
Gila bicolor ssp.	Hutton tui chub	Threatened
Gila bicolor ssp. mohavensis	Mohave tui chub	Endangered
Gila bicolor ssp. snyderi	Owens Tui Chub	Endangered
Gila boraxobius	Borax Lake chub	Endangered
Gila cypha	Humpback chub	Endangered
Gila ditaenia	Sonora chub	Threatened
Gila elegans	Bonytail	Endangered
Gila intermedia	Gila chub	Endangered
Gila nigrescens	Chihuahua chub	Threatened
Gila purpurea	Yaqui chub	Endangered
Gila robusta jordani	Pahranagat roundtail chub	Endangered
Gila seminuda (=robusta)	Virgin River Chub	Endangered
Glaucomys sabrinus coloratus	Carolina northern flying squirrel	Endangered
Glaucopsyche lygdamus palosverdesensis	Palos Verdes blue butterfly	Endangered
Gopherus agassizii	Desert tortoise	Threatened
Gopherus polyphemus	Gopher tortoise	Threatened
Graptemys flavimaculata	Yellow-blotched map turtle	Threatened
Graptemys oculifera	Ringed map turtle	Threatened
Grus americana	Whooping crane	Experimental Population, Non-Essential
Grus americana	Whooping crane	Endangered

Scientific Name	Common Name	Federal Listing Status
Grus americana	Whooping crane	Experimental Population, Non-Essential
Grus americana	Whooping crane	Experimental Population, Non-Essential
Grus canadensis pulla	Mississippi sandhill crane	Endangered
Gulo gulo luscus	North American wolverine	Proposed Threatened
Gymnogyps californianus	California condor	Endangered
Gymnogyps californianus	California condor	Experimental Population, Non-Essential
Hamiota australis	Southern sandshell	Threatened
Helminthoglypta walkeriana	Morro shoulderband (=Banded dune) snail	Endangered
Hemistena lata	Cracking pearlymussel	Endangered
Hemistena lata	Cracking pearlymussel	Experimental Population, Non-Essential
Hemistena lata	Cracking pearlymussel	Experimental Population, Non-Essential
Heraclides aristodemus ponceanus	Schaus swallowtail butterfly	Endangered
Herpailurus (=Felis) yagouaroundi cacomitli	Gulf Coast jaguarundi	Endangered
Herpailurus (=Felis) yagouaroundi tolteca	Sinaloan Jaguarundi	Endangered
Hesperia dacotae	Dakota Skipper	Threatened
Hesperia leonardus montana	Pawnee montane skipper	Threatened
Heterelmis comalensis	Comal Springs riffle beetle	Endangered
Hybognathus amarus	Rio Grande Silvery Minnow	Endangered
Hybognathus amarus	Rio Grande Silvery Minnow	Experimental Population, Non-Essential
Hypomesus transpacificus	Delta smelt	Threatened
Icaricia (Plebejus) shasta charlestonensis	Mount Charleston blue butterfly	Endangered
Icaricia icarioides fenderi	Fender's blue butterfly	Endangered
Icaricia icarioides missionensis	Mission blue butterfly	Endangered
Ictalurus pricei	Yaqui catfish	Threatened
Juturnia kosteri	Koster's springsnail	Endangered
Kinosternon sonoriense longifemorale	Sonoyta mud turtle	Endangered
Lampsilis abrupta	Pink mucket (pearlymussel)	Endangered
Lampsilis altilis	Finelined pocketbook	Threatened
Lampsilis higginsii	Higgins eye (pearlymussel)	Endangered
Lampsilis perovalis	Orangenacre mucket	Threatened
Lampsilis powellii	Arkansas fatmucket	Threatened
Lampsilis rafinesqueana	Neosho Mucket	Endangered
Lampsilis streckeri	Speckled pocketbook	Endangered
Lampsilis subangulata	Shinyrayed pocketbook	Endangered
Lampsilis virescens	Alabama lampmussel	Endangered
Lampsilis virescens	Alabama lampmussel	Experimental Population, Non-Essential
Lanius ludovicianus mearnsi	San Clemente loggerhead shrike	Endangered
Lanx sp.	Banbury Springs limpet	Endangered
Lasmigona decorata	Carolina heelsplitter	Endangered
Laterallus jamaicensis ssp. jamaicensis	Eastern Black rail	Proposed Threatened
Lednia tumana	Meltwater lednian stonefly	Threatened

Scientific Name	Common Name	Federal Listing Status
Lemiox rimosus	Birdwing pearlymussel	Experimental Population, Non-Essential
Lemiox rimosus	Birdwing pearlymussel	Endangered
Lemiox rimosus	Birdwing pearlymussel	Experimental Population, Non-Essential
Leopardus (=Felis) pardalis	Ocelot	Endangered
Lepidomeda albivallis	White River spinedace	Endangered
Lepidomeda mollispinis pratensis	Big Spring spinedace	Threatened
Lepidomeda vittata	Little Colorado spinedace	Threatened
Lepidurus packardi	Vernal pool tadpole shrimp	Endangered
Leptodea leptodon	Scaleshell mussel	Endangered
Leptonycteris nivalis	Mexican long-nosed bat	Endangered
Leptoxis ampla	Round rocksnail	Threatened
Leptoxis foremani	Interrupted (=Georgia) Rocksnail	Endangered
Leptoxis plicata	Plicate rocksnail	Endangered
Leptoxis taeniata	Painted rocksnail	Threatened
Lepyrium showalteri	Flat pebblesnail	Endangered
Lioplax cyclostomaformis	Cylindrical lioplax (snail)	Endangered
Lirceus usdagalun	Lee County cave isopod	Endangered
Lycaeides argyrognomon lotis	Lotis blue butterfly	Endangered
Lycaeides melissa samuelis	Karner blue butterfly	Endangered
Lycaena [Hermelycaena] hermes	Hermes copper butterfly	Proposed Threatened
Lynx canadensis	Canada Lynx	Threatened
Margaritifera hembeli	Louisiana pearlshell	Threatened
Margaritifera marrianae	Alabama pearlshell	Endangered
Martes caurina ssp. humboldtensis	Humboldt Marten	Proposed Threatened
Masticophis lateralis euryxanthus	Alameda whipsnake (=striped racer)	Threatened
Meda fulgida	Spikedace	Endangered
Medionidus acutissimus	Alabama moccasinshell	Threatened
Medionidus parvulus	Coosa moccasinshell	Endangered
Medionidus penicillatus	Gulf moccasinshell	Endangered
Medionidus simpsonianus	Ochlockonee moccasinshell	Endangered
Medionidus walkeri	Suwannee moccasinshell	Threatened
Menidia extensa	Waccamaw silverside	Threatened
Mesodon clarki nantahala	noonday snail	Threatened
Microhexura montivaga	Spruce-fir moss spider	Endangered
Microtus californicus scirpensis	Amargosa vole	Endangered
Microtus pennsylvanicus dukecampbelli	Florida salt marsh vole	Endangered
Moapa coriacea	Moapa dace	Endangered
Mustela nigripes	Black-footed ferret	Endangered
Mustela nigripes	Black-footed ferret	Experimental Population, Non-Essential
Mycteria americana	Wood stork	Threatened
Myotis grisescens	Gray bat	Endangered
Myotis septentrionalis	Northern Long-Eared Bat	Threatened
Myotis sodalis	Indiana bat	Endangered
Necturus alabamensis	Black warrior (=Sipsey Fork) Waterdog	Endangered
Necturus lewisi	Neuse River waterdog	Proposed Threatened
Neoleptoneta microps	Government Canyon Bat Cave Spider	Endangered

Scientific Name	Common Name	Federal Listing Status
Neoleptoneta myopica	Tooth Cave Spider	Endangered
Neonympha mitchellii francisci	Saint Francis' satyr butterfly	Endangered
Neonympha mitchellii mitchellii	Mitchell's satyr Butterfly	Endangered
Neoseps reynoldsi	Sand skink	Threatened
Neotoma floridana smalli	Key Largo woodrat	Endangered
Neotoma fuscipes riparia	Riparian woodrat (=San Joaquin Valley)	Endangered
Nerodia clarkii taeniata	Atlantic salt marsh snake	Threatened
Nerodia erythrogaster neglecta	Copperbelly water snake	Threatened
Nicrophorus americanus	American burying beetle	Endangered
Nicrophorus americanus	American burying beetle	Experimental Population, Non-Essential
Notropis albizonatus	Palezone shiner	Endangered
Notropis buccula	Smalleye Shiner	Endangered
Notropis cahabae	Cahaba shiner	Endangered
Notropis girardi	Arkansas River shiner	Threatened
Notropis mekistocholas	Cape Fear shiner	Endangered
Notropis oxyrhynchus	Sharpnose Shiner	Endangered
Notropis simus pecosensis	Pecos bluntnose shiner	Threatened
Notropis topeka (=tristis)	Topeka shiner	Endangered
Notropis topeka (=tristis)	Topeka shiner	Experimental Population, Non-Essential
Noturus baileyi	Smoky madtom	Endangered
Noturus baileyi	Smoky madtom	Experimental Population, Non-Essential
Noturus crypticus	Chucky Madtom	Endangered
Noturus flavipinnis	Yellowfin madtom	Experimental Population, Non-Essential
Noturus flavipinnis	Yellowfin madtom	Threatened
Noturus flavipinnis	Yellowfin madtom	Experimental Population, Non-Essential
Noturus flavipinnis	Yellowfin madtom	Experimental Population, Non-Essential
Noturus furiosus	Carolina madtom	Proposed Endangered
Noturus placidus	Neosho madtom	Threatened
Noturus stanauli	Pygmy madtom	Endangered
Noturus stanauli	Pygmy madtom	Experimental Population, Non-Essential
Noturus trautmani	Scioto madtom	Endangered
Numenius borealis	Eskimo curlew	Endangered
Oarisma poweshiek	Poweshiek skipperling	Endangered
Obovaria retusa	Ring pink (mussel)	Endangered
Obovaria retusa	Ring pink (mussel)	Experimental Population, Non-Essential
Odocoileus virginianus clavium	Key deer	Endangered
Odocoileus virginianus leucurus	Columbian white-tailed deer	Threatened
Oncorhynchus (=Salmo) kisutch	Coho salmon	Endangered
Oncorhynchus (=Salmo) kisutch	Coho salmon	Threatened
Oncorhynchus (=Salmo) kisutch	Coho salmon	Threatened
Oncorhynchus (=Salmo) kisutch	Coho salmon	Threatened
Oncorhynchus (=Salmo) mykiss	Steelhead	Endangered
Oncorhynchus (=Salmo) mykiss	Steelhead	Threatened

