

Environmental Assessment for Designation of Critical Habitat for Pecos Sunflower

U.S. Department of the Interior
Fish and Wildlife Service
Region 2



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1.0 PURPOSE OF AND NEED FOR ACTION

The U.S. Department of the Interior (USDI), Fish and Wildlife Service (Service) has prepared this Environmental Assessment (EA) to analyze potential effects to physical and biological resources and social and economic conditions that may result from designation of critical habitat for Pecos sunflower (*Helianthus paradoxus*), a species listed as threatened under the Endangered Species Act of 1973 (ESA), as amended.

This EA will be used by the Service to decide whether or not critical habitat will be designated as proposed, if the proposed action requires refinement, or if further analyses are needed through preparation of an environmental impact statement. If the proposed action is selected as described or with minimal changes and no further environmental analyses are needed, a Finding of No Significant Impact will be prepared. This EA has been prepared pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA) as implemented by the Council on Environmental Quality regulations (40 CFR §1500, *et seq.*)¹ and Department of the Interior NEPA procedures.

This Environmental Assessment analyzes the potential effects of designating critical habitat for Pecos sunflower, a plant species listed in 1999 as threatened under the federal Endangered Species Act

natural "background" rate, due to the effects of human actions (*e.g.*, Wilson, 1992; Ward, 2004). Recognition that human activities "untempered by adequate concern and conservation" were causing species extinctions was the primary reason for enacting the Endangered Species Act of 1973 (*cf.* ESA §2[a][1]). In developing the law, Congress found that the biological diversity and natural heritage of the United States had "esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people" (*cf.* ESA §2[a][3]). The ESA is now the main federal law for protecting and recovering species that are in danger of extinction, thereby conserving the biological diversity and natural heritage of the United States.

The final rule to list the Pecos sunflower as threatened under the ESA was published on 20 October 1999 (64 Federal Register 56582). Primary threats to Pecos sunflower at the time of listing were drying of wetlands from ground water depletion, alteration of wetlands (*e.g.* filling or draining of wetlands, construction of impoundments on waterways), competition from non-native plant species, excessive livestock grazing, mowing, and highway maintenance. Critical habitat was not designated when the species was listed because the Service concluded that critical habitat maps would increase vandalism and commercial collection (64 Federal Register 56582).

Pursuant to a court settlement reached on 20 March 2006 in the case of *Forest Guardians v. Hall* 2005, the Service agreed to reconsider

1.1 Introduction

While the extinction of a species can and does occur naturally, the current rate of extinctions is estimated to be many times greater than the

¹ CFR is the Code of Federal Regulations, which can be accessed via the Internet at <http://www.gpoaccess.gov/cfr/index.html>

critical habitat designation (72 Federal Register 14328: 14330)². Subsequently, the Service proposed designation of critical habitat for the Pecos sunflower on 27 March 2007 (72 Federal Register 14328).

This EA analyzes the potential effects of designating critical habitat for Pecos sunflower. Critical habitat is defined in the ESA as areas that are essential for the conservation³ of the species (see section 1.4.1 below for an in-depth discussion of critical habitat). The Service is required to designate critical habitat, to the maximum extent prudent, at the time species are listed as threatened or endangered (ESA §4[a][3]; 50 CFR §424.12), or within defined time frames after listing if critical habitat is not then determinable at the time of listing. Designation of critical habitat is not considered to be prudent when: 1) the species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of threat to the species; or 2) designation of critical habitat would not be beneficial to the species (40 CFR §424.12[a][1]).

Conservation of the Pecos sunflower may benefit from critical habitat designation. Federal actions that may affect designated critical habitat would be reviewed to analyze the effects of the action and its relationship to the function and

conservation role of the critical habitat. Designation of critical habitat may also help focus conservation activities for the species, alert the public and land-management agencies to the importance of specific areas for their conservation, and identify areas that may require special management.

The EA is organized in six chapters. Chapter 1 contains introductory information on critical habitat and the Pecos sunflower and describes the purpose of and need for the action. Chapter 2 describes the alternatives for critical habitat designation, including the No Action alternative, and provides a summary comparison of the effects of the alternatives. Chapter 3 presents the existing conditions and discloses the effects of the alternatives for critical habitat designation on relevant resource areas. Chapter 4 is the analysis of significance of the proposed action. Chapter 5 is the list of preparers of the EA, and Chapter 6 is a list of references cited in the EA.