Scientific Name	Common Name	Federal Listing Status
Oncorhynchus (=Salmo) mykiss	Steelhead	Threatened
Oncorhynchus (=Salmo) mykiss	Steelhead	Threatened
Oncorhynchus (=Salmo) mykiss	Steelhead	Threatened
Oncorhynchus (=Salmo) mykiss	Steelhead	Threatened
Oncorhynchus (=Salmo) mykiss	Steelhead	Threatened
Oncorhynchus (=Salmo) mykiss	Steelhead	Threatened
Oncorhynchus (=Salmo) mykiss	Steelhead	Threatened
Oncorhynchus (=Salmo) mykiss	Steelhead	Threatened
Oncorhynchus (=Salmo) mykiss	Steelhead	Threatened
Oncorhynchus (=Salmo) mykiss	Steelhead	Experimental Population, Non-Essential
Oncorhynchus (=Salmo) nerka	Sockeye salmon	Endangered
Oncorhynchus (=Salmo) nerka	Sockeye salmon	Threatened
Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	Endangered
Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	Endangered
Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	Threatened
Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	Threatened
Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	Threatened
Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	Threatened
Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	Threatened
Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	Threatened
Oncorhynchus (=Salmo) tshawytscha	Chinook salmon	Threatened
Oncorhynchus aguabonita whitei	Little Kern golden trout	Threatened
Oncorhynchus apache	Apache trout	Threatened
Oncorhynchus clarkii henshawi	Lahontan cutthroat trout	Threatened
Oncorhynchus clarkii seleniris	Paiute cutthroat trout	Threatened
Oncorhynchus clarkii stomias	Greenback Cutthroat trout	Threatened
Oncorhynchus gilae	Gila trout	Threatened
Oncorhynchus keta	Chum salmon	Threatened
Oncorhynchus keta	Chum salmon	Threatened
Orconectes shoupi	Nashville crayfish	Endangered
Orthalicus reses (not incl. nesodryas)	Stock Island tree snail	Threatened
Oryzomys palustris natator	Silver rice rat	Endangered
Ovis canadensis nelsoni	Peninsular bighorn sheep	Endangered
Ovis canadensis sierrae	Sierra Nevada bighorn sheep	Endangered
Oxyloma haydeni kanabensis	Kanab ambersnail	Endangered
Pacifastacus fortis	Shasta crayfish	Endangered
Palaemonetes cummingi	Squirrel Chimney Cave shrimp	Threatened
Palaemonias alabamae	Alabama cave shrimp	Endangered
Palaemonias ganteri	Kentucky cave shrimp	Endangered
Panthera onca	Jaguar	Endangered
Pegias fabula	Littlewing pearlymussel	Endangered
Pekania pennanti	West Coast Distinct Population Segment of Fisher	Proposed Threatened
Percina antesella	Amber darter	Endangered
Percina aurolineata	Goldline darter	Threatened
Percina aurora	Pearl darter	Threatened
Percina jenkinsi	Conasauga logperch	Endangered
Percina pantherina	Leopard darter	Threatened
Percina rex	Roanoke logperch	Endangered

Scientific Name	Common Name	Federal Listing Status
Percina tanasi	Snail darter	Threatened
Perognathus longimembris pacificus	Pacific pocket mouse	Endangered
Peromyscus gossypinus allapaticola	Key Largo cotton mouse	Endangered
Peromyscus polionotus allophrys	Choctawhatchee beach mouse	Endangered
Peromyscus polionotus ammobates	Alabama beach mouse	Endangered
Peromyscus polionotus niveiventris	Southeastern beach mouse	Threatened
Peromyscus polionotus peninsularis	St. Andrew beach mouse	Endangered
Peromyscus polionotus phasma	Anastasia Island beach mouse	Endangered
Peromyscus polionotus trissyllepsis	Perdido Key beach mouse	Endangered
Phaeognathus hubrichti	Red Hills salamander	Threatened
Phoxinus cumberlandensis	Blackside dace	Threatened
Physa natricina	Snake River physa snail	Endangered
Picoides borealis	Red-cockaded woodpecker	Endangered
Pipilo crissalis eremophilus	Inyo California towhee	Threatened
Pituophis melanoleucus lodingi	Black pine snake	Threatened
Pituophis ruthveni	Louisiana pinesnake	Threatened
Plagopterus argentissimus	Woundfin	Endangered
Plagopterus argentissimus	Woundfin	Experimental Population, Non-Essential
Plethobasus cicatricosus	White wartyback (pearlymussel)	Endangered
Plethobasus cicatricosus	White wartyback (pearlymussel)	Experimental Population, Non-Essential
Plethobasus cooperianus	Orangefoot pimpleback (pearlymussel)	Endangered
Plethobasus cooperianus	Orangefoot pimpleback (pearlymussel)	Experimental Population, Non-Essential
Plethobasus cyphyus	Sheepnose Mussel	Endangered
Plethodon neomexicanus	Jemez Mountains salamander	Endangered
Plethodon nettingi	Cheat Mountain salamander	Threatened
Plethodon shenandoah	Shenandoah salamander	Endangered
Pleurobema clava	Clubshell	Experimental Population, Non-Essential
Pleurobema clava	Clubshell	Endangered
Pleurobema collina	James spinymussel	Endangered
Pleurobema curtum	Black clubshell	Endangered
Pleurobema decisum	Southern clubshell	Endangered
Pleurobema furvum	Dark pigtoe	Endangered
Pleurobema georgianum	Southern pigtoe	Endangered
Pleurobema gibberum	Cumberland pigtoe	Endangered
Pleurobema hanleyianum	Georgia pigtoe	Endangered
Pleurobema marshalli	Flat pigtoe	Endangered
Pleurobema perovatum	Ovate clubshell	Endangered
Pleurobema plenum	Rough pigtoe	Endangered
Pleurobema plenum	Rough pigtoe	Experimental Population, Non-Essential
Pleurobema pyriforme	Oval pigtoe	Endangered
Pleurobema strodeanum	Fuzzy pigtoe	Threatened
Pleurobema taitianum	Heavy pigtoe	Endangered
Pleurocera foremani	Rough hornsnail	Endangered
Pleuronaia dolabelloides	Slabside Pearlymussel	Endangered
Poeciliopsis occidentalis	Gila topminnow (incl. Yaqui)	Endangered

Scientific Name	Common Name	Federal Listing Status
Polioptila californica californica	Coastal California gnatcatcher	Threatened
Polyborus plancus audubonii	Audubon's crested caracara	Threatened
Polygyriscus virginianus	Virginia fringed mountain snail	Endangered
Polyphylla barbata	Mount Hermon June beetle	Endangered
Popenaias popeii	Texas Hornshell	Endangered
Potamilus capax	Fat pocketbook	Endangered
Potamilus inflatus	Inflated heelsplitter	Threatened
Pristis pectinata	Smalltooth sawfish	Endangered
Procambarus econfinae	Panama City crayfish	Proposed Threatened
Pseudemys alabamensis	Alabama red-bellied turtle	Endangered
Pseudemys rubriventris bangsi	Plymouth Redbelly Turtle	Endangered
Pseudocopaeodes eunus obscurus	Carson wandering skipper	Endangered
Pseudotryonia adamantina	Diamond Tryonia	Endangered
Ptychobranchus greenii	Triangular Kidneyshell	Endangered
Ptychobranchus jonesi	Southern kidneyshell	Endangered
Ptychobranchus subtentum	Fluted kidneyshell	Endangered
Ptychocheilus lucius	Colorado pikeminnow (=squawfish)	Endangered
Ptychocheilus lucius	Colorado pikeminnow (=squawfish)	Experimental Population, Non-Essential
Puma (=Felis) concolor coryi	Florida panther	Endangered
Pyrgulopsis (=Marstonia) pachyta	Armored snail	Endangered
Pyrgulopsis bernardina	San Bernardino springsnail	Threatened
Pyrgulopsis bruneauensis	Bruneau Hot springsnail	Endangered
Pyrgulopsis chupaderae	Chupadera springsnail	Endangered
Pyrgulopsis neomexicana	Socorro springsnail	Endangered
Pyrgulopsis ogmorhaphe	Royal marstonia (snail)	Endangered
Pyrgulopsis roswellensis	Roswell springsnail	Endangered
Pyrgulopsis texana	Phantom Springsnail	Endangered
Pyrgulopsis trivialis	Three Forks Springsnail	Endangered
Pyrgus ruralis lagunae	Laguna Mountains skipper	Endangered
Quadrula cylindrica cylindrica	Rabbitsfoot	Threatened
Quadrula cylindrica strigillata	Rough rabbitsfoot	Endangered
Quadrula fragosa	Winged Mapleleaf	Experimental Population, Non-Essential
Quadrula fragosa	Winged Mapleleaf	Endangered
Quadrula intermedia	Cumberland monkeyface (pearlymussel)	Endangered
Quadrula intermedia	Cumberland monkeyface (pearlymussel)	Experimental Population, Non-Essential
Quadrula intermedia	Cumberland monkeyface (pearlymussel)	Experimental Population, Non-Essential
Quadrula sparsa	Appalachian monkeyface (pearlymussel)	Endangered
Quadrula sparsa	Appalachian monkeyface (pearlymussel)	Experimental Population, Non-Essential
Quadrula stapes	Stirrupshell	Endangered
Rallus longirostris levipes	Light-footed clapper rail	Endangered
Rallus longirostris obsoletus	California clapper rail	Endangered
Rallus longirostris yumanensis	Yuma clapper rail	Endangered
Rana chiricahuensis	Chiricahua leopard frog	Threatened
Rana draytonii	California red-legged frog	Threatened
Rana muscosa	Mountain yellow-legged frog	Endangered

Scientific Name	Common Name	Federal Listing Status
Rana muscosa	Mountain yellow-legged frog	Endangered
Rana pretiosa	Oregon spotted frog	Threatened
Rana sevosa	Dusky gopher frog	Endangered
Rana sierrae	Sierra Nevada Yellow-legged Frog	Endangered
Rangifer tarandus caribou	Woodland Caribou	Endangered
Reithrodontomys raviventris	Salt marsh harvest mouse	Endangered
Rhadine exilis	[no common name] Beetle	Endangered
Rhadine infernalis	[no common name] Beetle	Endangered
Rhadine persephone	Tooth Cave ground beetle	Endangered
Rhaphiomidas terminatus abdominalis	Delhi Sands flower-loving fly	Endangered
Rhinichthys osculus lethoporus	Independence Valley speckled dace	Endangered
Rhinichthys osculus nevadensis	Ash Meadows speckled dace	Endangered
Rhinichthys osculus oligoporus	Clover Valley speckled dace	Endangered
Rhinichthys osculus thermalis	Kendall Warm Springs dace	Endangered
Rhynchopsitta pachyrhyncha	Thick-billed parrot	Endangered
Rostrhamus sociabilis plumbeus	Everglade snail kite	Endangered
Salmo salar	Atlantic salmon	Endangered
Salvelinus confluentus	Bull Trout	Threatened
Salvelinus confluentus	Bull Trout	Experimental Population, Non-Essential
Scaphirhynchus albus	Pallid sturgeon	Endangered
Scaphirhynchus suttkusi	Alabama sturgeon	Endangered
Sistrurus catenatus	Eastern Massasauga (=rattlesnake)	Threatened
Somatochlora hineana	Hine's emerald dragonfly	Endangered
Sorex ornatus relictus	Buena Vista Lake ornate Shrew	Endangered
Speoplatyrhinus poulsoni	Alabama cavefish	Endangered
Speyeria callippe callippe	Callippe silverspot butterfly	Endangered
Speyeria zerene behrensii	Behren's silverspot butterfly	Endangered
Speyeria zerene hippolyta	Oregon silverspot butterfly	Threatened
Speyeria zerene hippolyta	Oregon silverspot butterfly	Experimental Population, Non-Essential
Speyeria zerene myrtleae	Myrtle's silverspot butterfly	Endangered
Sterna antillarum	Least tern	Endangered
Sterna antillarum browni	California least tern	Endangered
Sterna dougallii dougallii	Roseate tern	Endangered
Sterna dougallii dougallii	Roseate tern	Threatened
Sternotherus depressus	Flattened musk turtle	Threatened
Streptocephalus woottoni	Riverside fairy shrimp	Endangered
Strix occidentalis caurina	Northern spotted owl	Threatened
Strix occidentalis lucida	Mexican spotted owl	Threatened
Strymon acis bartrami	Bartram's hairstreak Butterfly	Endangered
Stygobromus (=Stygonectes) pecki	Peck's cave amphipod	Endangered
Stygobromus hayi	Hay's Spring amphipod	Endangered
Stygoparnus comalensis	Comal Springs dryopid beetle	Endangered
Succinea chittenangoensis	Chittenango ovate amber snail	Threatened
Sylvilagus bachmani riparius	Riparian brush rabbit	Endangered
Sylvilagus palustris hefneri	Lower Keys marsh rabbit	Endangered
Syncaris pacifica	California freshwater shrimp	Endangered
Tamiasciurus hudsonicus grahamensis	Mount Graham red squirrel	Endangered

Scientific Name	Common Name	Federal Listing Status
Tartarocreagris texana	Tooth Cave pseudoscorpion	Endangered
Taylorconcha serpenticola	Bliss Rapids snail	Threatened
Texamaurops reddelli	Kretschmarr Cave mold beetle	Endangered
Texella cokendolpheri	Cokendolpher Cave Harvestman	Endangered
Texella reddelli	Bee Creek Cave harvestman	Endangered
Texella reyesi	Bone Cave harvestman	Endangered
Thamnophis eques megalops	Northern Mexican gartersnake	Threatened
Thamnophis gigas	Giant garter snake	Threatened
Thamnophis rufipunctatus	Narrow-headed gartersnake	Threatened
Thamnophis sirtalis tetrataenia	San Francisco garter snake	Endangered
Thermosphaeroma thermophilus	Socorro isopod	Endangered
Thomomys mazama glacialis	Roy Prairie pocket gopher	Threatened
Thomomys mazama pugetensis	Olympia pocket gopher	Threatened
Thomomys mazama tumuli	Tenino pocket gopher	Threatened
Thomomys mazama yelmensis	Yelm pocket gopher	Threatened
Tiaroga cobitis	Loach minnow	Endangered
Toxolasma cylindrellus	Pale lilliput (pearlymussel)	Endangered
Trimerotropis infantilis	Zayante band-winged grasshopper	Endangered
Triodopsis platysayoides	Flat-spired three-toothed Snail	Threatened
Tryonia alamosae	Alamosa springsnail	Endangered
Tryonia cheatumi	Phantom Tryonia	Endangered
Tryonia circumstriata (=stocktonensis)	Gonzales tryonia	Endangered
Tulotoma magnifica	Tulotoma snail	Threatened
Tympanuchus cupido attwateri	Attwater's greater prairie-chicken	Endangered
Typhlomolge rathbuni	Texas blind salamander	Endangered
Uma inornata	Coachella Valley fringe-toed lizard	Threatened
Urocitellus brunneus	Northern Idaho Ground Squirrel	Threatened
Urocyon littoralis catalinae	Santa Catalina Island Fox	Threatened
Ursus arctos horribilis	Grizzly bear	Threatened
Ursus arctos horribilis	Grizzly bear	Experimental Population, Non-Essential
Vermivora bachmanii	Bachman's warbler (=wood)	Endangered
Villosa choctawensis	Choctaw bean	Endangered
Villosa fabalis	Rayed Bean	Endangered
Villosa perpurpurea	Purple bean	Endangered
Villosa trabalis	Cumberland bean (pearlymussel)	Endangered
Villosa trabalis	Cumberland bean (pearlymussel)	Experimental Population, Non-Essential
Villosa trabalis	Cumberland bean (pearlymussel)	Experimental Population, Non-Essential
Vireo bellii pusillus	Least Bell's vireo	Endangered
Vulpes macrotis mutica	San Joaquin kit fox	Endangered
Vulpes vulpes necator	Sierra Nevada Distinct Population Segment (DPS) of the Sierra Nevada red fox	Proposed Endangered
Xyrauchen texanus	Razorback sucker	Endangered
Zapada glacier	Western glacier stonefly	Threatened
Zapus hudsonius luteus	New Mexico meadow jumping mouse	Endangered
Zapus hudsonius preblei	Preble's meadow jumping mouse	Threatened

Appendix B. Plant species listed under the Endangered Species Act with the designations of Endangered or Threatened as of March 11, 2020. This includes all species that are likely to be present in the Contiguous U.S. whose habitats are not entirely marine.

Scientific Name	Common Name	Federal Listing Status
Abronia macrocarpa	Large-fruited sand-verbena	Endangered
Acanthomintha ilicifolia	San Diego thornmint	Threatened
Acanthomintha obovata ssp. duttonii	San Mateo thornmint	Endangered
Acmispon dendroideus var. traskiae (=Lotus d. ssp. traskiae)	San Clemente Island lotus (=broom)	Threatened
Aconitum noveboracense	Northern wild monkshood	Threatened
Aeschynomene virginica	Sensitive joint-vetch	Threatened
Agalinis acuta	Sandplain gerardia	Endangered
Allium munzii	Munz's onion	Endangered
Alopecurus aequalis var. sonomensis	Sonoma alopecurus	Endangered
Amaranthus pumilus	Seabeach amaranth	Threatened
Ambrosia cheiranthifolia	South Texas ambrosia	Endangered
Ambrosia pumila	San Diego ambrosia	Endangered
Amorpha crenulata	Crenulate lead-plant	Endangered
Amphianthus pusillus	Little amphianthus	Threatened
Amsinckia grandiflora	Large-flowered fiddleneck	Endangered
Amsonia kearneyana	Kearney's blue-star	Endangered
Apios priceana	Price''s potato-bean	Threatened
Arabis georgiana	Georgia rockcress	Threatened
Arabis hoffmannii	Hoffmann's rock-cress	Endangered
Arabis macdonaldiana	McDonald's rock-cress	Endangered
Arabis perstellata	Braun's rock-cress	Endangered
Arabis serotina	Shale barren rock cress	Endangered
Arctomecon humilis	Dwarf Bear-poppy	Endangered
Arctostaphylos confertiflora	Santa Rosa Island manzanita	Endangered
Arctostaphylos franciscana	Franciscan manzanita	Endangered
Arctostaphylos glandulosa ssp. crassifolia	Del Mar manzanita	Endangered
Arctostaphylos hookeri var. ravenii	Presidio Manzanita	Endangered
Arctostaphylos morroensis	Morro manzanita	Threatened
Arctostaphylos myrtifolia	Ione manzanita	Threatened
Arctostaphylos pallida	Pallid manzanita	Threatened
Arenaria cumberlandensis	Cumberland sandwort	Endangered
Arenaria paludicola	Marsh Sandwort	Endangered
Arenaria ursina	Bear Valley sandwort	Threatened
Argemone pleiacantha ssp. pinnatisecta	Sacramento prickly poppy	Endangered
Argythamnia blodgettii	Blodgett's silverbush	Threatened
Asclepias meadii	Mead's milkweed	Threatened
Asclepias welshii	Welsh's milkweed	Threatened
Asimina tetramera	Four-petal pawpaw	Endangered
Asplenium scolopendrium var. americanum	American hart's-tongue fern	Threatened
Astragalus albens	Cushenbury milk-vetch	Endangered
Astragalus ampullarioides	Shivwits milk-vetch	Endangered
Astragalus applegatei	Applegate's milk-vetch	Endangered

Scientific Name	Common Name	Federal Listing Status
Astragalus bibullatus	Guthrie's (=Pyne's) ground-plum	Endangered
Astragalus brauntonii	Braunton's milk-vetch	Endangered
Astragalus clarianus	Clara Hunt's milk-vetch	Endangered
Astragalus cremnophylax var. cremnophylax	Sentry milk-vetch	Endangered
Astragalus holmgreniorum	Holmgren milk-vetch	Endangered
Astragalus humillimus	Mancos milk-vetch	Endangered
Astragalus jaegerianus	Lane Mountain milk-vetch	Endangered
Astragalus lentiginosus var. coachellae	Coachella Valley milk-vetch	Endangered
Astragalus lentiginosus var. piscinensis	Fish Slough milk-vetch	Threatened
Astragalus magdalenae var. peirsonii	Peirson's milk-vetch	Threatened
Astragalus microcymbus	Skiff milkvetch	Candidate
Astragalus montii	Heliotrope milk-vetch	Threatened
Astragalus osterhoutii	Osterhout milkvetch	Endangered
Astragalus phoenix	Ash meadows milk-vetch	Threatened
Astragalus pycnostachyus var. lanosissimus	Ventura Marsh Milk-vetch	Endangered
Astragalus robbinsii var. jesupi	Jesup's milk-vetch	Endangered
Astragalus schmolliae	Chapin Mesa milkvetch	Candidate
Astragalus tener var. titi	Coastal dunes milk-vetch	Endangered
Astragalus tricarinatus	Triple-ribbed milk-vetch	Endangered
Astrophytum asterias	Star cactus	Endangered
Atriplex coronata var. notatior	San Jacinto Valley crownscale	Endangered
Ayenia limitaris	Texas ayenia	Endangered
Baccharis vanessae	Encinitas baccharis	Threatened
Baptisia arachnifera	Hairy rattleweed	Endangered
Berberis nevinii	Nevin's barberry	Endangered
Berberis pinnata ssp. insularis	Island Barberry	Endangered
Betula uber	Virginia round-leaf birch	Threatened
Blennosperma bakeri	Sonoma sunshine	Endangered
Boltonia decurrens	Decurrent false aster	Threatened
Bonamia grandiflora	Florida bonamia	Threatened
Brickellia mosieri	Florida brickell-bush	Endangered
Brodiaea filifolia	Thread-leaved brodiaea	Threatened
Brodiaea pallida	Chinese Camp brodiaea	Threatened
Callirhoe scabriuscula	Texas poppy-mallow	Endangered
Calochortus tiburonensis	Tiburon mariposa lily	Threatened
Calyptridium pulchellum	Mariposa pussypaws	Threatened
Calystegia stebbinsii	Stebbins' morning-glory	Endangered
Camissonia benitensis	San Benito evening-primrose	Threatened
Campanula robinsiae	Brooksville bellflower	Endangered
Cardamine micranthera	Small-anthered bittercress	Endangered
Carex albida	White sedge	Endangered
Carex lutea	Golden sedge	Endangered
Carex specuicola	Navajo sedge	Threatened
Castilleja affinis ssp. neglecta	Tiburon paintbrush	Endangered
Castilleja campestris ssp. succulenta	Fleshy owl's-clover	Threatened