1.2 Purpose of the Action

The critical habitat provisions of the ESA are intended to provide protection of habitat that is essential to the conservation of listed species, which includes that habitat necessary for recovery of the species. A primary purpose of the ESA is to "provide a means whereby the ecosystems upon which endangered species and threatened species may be conserved" (ESA §2[b]).

The purpose of this action is to designate critical habitat for the Pecos sunflower, which is listed as threatened under the ESA. Critical habitat designation identifies geographic areas that are essential for conservation of Pecos sunflower. It also describes the physical and biological features that constitute critical habitat (*i.e.*, primary constituent elements).

² Citations in this Environmental Assessment often point to the specific page number of the reference. For example, (72 FR 14328: 14330) refers to page number 14330 of the proposed rule published in the Federal Register. Full citations are provided at the end of the Environmental Assessment in the section titled *References*.

³ Conservation is defined in the ESA as the use of "all methods and procedures which are necessary to bring any endangered or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary."

1.3 Need for the Action

Habitat protection and management is essential for conservation of Pecos sunflower. Threats to habitat of the Pecos sunflower, including drying of wetlands from groundwater depletion, alteration of wetlands (*e.g.* wetland fills, draining, construction of water impoundments), competition from non-native plant species, excessive livestock grazing, mowing, and highway maintenance, were a primary reason for listing the species as threatened (64 Federal Register 56582). The critical habitat provisions of the ESA were intended to address habitat requirements for conservation of listed species.

1.4 Background

1.4.1 Critical Habitat

1.4.1.1 Provisions of the ESA Section 4(a)(3) of the ESA states that critical habitat shall be designated to the maximum extent prudent and determinable and that such designation may be revised periodically, as appropriate. Section 4(b)(2) of the ESA requires that critical habitat designation be based on the best scientific and commercial information available and that economic and other impacts must be considered.

Areas may be excluded from critical habitat designation if it is determined that the benefits of excluding them outweigh the benefits of their inclusion, unless failure to include the areas in critical habitat would result in extinction of the species.

Critical habitat is defined in section 3(5)(A) of the ESA as:

"(I) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical and biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection;

and

(ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species."

Section 3(5)(C) also states that critical habitat "shall not include the entire geographical area which can be occupied by the threatened or endangered species" except when the Secretary of the Interior determines that the areas are essential for the conservation of the species.

Section 7(a)(2) of the ESA requires federal agencies to consult with the Service to "insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined ... to be critical." Each agency is required to use the best scientific and commercial data available. This consultation process is typically referred to as section 7 consultation. Section 7 of the ESA does not apply to state, local, or private land unless there is a federal nexus (*i.e.*, federal funding, authorization, permitting).

Designation of critical habitat can help focus conservation activities by identifying areas that are essential to the conservation of the species, regardless of whether they are currently occupied by the listed species. Designation of critical habitat also serves to alert the public and land management agencies to the importance of an area for conservation of a listed species. As described above, critical habitat receives protection from destruction or adverse modification through required consultation under section 7 of the ESA. Aside from outcomes of consultation with the Service under section 7, the ESA does not automatically impose any restrictions on lands designated as critical habitat.

1.4.1.2 The Section 7 Consultation Process

The section 7 consultation process begins with a determination of effects on listed species and designated critical habitat by the federal action agency (Figure 1). If the federal action agency determines that there will be no effect on listed species or designated critical habitat, the proposed action is not altered or impacted by ESA considerations. If the federal action agency determines that listed species or designated critical habitat may be affected, then consultation with the Service is initiated.

Once it is determined that the proposed federal action may affect a listed species or critical habitat, the federal action agency and the Service typically enter into informal section 7 consultation. Informal consultation is an optional process for identifying affected species and critical habitat, determining potential effects, and exploring ways to modify the action to remove or reduce adverse effects to listed species or critical habitat (50 CFR §402.13). The informal section 7 consultation process concludes in one of two ways: 1) the Service concurs in writing that the proposed action is not likely to adversely affect

listed species or critical habitat; or 2) adverse impacts are likely to occur and formal consultation is initiated.