Scientific Name	Common Name	Federal Listing Status
Castilleja cinerea	Ash-grey paintbrush	Threatened
Castilleja grisea	San Clemente Island Paintbrush	Threatened
Castilleja levisecta	golden paintbrush	Threatened
Castilleja mollis	Soft-leaved paintbrush	Endangered
Caulanthus californicus	California jewelflower	Endangered
Ceanothus ferrisae	Coyote ceanothus	Endangered
Ceanothus ophiochilus	Vail Lake ceanothus	Threatened
Ceanothus roderickii	Pine Hill ceanothus	Endangered
Centaurium namophilum	Spring-loving centaury	Threatened
Cercocarpus traskiae	Catalina Island mountain-mahogany	Endangered
Cereus eriophorus var. fragrans	Fragrant prickly-apple	Endangered
Chamaecrista lineata keyensis	Big Pine partridge pea	Endangered
Chamaesyce deltoidea pinetorum	Pineland sandmat	Threatened
Chamaesyce deltoidea serpyllum	Wedge spurge	Endangered
Chamaesyce deltoidea ssp. deltoidea	Deltoid spurge	Endangered
Chamaesyce garberi	Garber's spurge	Threatened
Chamaesyce hooveri	Hoover's spurge	Threatened
Chionanthus pygmaeus	Pygmy fringe-tree	Endangered
Chlorogalum purpureum	Purple amole	Threatened
Chorizanthe howellii	Howell's spineflower	Endangered
Chorizanthe orcuttiana	Orcutt's spineflower	Endangered
Chorizanthe pungens var. hartwegiana	Ben Lomond spineflower	Endangered
Chorizanthe pungens var. pungens	Monterey spineflower	Threatened
Chorizanthe robusta var. hartwegii	Scotts Valley spineflower	Endangered
Chorizanthe robusta var. robusta	Robust spineflower	Endangered
Chorizanthe valida	Sonoma spineflower	Endangered
Chromolaena frustrata	Cape Sable Thoroughwort	Endangered
Chrysopsis floridana	Florida golden aster	Endangered
Cirsium fontinale var. fontinale	Fountain thistle	Endangered
Cirsium fontinale var. obispoense	Chorro Creek bog thistle	Endangered
Cirsium hydrophilum var. hydrophilum	Suisun thistle	Endangered
Cirsium loncholepis	La Graciosa thistle	Endangered
Cirsium pitcheri	Pitcher's thistle	Threatened
Cirsium vinaceum	Sacramento Mountains thistle	Threatened
Cirsium wrightii	Wright's marsh thistle	Candidate
Cladonia perforata	Florida perforate cladonia	Endangered
Clarkia franciscana	Presidio clarkia	Endangered
Clarkia imbricata	Vine Hill clarkia	Endangered
Clarkia speciosa ssp. immaculata	Pismo clarkia	Endangered
Clarkia springvillensis	Springville clarkia	Threatened
Clematis morefieldii	Morefield''s leather flower	Endangered
Clematis socialis	Alabama leather flower	Endangered
Clitoria fragrans	Pigeon wings	Threatened
Conradina brevifolia	Short-leaved rosemary	Endangered
Conradina etonia	Etonia rosemary	Endangered

Scientific Name	Common Name	Federal Listing Status
Conradina glabra	Apalachicola rosemary	Endangered
Conradina verticillata	Cumberland rosemary	Threatened
Consolea corallicola	Florida semaphore Cactus	Endangered
Cordylanthus maritimus ssp. maritimus	Salt marsh bird's-beak	Endangered
Cordylanthus mollis ssp. mollis	Soft bird's-beak	Endangered
Cordylanthus palmatus	Palmate-bracted bird's beak	Endangered
Cordylanthus tenuis ssp. capillaris	Pennell's bird's-beak	Endangered
Coryphantha minima	Nellie cory cactus	Endangered
Coryphantha ramillosa	Bunched cory cactus	Threatened
Coryphantha robbinsiorum	Cochise pincushion cactus	Threatened
Coryphantha scheeri var. robustispina	Pima pineapple cactus	Endangered
Coryphantha sneedii var. leei	Lee pincushion cactus	Threatened
Coryphantha sneedii var. sneedii	Sneed pincushion cactus	Endangered
Crotalaria avonensis	Avon Park harebells	Endangered
Cryptantha crassipes	Terlingua Creek cat's-eye	Endangered
Cucurbita okeechobeensis ssp. okeechobeensis	Okeechobee gourd	Endangered
Cupressus abramsiana	Santa Cruz cypress	Threatened
Cupressus goveniana ssp. goveniana	Gowen cypress	Threatened
Cycladenia humilis var. jonesii	Jones Cycladenia	Threatened
Dalea carthagenensis floridana	Florida prairie-clover	Endangered
Dalea foliosa	Leafy prairie-clover	Endangered
Deeringothamnus pulchellus	Beautiful pawpaw	Endangered
Deeringothamnus rugelii	Rugel's pawpaw	Endangered
Deinandra (=Hemizonia) conjugens	Otay tarplant	Threatened
Deinandra increscens ssp. villosa	Gaviota Tarplant	Endangered
Delphinium bakeri	Baker's larkspur	Endangered
Delphinium luteum	Yellow larkspur	Endangered
Delphinium variegatum ssp. kinkiense	San Clemente Island larkspur	Endangered
Dicerandra christmanii	Garrett's mint	Endangered
Dicerandra cornutissima	Longspurred mint	Endangered
Dicerandra frutescens	Scrub mint	Endangered
Dicerandra immaculata	Lakela's mint	Endangered
Digitaria pauciflora	Florida pineland crabgrass	Threatened
Diplacus vandenbergensis	Vandenberg monkeyflower	Endangered
Dodecahema leptoceras	Slender-horned spineflower	Endangered
Dudleya abramsii ssp. parva	Conejo dudleya	Threatened
Dudleya cymosa ssp. marcescens	Marcescent dudleya	Threatened
Dudleya cymosa ssp. ovatifolia	Santa Monica Mountains dudleyea	Threatened
Dudleya nesiotica	Santa Cruz Island dudleya	Threatened
Dudleya setchellii	Santa Clara Valley dudleya	Endangered
Dudleya stolonifera	Laguna Beach liveforever	Threatened
Dudleya traskiae	Santa Barbara Island liveforever	Endangered
Dudleya verityi	Verity's dudleya	Threatened
Echinacea laevigata	Smooth coneflower	Endangered
Echinocactus horizonthalonius var. nicholii	Nichol's Turk's head cactus	Endangered

Scientific Name	Common Name	Federal Listing Status
Echinocereus chisoensis var. chisoensis	Chisos Mountain hedgehog Cactus	Threatened
Echinocereus fendleri var. kuenzleri	Kuenzler hedgehog cactus	Threatened
Echinocereus reichenbachii var. albertii	Black lace cactus	Endangered
Echinocereus triglochidiatus var. arizonicus	Arizona hedgehog cactus	Endangered
Echinocereus viridiflorus var. davisii	Davis' green pitaya	Endangered
Echinomastus erectocentrus var. acunensis	Acuna Cactus	Endangered
Echinomastus mariposensis	Lloyd's Mariposa cactus	Threatened
Enceliopsis nudicaulis var. corrugata	Ash Meadows sunray	Threatened
Eremalche kernensis	Kern mallow	Endangered
Eriastrum densifolium ssp. sanctorum	Santa Ana River woolly-star	Endangered
Erigeron decumbens	Willamette daisy	Endangered
Erigeron parishii	Parish's daisy	Threatened
Erigeron rhizomatus	Zuni fleabane	Threatened
Eriodictyon altissimum	Indian Knob mountainbalm	Endangered
Eriodictyon capitatum	Lompoc yerba santa	Endangered
Eriogonum apricum (incl. var. prostratum)	Ione (incl. Irish Hill) buckwheat	Endangered
Eriogonum codium	Umtanum Desert buckwheat	Threatened
Eriogonum gypsophilum	Gypsum wild-buckwheat	Threatened
Eriogonum kennedyi var. austromontanum	Southern mountain wild-buckwheat	Threatened
Eriogonum longifolium var. gnaphalifolium	Scrub buckwheat	Threatened
Eriogonum ovalifolium var. vineum	Cushenbury buckwheat	Endangered
Eriogonum ovalifolium var. williamsiae	Steamboat buckwheat	Endangered
Eriogonum pelinophilum	Clay-Loving wild buckwheat	Endangered
Eriophyllum latilobum	San Mateo woolly sunflower	Endangered
Eryngium aristulatum var. parishii	San Diego button-celery	Endangered
Eryngium constancei	Loch Lomond coyote thistle	Endangered
Eryngium cuneifolium	Snakeroot	Endangered
Erysimum capitatum var. angustatum	Contra Costa wallflower	Endangered
Erysimum menziesii	Menzies' wallflower	Endangered
Erysimum teretifolium	Ben Lomond wallflower	Endangered
Erythronium propullans	Minnesota dwarf trout lily	Endangered
Euphorbia telephioides	Telephus spurge	Threatened
Eutrema penlandii	Penland alpine fen mustard	Threatened
Festuca ligulata	Guadalupe fescue	Endangered
Fremontodendron californicum ssp. decumbens	Pine Hill flannelbush	Endangered
Fremontodendron mexicanum	Mexican flannelbush	Endangered
Fritillaria gentneri	Gentner's Fritillary	Endangered
Galactia smallii	Small's milkpea	Endangered
Galium buxifolium	Island bedstraw	Endangered
Galium californicum ssp. sierrae	El Dorado bedstraw	Endangered
Gaura neomexicana var. coloradensis	Colorado Butterfly plant	Threatened
Geocarpon minimum	No common name	Threatened
Geum radiatum	Spreading avens	Endangered
Gilia tenuiflora ssp. arenaria	Monterey gilia	Endangered
Gilia tenuiflora ssp. hoffmannii	Hoffmann's slender-flowered gilia	Endangered

Scientific Name	Common Name	Federal Listing Status
Graptopetalum bartramii	Bartram's stonecrop	Proposed Threatened
Grindelia fraxinipratensis	Ash Meadows gumplant	Threatened
Gymnoderma lineare	Rock gnome lichen	Endangered
Hackelia venusta	Showy stickseed	Endangered
Harperocallis flava	Harper's beauty	Endangered
Harrisia (=Cereus) aboriginum (=gracilis)	Aboriginal Prickly-apple	Endangered
Hedeoma todsenii	Todsen's pennyroyal	Endangered
Hedyotis purpurea var. montana	Roan Mountain bluet	Endangered
Helenium virginicum	Virginia sneezeweed	Threatened
Helianthemum greenei	Island rush-rose	Threatened
Helianthus paradoxus	Pecos (=puzzle, =paradox) sunflower	Threatened
Helianthus schweinitzii	Schweinitz's sunflower	Endangered
Helianthus verticillatus	Whorled Sunflower	Endangered
Helonias bullata	Swamp pink	Threatened
Hesperolinon congestum	Marin dwarf-flax	Threatened
Hexastylis naniflora	Dwarf-flowered heartleaf	Threatened
Hibiscus dasycalyx	Neches River rose-mallow	Threatened
Hoffmannseggia tenella	Slender rush-pea	Endangered
Holocarpha macradenia	Santa Cruz tarplant	Threatened
Howellia aquatilis	Water howellia	Threatened
Hudsonia montana	Mountain golden heather	Threatened
Hymenoxys herbacea	Lakeside daisy	Threatened
Hymenoxys texana	Texas prairie dawn-flower	Endangered
Hypericum cumulicola	Highlands scrub hypericum	Endangered
Iliamna corei	Peter's Mountain mallow	Endangered
Ipomopsis polyantha	Pagosa skyrocket	Endangered
Ipomopsis sancti-spiritus	Holy Ghost ipomopsis	Endangered
Iris lacustris	Dwarf lake iris	Threatened
Isoetes louisianensis	Louisiana quillwort	Endangered
Isoetes melanospora	Black spored quillwort	Endangered
Isoetes tegetiformans	Mat-forming quillwort	Endangered
Isotria medeoloides	Small whorled pogonia	Threatened
Ivesia kingii var. eremica	Ash Meadows ivesia	Threatened
Ivesia webberi	Webber's ivesia	Threatened
Jacquemontia reclinata	Beach jacquemontia	Endangered
Justicia cooleyi	Cooley's water-willow	Endangered
Lasthenia burkei	Burke's goldfields	Endangered
Lasthenia conjugens	Contra Costa goldfields	Endangered
Layia carnosa	Beach layia	Endangered
Leavenworthia crassa	Fleshy-fruit gladecress	Endangered
Leavenworthia exigua laciniata	Kentucky glade cress	Threatened
Leavenworthia texana	Texas golden Gladecress	Endangered
Lepidium barnebyanum	Barneby ridge-cress	Endangered
Lepidium papilliferum	Slickspot peppergrass	Threatened
Lespedeza leptostachya	Prairie bush-clover	Threatened

Scientific Name	Common Name	Federal Listing Status
Lesquerella congesta	Dudley Bluffs bladderpod	Threatened
Lesquerella kingii ssp. bernardina	San Bernardino Mountains bladderpod	Endangered
Lesquerella lyrata	Lyrate bladderpod	Threatened
Lesquerella pallida	White bladderpod	Endangered
Lesquerella perforata	Spring Creek bladderpod	Endangered
Lesquerella thamnophila	Zapata bladderpod	Endangered
Lesquerella tumulosa	Kodachrome bladderpod	Endangered
Lessingia germanorum (=L.g. var. germanorum)	San Francisco lessingia	Endangered
Liatris helleri	Heller's blazingstar	Threatened
Liatris ohlingerae	Scrub blazingstar	Endangered
Lilaeopsis schaffneriana var. recurva	Huachuca water-umbel	Endangered
Lilium occidentale	Western lily	Endangered
Lilium pardalinum ssp. pitkinense	Pitkin Marsh lily	Endangered
Limnanthes floccosa ssp. californica	Butte County meadowfoam	Endangered
Limnanthes pumila ssp. grandiflora	Large-flowered woolly meadowfoam	Endangered
Limnanthes vinculans	Sebastopol meadowfoam	Endangered
Lindera melissifolia	Pondberry	Endangered
Linum arenicola	Sand flax	Endangered
Linum carteri carteri	Carter's small-flowered flax	Endangered
Lithophragma maximum	San Clemente Island woodland-star	Endangered
Lomatium bradshawii	Bradshaw's desert-parsley	Endangered
Lomatium cookii	Cook's lomatium	Endangered
Lupinus aridorum	Scrub lupine	Endangered
Lupinus nipomensis	Nipomo Mesa lupine	Endangered
Lupinus sulphureus ssp. kincaidii	Kincaid's Lupine	Threatened
Lupinus tidestromii	Clover lupine	Endangered
Lysimachia asperulaefolia	Rough-leaved loosestrife	Endangered
Macbridea alba	White birds-in-a-nest	Threatened
Malacothamnus clementinus	San Clemente Island bush-mallow	Endangered
Malacothamnus fasciculatus var. nesioticus	Santa Cruz Island bush-mallow	Endangered
Malacothrix indecora	Santa Cruz Island malacothrix	Endangered
Malacothrix squalida	Island malacothrix	Endangered
Manihot walkerae	Walker's manioc	Endangered
Marshallia mohrii	Mohr's Barbara's buttons	Threatened
Mentzelia leucophylla	Ash Meadows blazingstar	Threatened
Mimulus michiganensis	Michigan monkey-flower	Endangered
Mirabilis macfarlanei	MacFarlane's four-o'clock	Threatened
Monardella viminea	Willowy monardella	Endangered
Monolopia (=Lembertia) congdonii	San Joaquin wooly-threads	Endangered
Navarretia fossalis	Spreading navarretia	Threatened
Navarretia leucocephala ssp. pauciflora (=N. pauciflora)	Few-flowered navarretia	Endangered
Navarretia leucocephala ssp. plieantha	Many-flowered navarretia	Endangered
Neostapfia colusana	Colusa grass	Threatened
Nitrophila mohavensis	Amargosa niterwort	Endangered
Nolina brittoniana	Britton's beargrass	Endangered

Scientific Name	Common Name	Federal Listing Status
Oenothera deltoides ssp. howellii	Antioch Dunes evening-primrose	Endangered
Opuntia treleasei	Bakersfield cactus	Endangered
Orcuttia californica	California Orcutt grass	Endangered
Orcuttia inaequalis	San Joaquin Orcutt grass	Threatened
Orcuttia pilosa	Hairy Orcutt grass	Endangered
Orcuttia tenuis	Slender Orcutt grass	Threatened
Orcuttia viscida	Sacramento Orcutt grass	Endangered
Oxypolis canbyi	Canby's dropwort	Endangered
Oxytheca parishii var. goodmaniana	Cushenbury oxytheca	Endangered
Oxytropis campestris var. chartacea	Fassett's locoweed	Threatened
Packera franciscana	San Francisco Peaks ragwort	Threatened
Paronychia chartacea	Papery whitlow-wort	Threatened
Parvisedum leiocarpum	Lake County stonecrop	Endangered
Pectis imberbis	Beardless chinchweed	Proposed Endangered
Pedicularis furbishiae	Furbish lousewort	Endangered
Pediocactus (=Echinocactus,=Utahia) sileri	Siler pincushion cactus	Threatened
Pediocactus bradyi	Brady pincushion cactus	Endangered
Pediocactus despainii	San Rafael cactus	Endangered
Pediocactus knowltonii	Knowlton's cactus	Endangered
Pediocactus peeblesianus fickeiseniae	Fickeisen plains cactus	Endangered
Pediocactus peeblesianus var. peeblesianus	Peebles Navajo cactus	Endangered
Pediocactus winkleri	Winkler cactus	Threatened
Penstemon debilis	Parachute beardtongue	Threatened
Penstemon haydenii	Blowout penstemon	Endangered
Penstemon penlandii	Penland beardtongue	Endangered
Pentachaeta bellidiflora	White-rayed pentachaeta	Endangered
Pentachaeta lyonii	Lyon's pentachaeta	Endangered
Phacelia argillacea	Clay phacelia	Endangered
Phacelia formosula	North Park phacelia	Endangered
Phacelia insularis ssp. insularis	Island phacelia	Endangered
Phacelia submutica	DeBeque phacelia	Threatened
Phlox hirsuta	Yreka phlox	Endangered
Phlox nivalis ssp. texensis	Texas trailing phlox	Endangered
Physaria douglasii ssp. tuplashensis	White Bluffs bladderpod	Threatened
Physaria filiformis	Missouri bladderpod	Threatened
Physaria globosa	Short's bladderpod	Endangered
Physaria obcordata	Dudley Bluffs twinpod	Threatened
Pilosocereus robinii	Key tree cactus	Endangered
Pinguicula ionantha	Godfrey's butterwort	Threatened
Pinus albicaulis	Whitebark pine	Candidate
Piperia yadonii	Yadon's piperia	Endangered
Pityopsis ruthii	Ruth's golden aster	Endangered
Plagiobothrys hirtus	rough popcornflower	Endangered
Plagiobothrys strictus	Calistoga allocarya	Endangered
Platanthera integrilabia	White fringeless orchid	Threatened

Scientific Name	Common Name	Federal Listing Status
Platanthera leucophaea	Eastern prairie fringed orchid	Threatened
Platanthera praeclara	Western prairie fringed Orchid	Threatened
Poa atropurpurea	San Bernardino bluegrass	Endangered
Poa napensis	Napa bluegrass	Endangered
Pogogyne abramsii	San Diego mesa-mint	Endangered
Pogogyne nudiuscula	Otay mesa-mint	Endangered
Polygala lewtonii	Lewton's polygala	Endangered
Polygala smallii	Tiny polygala	Endangered
Polygonella basiramia	Wireweed	Endangered
Polygonella myriophylla	Sandlace	Endangered
Polygonum hickmanii	Scotts Valley Polygonum	Endangered
Potamogeton clystocarpus	Little Aguja (=Creek) Pondweed	Endangered
Potentilla hickmanii	Hickman's potentilla	Endangered
Primula maguirei	Maguire primrose	Threatened
Prunus geniculata	Scrub plum	Endangered
Pseudobahia bahiifolia	Hartweg's golden sunburst	Endangered
Pseudobahia peirsonii	San Joaquin adobe sunburst	Threatened
Ptilimnium nodosum	Harperella	Endangered
Purshia (=Cowania) subintegra	Arizona Cliffrose	Endangered
Quercus hinckleyi	Hinckley oak	Threatened
Ranunculus aestivalis (=acriformis)	Autumn Buttercup	Endangered
Rhodiola integrifolia ssp. leedyi	Leedy's roseroot	Threatened
Rhododendron chapmanii	Chapman rhododendron	Endangered
Rhus michauxii	Michaux's sumac	Endangered
Rhynchospora knieskernii	Knieskern's Beaked-rush	Threatened
Ribes echinellum	Miccosukee gooseberry	Threatened
Rorippa gambellii	Gambel's watercress	Endangered
Sagittaria fasciculata	Bunched arrowhead	Endangered
Sagittaria secundifolia	Kral's water-plantain	Threatened
Sarracenia oreophila	Green pitcher-plant	Endangered
Sarracenia rubra ssp. alabamensis	Alabama canebrake pitcher-plant	Endangered
Sarracenia rubra ssp. jonesii	Mountain sweet pitcher-plant	Endangered
Schoenocrambe argillacea	Clay reed-mustard	Threatened
Schoenocrambe barnebyi	Barneby reed-mustard	Endangered
Schoenocrambe suffrutescens	Shrubby reed-mustard	Threatened
Schwalbea americana	American chaffseed	Endangered
Scirpus ancistrochaetus	Northeastern bulrush	Endangered
Sclerocactus brevihamatus ssp. tobuschii	Tobusch fishhook cactus	Threatened
Sclerocactus brevispinus	Pariette cactus	Threatened
Sclerocactus glaucus	Colorado hookless Cactus	Threatened
Sclerocactus mesae-verdae	Mesa Verde cactus	Threatened
Sclerocactus wetlandicus	Uinta Basin hookless cactus	Threatened
Sclerocactus wrightiae	Wright fishhook cactus	Endangered
Scutellaria floridana	Florida skullcap	Threatened
Scutellaria montana	Large-flowered skullcap	Threatened

Scientific Name	Common Name	Federal Listing Status
Senecio layneae	Layne's butterweed	Threatened
Sibara filifolia	Santa Cruz Island rockcress	Endangered
Sidalcea keckii	Keck's Checker-mallow	Endangered
Sidalcea nelsoniana	Nelson's checker-mallow	Threatened
Sidalcea oregana ssp. valida	Kenwood Marsh checker-mallow	Endangered
Sidalcea oregana var. calva	Wenatchee Mountains checkermallow	Endangered
Sidalcea pedata	Pedate checker-mallow	Endangered
Sideroxylon reclinatum ssp. austrofloridense	Everglades bully	Threatened
Silene polypetala	Fringed campion	Endangered
Silene spaldingii	Spalding's Catchfly	Threatened
Sisyrinchium dichotomum	White irisette	Endangered
Solidago houghtonii	Houghton's goldenrod	Threatened
Solidago shortii	Short's goldenrod	Endangered
Solidago spithamaea	Blue Ridge goldenrod	Threatened
Sphaeralcea gierischii	Gierisch mallow	Endangered
Spigelia gentianoides	Gentian pinkroot	Endangered
Spiraea virginiana	Virginia spiraea	Threatened
Spiranthes delitescens	Canelo Hills ladies-tresses	Endangered
Spiranthes diluvialis	Ute ladies'-tresses	Threatened
Spiranthes parksii	Navasota ladies-tresses	Endangered
Stephanomeria malheurensis	Malheur wire-lettuce	Endangered
Streptanthus albidus ssp. albidus	Metcalf Canyon jewelflower	Endangered
Streptanthus bracteatus	Bracted twistflower	Candidate
Streptanthus niger	Tiburon jewelflower	Endangered
Styrax texanus	Texas snowbells	Endangered
Suaeda californica	California seablite	Endangered
Swallenia alexandrae	Eureka Dune grass	Threatened
Taraxacum californicum	California taraxacum	Endangered
Thalictrum cooleyi	Cooley's meadowrue	Endangered
Thelypodium howellii ssp. spectabilis	Howell''s spectacular thelypody	Threatened
Thelypodium stenopetalum	Slender-petaled mustard	Endangered
Thelypteris pilosa var. alabamensis	Alabama streak-sorus fern	Threatened
Thlaspi californicum	Kneeland Prairie penny-cress	Endangered
Thymophylla tephroleuca	Ashy dogweed	Endangered
Thysanocarpus conchuliferus	Santa Cruz Island fringepod	Endangered
Torreya taxifolia	Florida torreya	Endangered
Townsendia aprica	Last Chance townsendia	Threatened
Trichomanes punctatum ssp. floridanum	Florida bristle fern	Endangered
Trifolium amoenum	Showy Indian clover	Endangered
Trifolium stoloniferum	Running buffalo clover	Endangered
Trifolium trichocalyx	Monterey clover	Endangered
Trillium persistens	Persistent trillium	Endangered
Trillium reliquum	Relict trillium	Endangered
Tuctoria greenei	Greene's tuctoria	Endangered
Tuctoria mucronata	Solano grass	Endangered