Formal consultation is initiated when it is determined that the proposed federal action is likely to adversely affect a listed species or critical habitat (50 CFR §402.14). Formal consultation concludes with a biological opinion issued by the Service on whether the proposed federal action is likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of critical habitat (50 CFR §402.14[h]). Independent analyses are made under both the jeopardy and the adverse modification standards.

A “non-jeopardy” or “no adverse modification” opinion concludes consultation and the proposed action may proceed under the ESA. The Service may prepare an incidental take statement with reasonable and prudent measures to minimize take of listed fish or wildlife species, and associated, mandatory terms and conditions that describe the methods for accomplishing the reasonable and prudent measures (ESA §7[b][4]). However, the ESA does not explicitly prohibit incidental take of listed plant species. Therefore incidental take statements and associated reasonable and prudent measures and terms and conditions are not specified for plants. Discretionary conservation recommendations may also be included in a biological opinion based on effects to species. Conservation recommendations, whether they relate to the jeopardy or adverse modification standard, are discretionary actions recommended by the Service. These recommendations may address minimizing adverse effects on listed species or critical habitat, identify studies or monitoring, or suggest how action agencies can assist species under their own authorities and section 7(a)(1) of the ESA.

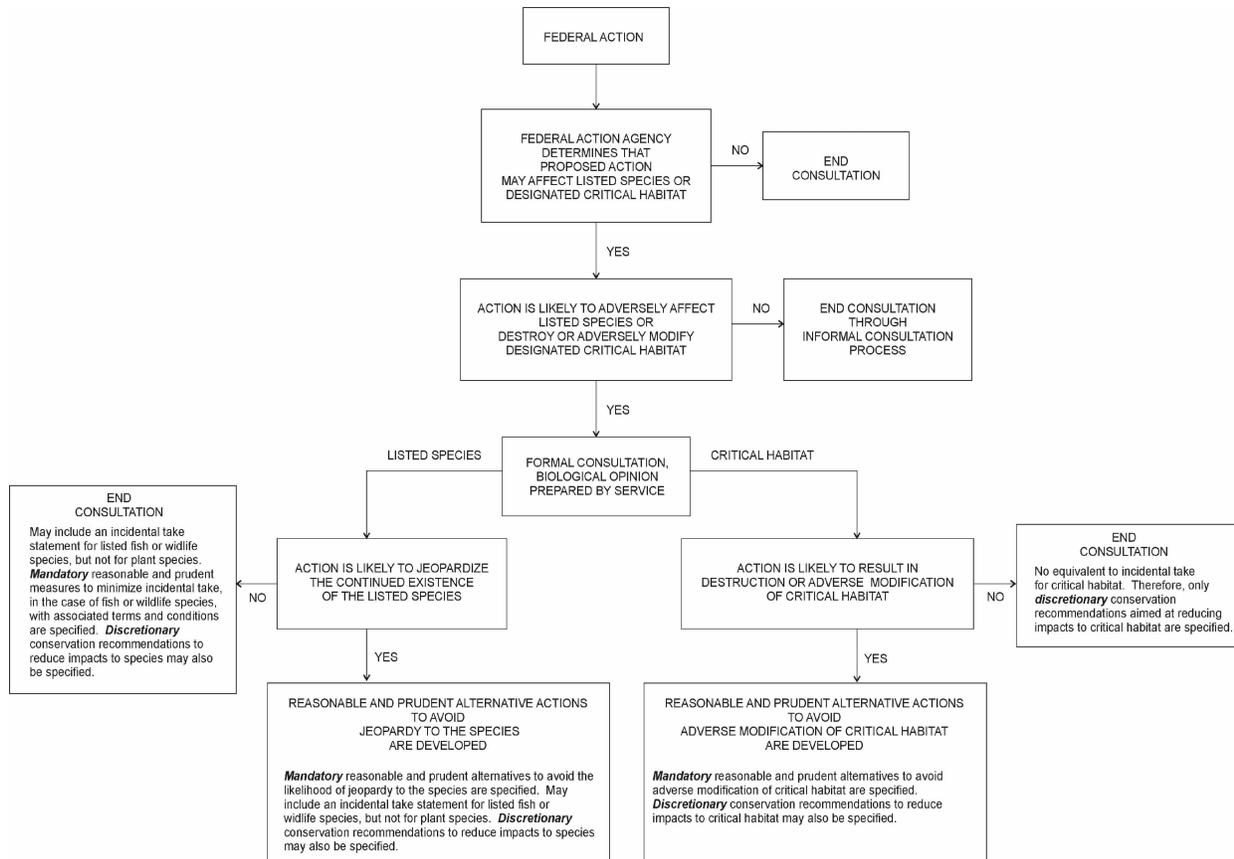
There are no ESA section 9 prohibitions for critical habitat. Therefore, a biological opinion that concludes no destruction or adverse modification of critical habitat may contain conservation recommendations but would not include an incidental take statement, reasonable and prudent measures, or terms and conditions.