Scientific Name	Common Name	Federal Listing Status
Verbena californica	Red Hills vervain	Threatened
Verbesina dissita	Big-leaved crownbeard	Threatened
Warea amplexifolia	Wide-leaf warea	Endangered
Warea carteri	Carter's mustard	Endangered
Xyris tennesseensis	Tennessee yellow-eyed grass	Endangered
Yermo xanthocephalus	Desert yellowhead	Threatened
Zizania texana	Texas wild-rice	Endangered
Ziziphus celata	Florida ziziphus	Endangered

Appendix C. Critical habitat (CH) proposed (P) or designated (Final) for threatened or endangered species in the Contiguous U.S. as of March 11, 2020.

Species Common Name	Species Scientific Name	CH Status	Federal Register Citation for Final or Proposed Rule (Volume FR Pages)
San Diego thornmint	*Acanthomintha ilicifolia*	Final	73FR50454 50496
Atlantic sturgeon (Gulf subspecies)	*Acipenser oxyrinchus (=oxyrhynchus) desotoi*	Final	68FR13370 13495
White sturgeon	*Acipenser transmontanus*	Final	73FR39506 39523
Cumberland elktoe	*Alasmidonta atropurpurea*	Final	69FR53136 53180
Appalachian elktoe	*Alasmidonta raveneliana*	Final	67FR61016 61040
Munz's onion	*Allium munzii*	Final	78FR22625 22658
Fat threeridge (mussel)	*Amblema neislerii*	Final	72FR64286 64340
San Diego ambrosia	*Ambrosia pumila*	Final	75FR74546 74604
Ash Meadows naucorid	*Ambrysus amargosus*	Final	50FR20777 20794
Reticulated flatwoods salamander	*Ambystoma bishopi*	Final	74FR6700 6774
California tiger Salamander	*Ambystoma californiense*	Final	70FR49380 49458
California tiger Salamander	*Ambystoma californiense*	Final	76FR54346 54372
California tiger Salamander	*Ambystoma californiense*	Final	69FR68568 68609
Frosted Flatwoods salamander	*Ambystoma cingulatum*	Final	74FR6700 6774
Cape Sable seaside sparrow	*Ammodramus maritimus mirabilis*	Final	72FR62736 62766
Large-flowered fiddleneck	*Amsinckia grandiflora*	Final	50FR19374 19378
Florida leafwing Butterfly	*Anaea troglodyta floridalis*	P	79FR47179 47220
Arroyo (=arroyo southwestern) toad	*Anaxyrus californicus*	Final	76FR7245 7467
Yosemite toad	*Anaxyrus canorus*	Final	81FR59045 59119
Tumbling Creek cavesnail	*Antrobia culveri*	Final	76FR37663 37677
Georgia rockcress	*Arabis georgiana*	Final	79FR54635 54667
Braun's rock-cress	*Arabis perstellata*	Final	69FR31460 31496
Franciscan manzanita	*Arctostaphylos franciscana*	Final	78FR77289 77325
Bear Valley sandwort	*Arenaria ursina*	Final	72FR73092 73178
Welsh's milkweed	*Asclepias welshii*	Final	52FR41435 41441
Pecos assiminea snail	*Assiminea pecos*	Final	76FR33036 33064
Cushenbury milk-vetch	*Astragalus albens*	Final	67FR78570 78610
Shivwits milk-vetch	*Astragalus ampullarioides*	Final	71FR77972 78012
Braunton's milk-vetch	*Astragalus brauntonii*	Final	71FR66374 66423
Holmgren milk-vetch	*Astragalus holmgreniorum*	Final	71FR77972 78012
Lane Mountain milk-vetch	*Astragalus jaegerianus*	Final	76FR29108 29129
Coachella Valley milk-vetch	*Astragalus lentiginosus var. coachellae*	Final	78FR10449 10497
Fish Slough milk-vetch	*Astragalus lentiginosus var. piscinensis*	Final	70FR33774 33795

Species Common Name	Species Scientific Name	CH Status	Federal Register Citation for Final or Proposed Rule (Volume FR Pages)
Peirson's milk-vetch	*Astragalus magdalenae var. peirsonii*	Final	73FR8748 8785
Heliotrope milk-vetch	*Astragalus montii*	Final	52FR42652 42657
Ash meadows milk-vetch	*Astragalus phoenix*	Final	50FR20777 20794
Ventura Marsh Milk-vetch	*Astragalus pycnostachyus var. lanosissimus*	Final	69FR29081 29100
Helotes mold beetle	*Batrisodes venyivi*	Final	77FR8450 8523
Nevin's barberry	*Berberis nevinii*	Final	73FR8412 8440
Marbled murrelet	*Brachyramphus marmoratus*	Final	81FR51348 51370
Conservancy fairy shrimp	*Branchinecta conservatio*	Final	71FR7118 7316
Longhorn fairy shrimp	*Branchinecta longiantenna*	Final	71FR7118 7316
Vernal pool fairy shrimp	*Branchinecta lynchi*	Final	71FR7118 7316
San Diego fairy shrimp	*Branchinecta sandiegonensis*	Final	72FR70648 70714
Florida brickell-bush	*Brickellia mosieri*	Final	80FR49845 49886
Thread-leaved brodiaea	*Brodiaea filifolia*	Final	76FR6848 6925
Houston toad	*Bufo houstonensis*	Final	43FR4022 4026
Big Sandy crayfish	*Cambarus callainus*	P	85FR5072 5122
Guyandotte River crayfish	*Cambarus veteranus*	P	85FR5072 5122
Gray wolf	*Canis lupus*	Final	43FR9607 9615
Loggerhead sea turtle	*Caretta caretta*	Final	79FR39755 39854
Golden sedge	*Carex lutea*	Final	76FR11086 11111
Navajo sedge	*Carex specuicola*	Final	50FR19370 19374
Fleshy owl's-clover	*Castilleja campestris ssp. succulenta*	Final	71FR7118 7316
Ash-grey paintbrush	*Castilleja cinerea*	Final	72FR73092 73178
Zuni bluehead Sucker	*Catostomus discobolus yarrowi*	Final	81FR36761 36785
Santa Ana sucker	*Catostomus santaanae*	Final	75FR77962 78027
Warner sucker	*Catostomus warnerensis*	Final	50FR39117 39123
Vail Lake ceanothus	*Ceanothus ophiochilus*	Final	72FR54984 55010
Spring-loving centaury	*Centaurium namophilum*	Final	50FR20777 20794
Gunnison sage-grouse	*Centrocercus minimus*	Final	79FR69311 69363
Hoover's spurge	*Chamaesyce hooveri*	Final	71FR7118 7316
Piping Plover	*Charadrius melodus*	Final	66FR22938 22969
Piping Plover	*Charadrius melodus*	Final	74FR23476 23600
Western snowy plover	*Charadrius nivosus nivosus*	Final	77FR36727 36869
Shortnose Sucker	*Chasmistes brevirostris*	Final	77FR73739 73768
June sucker	*Chasmistes liorus*	Final	51FR10851 10857
Purple amole	*Chlorogalum purpureum*	Final	67FR65414 65445

Species Common Name	Species Scientific Name	CH Status	Federal Register Citation for Final or Proposed Rule (Volume FR Pages)
Monterey spineflower	*Chorizanthe pungens var. pungens*	Final	73FR1525
Scotts Valley spineflower	*Chorizanthe robusta var. hartwegii*	Final	67FR37336 37353
Robust spineflower	*Chorizanthe robusta var. robusta*	Final	67FR36822 36845
Cape Sable Thoroughwort	*Chromolaena frustrata*	Final	79FR1551 1590
Laurel dace	*Chrosomus saylori*	Final	77FR63603 63668
Salt Creek Tiger beetle	*Cicindela nevadica lincolniana*	Final	79FR26013 26038
Robber Baron Cave Meshweaver	*Cicurina baronia*	Final	77FR8450 8523
Madla Cave Meshweaver	*Cicurina madla*	Final	77FR8450 8523
Braken Bat Cave Meshweaver	*Cicurina venii*	Final	77FR8450 8523
Government Canyon Bat Cave Meshweaver	*Cicurina vespera*	Final	77FR8450 8523
Suisun thistle	*Cirsium hydrophilum var. hydrophilum*	Final	72FR18518 18553
La Graciosa thistle	*Cirsium loncholepis*	Final	74FR56978 57046
Yellow-billed Cuckoo	*Coccyzus americanus*	P	79FR48547 48652
Florida semaphore Cactus	*Consolea corallicola*	Final	81FR3865 3925
Soft bird's-beak	*Cordylanthus mollis ssp. mollis*	Final	72FR18518 18553
Virginia big-eared bat	*Corynorhinus (=Plecotus) townsendii virginianus*	Final	44FR69206 69208
White River springfish	*Crenichthys baileyi baileyi*	Final	50FR39123 39128
Hiko White River springfish	*Crenichthys baileyi grandis*	Final	50FR39123 39128
Railroad Valley springfish	*Crenichthys nevadae*	Final	51FR10857 10865
American crocodile	*Crocodylus acutus*	Final	42FR47840 47845
New Mexican ridge-nosed rattlesnake	*Crotalus willardi obscurus*	Final	43FR34476 34480
Diamond Darter	*Crystallaria cincotta*	Final	78FR52363 52387
Beautiful shiner	*Cyprinella formosa*	Final	49FR34490 34497
Leon Springs pupfish	*Cyprinodon bovinus*	Final	45FR54678 54681
Ash Meadows Amargosa pupfish	*Cyprinodon nevadensis mionectes*	Final	48FR40178 40186
Otay tarplant	*Deinandra (=Hemizonia) conjugens*	Final	67FR76030 76053
Gaviota Tarplant	*Deinandra increscens ssp. villosa*	Final	67FR67968 68001
Baker's larkspur	*Delphinium bakeri*	Final	68FR12834 12863
Yellow larkspur	*Delphinium luteum*	Final	68FR12834 12863
Lost River sucker	*Deltistes luxatus*	Final	77FR73739 73768
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	Final	45FR52803 52807
Casey's June Beetle	*Dinacoma caseyi*	Final	76FR58954 58998
Devils River minnow	*Dionda diaboli*	Final	73FR46988 47026
Vandenberg monkeyflower	*Diplacus vandenbergensis*	P	80FR48141 48170
Morro Bay kangaroo rat	*Dipodomys heermanni morroensis*	Final	42FR47840 47845