In a biological opinion that results in a jeopardy or adverse modification conclusion, the Service develops mandatory reasonable and prudent alternatives to the proposed action. Reasonable and prudent alternatives are actions that the federal agency can take to avoid jeopardizing the continued existence of the species or adversely modifying critical habitat. The Service may develop reasonable and prudent alternatives that vary from slight project modifications to extensive redesign or relocation of the project, depending on the situations involved.

Reasonable and prudent alternatives must be consistent with the intended purpose of the proposed action and they also must be consistent with the scope of the federal agency's legal authority. Furthermore, the reasonable and prudent alternatives must be economically and technically feasible.

A biological opinion that results in a jeopardy finding, based on effects to the species, may also include an incidental take statement in the case of listed fish or wildlife species, reasonable and prudent measures, terms and conditions, and conservation recommendations. In the case of plant species, no incidental take statement is prepared. A biological opinion that results in an adverse modification finding may include reasonable and prudent alternatives and conservation recommendations, but no incidental take statement or associated reasonable and prudent measures and terms and conditions.

Figure 1. Simplified diagram of the ESA section 7 consultation process showing the parallel track for listed species and designated critical habitat. The informal section 7 consultation process leading to a determination of no adverse effect to listed species or designated critical habitat is not portrayed in detail.



1.4.1.3 Proposed Primary Constituent Elements

In accordance with section 3(5)(A)(I) of the ESA and regulations at 50 CFR §424.12, the Service is required to consider those physical and biological features, called primary constituent elements, that are essential to conservation of the species. Proposed primary constituent elements are based on consideration of factors including space for individual and population growth and areas that provide the basic requirements for growth (72 Federal Register 14328). Proposed primary constituent elements of critical habitat for Pecos sunflower are:

- silty clay or fine sand soils that contain high organic content, are saline or alkaline, are permanently saturated within the root zone (*i.e.* the top 20 inches of the soil profile), and have salinity levels ranging from 10 to 40 parts per thousand; and
- low proportion (less than 10 percent) of woody shrub or canopy cover directly around the plant.

1.4.2 Background Information on Pecos Sunflower

1.4.2.1 Description Pecos sunflower was described as a species in 1958 (Heiser, 1958) and was confirmed as a valid species by subsequent studies of the morphological and genetic characteristics of the plant (Rieseberg *et al.*, 1990; Lexer *et al.*, 2003; Welch and Rieseberg, 2002). Pecos sunflower is intermediate in appearance between annual sunflower (*Helianthus annuus*) and prairie sunflower (*Helianthus petiolaris*) (New Mexico Rare Plant Technical Council, 2007). It has smaller flower heads than *H. annuus* (Figure 2), and narrower leaves than that species. It has shorter leaf petioles than prairie sunflower and also lacks hairs at the tips of the paleae⁴ of the flower head, which are present in prairie sunflower (New Mexico Rare Plant Technical Council, 2007). Pecos sunflower is an annual, meaning that plants grow from seed, flower, and die in one year. Plants grow to an average maximum height of about 6 feet and flower from August to October.

⁴ A technical botanical term referring to thin, dry bracts between individual flowers in the sunflower head.

Figure 2. Pecos sunflower (*Helianthus paradoxus*). Close-up of inflorescence of Pecos sunflower (A) and view of a stand of Pecos sunflower (B). Both photographs taken by J. Pittenger at La Joya Waterfowl Area on 4 September 2007.