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San Bernardino Merriam's kangaroo rat	*Dipodomys merriami parvus*	Final	73FR61936 62002
Fresno kangaroo rat	*Dipodomys nitratoides exilis*	Final	50FR4222 4226
Acuna Cactus	*Echinomastus erectocentrus var. acunensis*	Final	81FR55265 55313
Delta green ground beetle	*Elaphrus viridis*	Final	45FR52807 52810
Chipola slabshell	*Elliptio chipolaensis*	Final	72FR64286 64340
Yellow lance	*Elliptio lanceolata*	P	85FR6856 6883
Altamaha Spinymussel	*Elliptio spinosa*	Final	76FR62928 62960
Purple bankclimber (mussel)	*Elliptoideus sloatianus*	Final	72FR64286 64340
Southwestern willow flycatcher	*Empidonax traillii extimus*	Final	78FR343 534
Ash Meadows sunray	*Enceliopsis nudicaulis var. corrugata*	Final	50FR20777 20794
Cumberlandian combshell	*Epioblasma brevidens*	Final	69FR53136 53180
Oyster mussel	*Epioblasma capsaeformis*	Final	69FR53136 53180
Upland combshell	*Epioblasma metastriata*	Final	69FR40084 40171
Southern acornshell	*Epioblasma othcaloogensis*	Final	69FR40084 40171
Desert dace	*Eremichthys acros*	Final	50FR50304 50309
Streaked Horned lark	*Eremophila alpestris strigata*	Final	78FR61505 61589
Willamette daisy	*Erigeron decumbens*	Final	71FR63862 63977
Parish's daisy	*Erigeron parishii*	Final	67FR78570 78610
Spotfin Chub	*Erimonax monachus*	Final	42FR47840 47845
Slender chub	*Erimystax cahni*	Final	42FR47840 47845
Lompoc yerba santa	*Eriodictyon capitatum*	Final	67FR67968 68001
Umtanum Desert buckwheat	*Eriogonum codium*	Final	78FR76995 77005
Gypsum wild-buckwheat	*Eriogonum gypsophilum*	Final	46FR5730 5733
Southern mountain wild-buckwheat	*Eriogonum kennedyi var. austromontanum*	Final	72FR73092 73178
Cushenbury buckwheat	*Eriogonum ovalifolium var. vineum*	Final	67FR78570 78610
Clay-Loving wild buckwheat	*Eriogonum pelinophilum*	Final	49FR28562 28565
Contra Costa wallflower	*Erysimum capitatum var. angustatum*	Final	43FR39042 39044
Slackwater darter	*Etheostoma boschungi*	Final	42FR47840 47845
Vermilion darter	*Etheostoma chermocki*	Final	75FR75913 75931
Fountain darter	*Etheostoma fonticola*	Final	45FR47355 47364
Yellowcheek Darter	*Etheostoma moorei*	Final	77FR63603 63668
Niangua darter	*Etheostoma nianguae*	Final	50FR24649 24653
Candy darter	*Etheostoma osburni*	P	83FR59232 59268
Rush Darter	*Etheostoma phytophilum*	Final	77FR63603 63668
Maryland darter	*Etheostoma sellare*	Final	49FR34228 34232

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Kentucky arrow darter	*Etheostoma spilotum*	Final	81FR69312 69363
Cumberland darter	*Etheostoma susanae*	Final	77FR63603 63668
Trispot darter	*Etheostoma trisella*	P	83FR67190 67210
Island marble Butterfly	*Euchloe ausonides insulanus*	P	83FR15900 15936
Tidewater goby	*Eucyclogobius newberryi*	Final	78FR8745 8819
Bay checkerspot butterfly	*Euphydryas editha bayensis*	Final	73FR50406 50452
Quino checkerspot butterfly	*Euphydryas editha quino (=E. e. wrighti)*	Final	74FR28776 28862
Taylor's (=whulge) Checkerspot	*Euphydryas editha taylori*	Final	78FR61505 61589
Salado Salamander	*Eurycea chisholmensis*	P	78FR5385 5403
San Marcos salamander	*Eurycea nana*	Final	45FR47355 47364
Georgetown Salamander	*Eurycea naufragia*	P	78FR5385 5403
Jollyville Plateau Salamander	*Eurycea tonkawae*	Final	78FR51327 51379
Austin blind Salamander	*Eurycea waterlooensis*	Final	78FR51327 51379
Guadalupe fescue	*Festuca ligulata*	P	82FR42245 42260
Mexican flannelbush	*Fremontodendron mexicanum*	Final	72FR54984 55010
Tapered pigtoe	*Fusconaia burkei*	Final	77FR61663 61719
Narrow pigtoe	*Fusconaia escambia*	Final	77FR61663 61719
Atlantic pigtoe	*Fusconaia masoni*	P	83FR51570 51609
Round Ebonyshell	*Fusconaia rotulata*	Final	77FR61663 61719
San Marcos gambusia	*Gambusia georgei*	Final	45FR47355 47364
Noel's Amphipod	*Gammarus desperatus*	Final	76FR33036 33064
Diminutive Amphipod	*Gammarus hyalleloides*	Final	78FR40970 40996
Pecos amphipod	*Gammarus pecos*	Final	78FR40970 40996
Colorado Butterfly plant	*Gaura neomexicana var. coloradensis*	Final	70FR1940 1970
Owens Tui Chub	*Gila bicolor ssp. snyderi*	Final	50FR31592 31597
Borax Lake chub	*Gila boraxobius*	Final	47FR43957 43964
Humpback chub	*Gila cypha*	Final	59FR13374 13400
Sonora chub	*Gila ditaenia*	Final	51FR16042 16047
Bonytail chub	*Gila elegans*	Final	59FR13374 13400
Gila chub	*Gila intermedia*	Final	70FR66664 66721
Yaqui chub	*Gila purpurea*	Final	49FR34490 34497
Virgin River Chub	*Gila seminuda (=robusta)*	Final	65FR4140 4156
Palos Verdes blue butterfly	*Glaucopsyche lygdamus palosverdesensis*	Final	45FR44939 44942
Desert tortoise	*Gopherus agassizii*	Final	59FR5820 5866
Ash Meadows gumplant	*Grindelia fraxinipratensis*	Final	50FR20777 20794

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Whooping crane	*Grus americana*	Final	43FR20938 20942
Mississippi sandhill crane	*Grus canadensis pulla*	Final	42FR39985 39988
California condor	*Gymnogyps californianus*	Final	42FR47840 47845
Southern sandshell	*Hamiota australis*	Final	77FR61663 61719
Aboriginal Prickly-apple	*Harrisia (=Cereus) aboriginum (=gracilis)*	Final	81FR3865 3925
Todsen's pennyroyal	*Hedeoma todsenii*	Final	46FR5730 5733
Pecos (=puzzle, =paradox) sunflower	*Helianthus paradoxus*	Final	73FR17762 17807
Whorled Sunflower	*Helianthus verticillatus*	Final	79FR50989 51039
Morro shoulderband (=Banded dune) snail	*Helminthoglypta walkeriana*	Final	66FR9233 9246
Dakota Skipper	*Hesperia dacotae*	Final	80FR59247 59384
Comal Springs riffle beetle	*Heterelmis comalensis*	Final	78FR63100 63127
Neches River rose-mallow	*Hibiscus dasycalyx*	Final	78FR56071 56120
Santa Cruz tarplant	*Holocarpha macradenia*	Final	67FR63968 64007
Mountain golden heather	*Hudsonia montana*	Final	45FR69360 69363
Rio Grande Silvery Minnow	*Hybognathus amarus*	Final	68FR8088 8135
Delta smelt	*Hypomesus transpacificus*	Final	59FR65256 65279
Mount Charleston blue butterfly	*Icaricia (Plebejus) shasta charlestonensis*	Final	80FR37403 37430
Fender's blue butterfly	*Icaricia icarioides fenderi*	Final	71FR63862 63977
Yaqui catfish	*Ictalurus pricei*	Final	49FR34490 34497
Pagosa skyrocket	*Ipomopsis polyantha*	Final	77FR48367 48418
Ash Meadows ivesia	*Ivesia kingii var. eremica*	Final	50FR20777 20794
Webber's ivesia	*Ivesia webberi*	Final	79FR32125 32155
Koster's springsnail	*Juturnia kosteri*	Final	76FR33036 33064
Finelined pocketbook	*Lampsilis altilis*	Final	69FR40084 40171
Orangenacre mucket	*Lampsilis perovalis*	Final	69FR40084 40171
Neosho Mucket	*Lampsilis rafinesqueana*	Final	80FR24691 24774
Shinyrayed pocketbook	*Lampsilis subangulata*	Final	72FR64286 64340
Carolina heelsplitter	*Lasmigona decorata*	Final	67FR44502 44522
Contra Costa goldfields	*Lasthenia conjugens*	Final	71FR7118 7316
Fleshy-fruit gladecress	*Leavenworthia crassa*	Final	79FR50989 51039
Kentucky glade cress	*Leavenworthia exigua laciniata*	Final	79FR25689 25707
Texas golden Gladecress	*Leavenworthia texana*	Final	78FR56071 56120
Slickspot peppergrass	*Lepidium papilliferum*	P	76FR27184 27215
White River spinedace	*Lepidomeda albivallis*	Final	50FR37194 37198
Big Spring spinedace	*Lepidomeda mollispinis pratensis*	Final	50FR12298 12302

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Little Colorado spinedace	*Lepidomeda vittata*	Final	52FR35034 35041
Vernal pool tadpole shrimp	*Lepidurus packardi*	Final	71FR7118 7316
Interrupted (=Georgia) Rocksnail	*Leptoxis foremani*	Final	75FR67512 67550
San Bernardino Mountains bladderpod	*Lesquerella kingii ssp. bernardina*	Final	67FR78570 78610
Zapata bladderpod	*Lesquerella thamnophila*	Final	65FR81182 81212
Huachuca water-umbel	*Lilaeopsis schaffneriana var. recurva*	Final	64FR37441 37453
Butte County meadowfoam	*Limnanthes floccosa ssp. californica*	Final	71FR7118 7316
Large-flowered woolly meadowfoam	*Limnanthes pumila ssp. grandiflora*	Final	75FR42490 42570
Carter's small-flowered flax	*Linum carteri carteri*	Final	80FR49845 49886
Cook's lomatium	*Lomatium cookii*	Final	75FR42490 42570
Kincaid's Lupine	*Lupinus sulphureus ssp. kincaidii*	Final	71FR63862 63977
Hermes copper butterfly	*Lycaena [Hermelycaena] hermes*	P	85FR1018 1050
Canada Lynx	*Lynx canadensis*	Final	79FR54781 54846
Alabama pearlshell	*Margaritifera marrianae*	Final	77FR61663 61719
Alameda whipsnake (=striped racer)	*Masticophis lateralis euryxanthus*	Final	71FR58176 58231
Spikedace	*Meda fulgida*	Final	77FR10810 10932
Alabama moccasinshell	*Medionidus acutissimus*	Final	69FR40084 40171
Coosa moccasinshell	*Medionidus parvulus*	Final	69FR40084 40171
Gulf moccasinshell	*Medionidus penicillatus*	Final	72FR64286 64340
Ochlockonee moccasinshell	*Medionidus simpsonianus*	Final	72FR64286 64340
Suwannee moccasinshell	*Medionidus walkeri*	P	84 FR 65325 65345
Waccamaw silverside	*Menidia extensa*	Final	52FR11277 11286
Ash Meadows blazingstar	*Mentzelia leucophylla*	Final	50FR20777 20794
Spruce-fir moss spider	*Microhexura montivaga*	Final	66FR35547 35566
Amargosa vole	*Microtus californicus scirpensis*	Final	49FR45160 45164
Willowy monardella	*Monardella viminea*	Final	77FR13394 13447
Indiana bat	*Myotis sodalis*	Final	42FR47840 47845
Spreading navarretia	*Navarretia fossalis*	Final	75FR62192 62255
Black warrior (=Sipsey Fork) Waterdog	*Necturus alabamensis*	Final	83FR257 284
Neuse River waterdog	*Necturus lewisi*	P	
Government Canyon Bat Cave Spider	*Neoleptoneta microps*	Final	77FR8450 8523
Colusa grass	*Neostapfia colusana*	Final	71FR7118 7316
Amargosa niterwort	*Nitrophila mohavensis*	Final	50FR20777 20794
Smalleye Shiner	*Notropis buccula*	Final	79FR45241 45271
Arkansas River shiner	*Notropis girardi*	Final	70FR59808 59846

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Cape Fear shiner	*Notropis mekistocholas*	Final	52FR36034 36039
Sharpnose Shiner	*Notropis oxyrhynchus*	Final	79FR45241 45271
Pecos bluntnose shiner	*Notropis simus pecosensis*	Final	52FR5295 5303
Topeka shiner	*Notropis topeka (=tristis)*	Final	69FR44736 44770
Smoky madtom	*Noturus baileyi*	Final	49FR43065 43069
Chucky Madtom	*Noturus crypticus*	Final	77FR63603 63668
Yellowfin madtom	*Noturus flavipinnis*	Final	42FR47840 47845
Carolina madtom	*Noturus furiosus*	P	
Poweshiek skipperling	*Oarisma poweshiek*	Final	80FR59247 59384
Antioch Dunes evening-primrose	*Oenothera deltoides ssp. howellii*	Final	43FR39042 39044
Little Kern golden trout	*Oncorhynchus aguabonita whitei*	Final	43FR15427 15429
San Joaquin Orcutt grass	*Orcuttia inaequalis*	Final	71FR7118 7316
Hairy Orcutt grass	*Orcuttia pilosa*	Final	71FR7118 7316
Slender Orcutt grass	*Orcuttia tenuis*	Final	71FR7118 7316
Sacramento Orcutt grass	*Orcuttia viscida*	Final	71FR7118 7316
Peninsular bighorn sheep	*Ovis canadensis nelsoni*	Final	74FR17288 17365
Sierra Nevada bighorn sheep	*Ovis canadensis sierrae*	Final	73FR45534 45604
Cushenbury oxytheca	*Oxytheca parishii var. goodmaniana*	Final	67FR78570 78610
San Francisco Peaks ragwort	*Packera franciscana*	Final	48FR52743 52747
Kentucky cave shrimp	*Palaemonias ganteri*	Final	48FR46337 46342
Jaguar	*Panthera onca*	Final	79FR12571 12654
Beardless chinchweed	*Pectis imberbis*	P	84FR67060 67104
Fickeisen plains cactus	*Pediocactus peeblesianus fickeiseniae*	Final	81FR55265 55313
Parachute beardtongue	*Penstemon debilis*	Final	77FR48367 48418
Lyon's pentachaeta	*Pentachaeta lyonii*	Final	71FR66374 66423
Amber darter	*Percina antesella*	Final	50FR31597 31604
Conasauga logperch	*Percina jenkinsi*	Final	50FR31597 31604
Leopard darter	*Percina pantherina*	Final	43FR3711 3716
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	Final	71FR60238 60370
Alabama beach mouse	*Peromyscus polionotus ammobates*	Final	72FR4330 4369
St. Andrew beach mouse	*Peromyscus polionotus peninsularis*	Final	71FR60238 60370
DeBeque phacelia	*Phacelia submutica*	Final	77FR48367 48418
White Bluffs bladderpod	*Physaria douglasii ssp. tuplashensis*	Final	78FR76995 77005
Short's bladderpod	*Physaria globosa*	Final	79FR50989 51039
Yadon's piperia	*Piperia yadonii*	Final	72FR60410 60450
Inyo California towhee	*Pipilo crissalis eremophilus*	Final	52FR28780 28786

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Black pinesnake	*Pituophis melanoleucus lodingi*	Final	85FR11238 11270
Woundfin	*Plagopterus argentissimus*	Final	65FR4140 4156
Jemez Mountains salamander	*Plethodon neomexicanus*	Final	78FR69569 69591
Southern clubshell	*Pleurobema decisum*	Final	69FR40084 40171
Dark pigtoe	*Pleurobema furvum*	Final	69FR40084 40171
Southern pigtoe	*Pleurobema georgianum*	Final	69FR40084 40171
Georgia pigtoe	*Pleurobema hanleyianum*	Final	75FR67512 67550
Ovate clubshell	*Pleurobema perovatum*	Final	69FR40084 40171
Oval pigtoe	*Pleurobema pyriforme*	Final	72FR64286 64340
Fuzzy pigtoe	*Pleurobema strodeanum*	Final	77FR61663 61719
Rough hornsnail	*Pleurocera foremani*	Final	75FR67512 67550
Slabside Pearlymussel	*Pleuronaia dolabelloides*	Final	78FR59555 59620
San Bernardino bluegrass	*Poa atropurpurea*	Final	73FR47706 47767
Coastal California gnatcatcher	*Polioptila californica californica*	Final	72FR72010 72213
Scotts Valley Polygonum	*Polygonum hickmanii*	Final	68FR16979 16990
Plymouth Redbelly Turtle	*Pseudemys rubriventris bangsi*	Final	45FR21828 21833
Diamond Tryonia	*Pseudotryonia adamantina*	Final	78FR40970 40996
Triangular Kidneyshell	*Ptychobranchus greenii*	Final	69FR40084 40171
Southern kidneyshell	*Ptychobranchus jonesi*	Final	77FR61663 61719
Fluted kidneyshell	*Ptychobranchus subtentum*	Final	78FR59555 59620
Colorado pikeminnow (=squawfish)	*Ptychocheilus lucius*	Final	59FR13374 13400
Chupadera springsnail	*Pyrgulopsis chupaderae*	Final	77FR41088 41106
Roswell springsnail	*Pyrgulopsis roswellensis*	Final	76FR33036 33064
Phantom Springsnail	*Pyrgulopsis texana*	Final	78FR40970 40996
Three Forks Springsnail	*Pyrgulopsis trivialis*	Final	77FR23060 23092
Laguna Mountains skipper	*Pyrgus ruralis lagunae*	Final	71FR74592 74615
Rabbitsfoot	*Quadrula cylindrica cylindrica*	Final	80FR24691 24774
Rough rabbitsfoot	*Quadrula cylindrica strigillata*	Final	69FR53136 53180
Chiricahua leopard frog	*Rana chiricahuensis*	Final	77FR16324 16424
California red-legged frog	*Rana draytonii*	Final	75FR12816 12959
Mountain yellow-legged frog	*Rana muscosa*	Final	81FR59045 59119
Mountain yellow-legged frog	*Rana muscosa*	Final	71FR54344 54386
Oregon spotted frog	*Rana pretiosa*	Final	81FR29335 29396
Dusky gopher frog	*Rana sevosa*	Final	77FR35117 35161
Sierra Nevada Yellow-legged Frog	*Rana sierrae*	Final	81FR59045 59119
Woodland Caribou	*Rangifer tarandus caribou*	Final	77FR71041 71082

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[no common name] Beetle	*Rhadine exilis*	Final	77FR8450 8523
[no common name] Beetle	*Rhadine infernalis*	Final	77FR8450 8523
Ash Meadows speckled dace	*Rhinichthys osculus nevadensis*	Final	48FR40178 40186
Everglade snail kite	*Rostrhamus sociabilis plumbeus*	Final	42FR47840 47845
Atlantic salmon	*Salmo salar*	Final	74FR29300 29341
Bull Trout	*Salvelinus confluentus*	Final	75FR63898 64070
Alabama sturgeon	*Scaphirhynchus suttkusi*	Final	74FR26488 26510
Keck's Checker-mallow	*Sidalcea keckii*	Final	68FR12863 12880
Wenatchee Mountains checkermallow	*Sidalcea oregana var. calva*	Final	66FR46536 46548
Hine's emerald dragonfly	*Somatochlora hineana*	Final	75FR21394 21453
Buena Vista Lake ornate Shrew	*Sorex ornatus relictus*	Final	78FR39835 39867
Alabama cavefish	*Speoplatyrhinus poulsoni*	Final	42FR45526 45530
Oregon silverspot butterfly	*Speyeria zerene hippolyta*	Final	45FR44935 44939
Gierisch mallow	*Sphaeralcea gierischii*	Final	78FR49165 49183
Malheur wire-lettuce	*Stephanomeria malheurensis*	Final	47FR50881 50886
Riverside fairy shrimp	*Streptocephalus woottoni*	Final	77FR72069 72140
Northern spotted owl	*Strix occidentalis caurina*	Final	77FR71875 72068
Mexican spotted owl	*Strix occidentalis lucida*	Final	69FR53182 53298
Bartram's hairstreak Butterfly	*Strymon acis bartrami*	P	79FR47179 47220
Peck's cave amphipod	*Stygobromus (=Stygonectes) pecki*	Final	78FR63100 63127
Comal Springs dryopid beetle	*Stygoparnus comalensis*	Final	78FR63100 63127
Mount Graham red squirrel	*Tamiasciurus hudsonicus grahamensis*	Final	55FR425 429
California taraxacum	*Taraxacum californicum*	Final	73FR47706 47767
Cokendolpher Cave Harvestman	*Texella cokendolpheri*	Final	77FR8450 8523
Northern Mexican gartersnake	*Thamnophis eques megalops*	P	78FR41549 41608
Narrow-headed gartersnake	*Thamnophis rufipunctatus*	P	78FR41549 41608
Kneeland Prairie penny-cress	*Thlaspi californicum*	Final	67FR62897 62910
Olympia pocket gopher	*Thomomys mazama pugetensis*	Final	79FR19711 19757
Tenino pocket gopher	*Thomomys mazama tumuli*	Final	79FR19711 19757
Yelm pocket gopher	*Thomomys mazama yelmensis*	Final	79FR19711 19757
Loach minnow	*Tiaroga cobitis*	Final	77FR10810 10932
West Indian Manatee	*Trichechus manatus*	Final	42FR47840 47845
Florida Bristle Fern	*Trichomanes punctatum ssp. floridanum*	P	85FR10371 10397
Zayante band-winged grasshopper	*Trimerotropis infantilis*	Final	66FR9219 9233
Phantom Tryonia	*Tryonia cheatumi*	Final	78FR40970 40996

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Gonzales tryonia	*Tryonia circumstriata (=stocktonensis)*	Final	78FR40970 40996
Greene's tuctoria	*Tuctoria greenei*	Final	71FR7118 7316
Solano grass	*Tuctoria mucronata*	Final	71FR7118 7316
Coachella Valley fringe-toed lizard	*Uma inornata*	Final	45FR63812 63820
Choctaw bean	*Villosa choctawensis*	Final	77FR61663 61719
Purple bean	*Villosa perpurpurea*	Final	69FR53136 53180
Least Bell's vireo	*Vireo bellii pusillus*	Final	59FR4845 4867
Razorback sucker	*Xyrauchen texanus*	Final	59FR13374 13400
Desert yellowhead	*Yermo xanthocephalus*	Final	69FR12278 12290
New Mexico meadow jumping mouse	*Zapus hudsonius luteus*	Final	81FR14263 14325
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	Final	75FR78430 78483
Texas wild-rice	*Zizania texana*	Final	45FR47355 47364