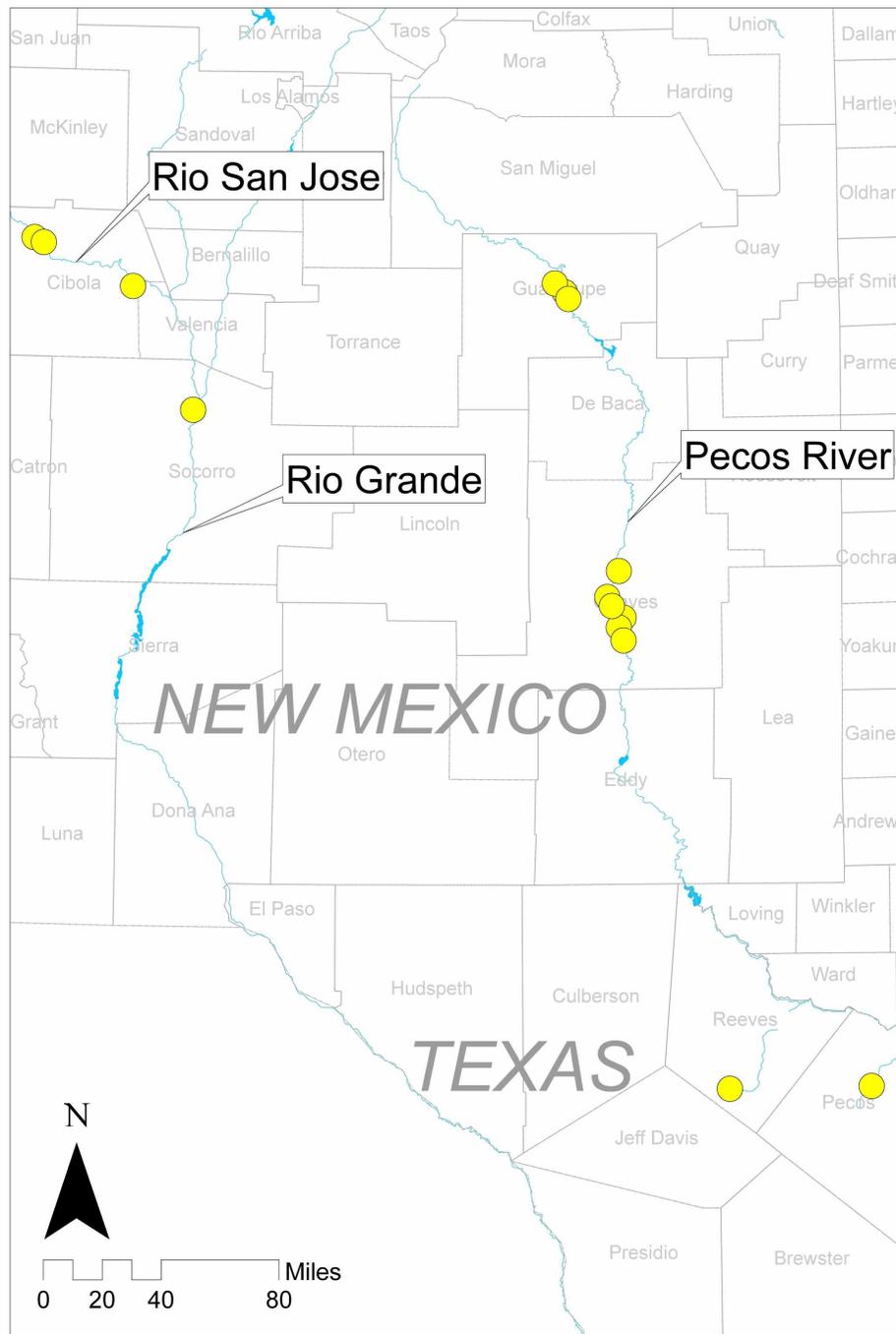
1.4.2.2 Distribution Pecos sunflower is restricted to desert wetland habitats. Those desert wetland habitats where it is found generally are spring-fed marshes or wet meadows, referred to as *cieneegas*, with saline soils (Service, 2005: 6). The historic distribution of Pecos sunflower is not well known due to the lack of historical collections (Service, 2005: 4). Presumably, the species occurred in suitable desert, saline wetland habitats throughout the Pecos, Rio Grande, and Rio San Jose drainages from west Texas to west-central New Mexico from about 3,300 to 6,600 feet elevation (New Mexico Rare Plant Technical Council, 2007; Figure 3). The known distribution of Pecos sunflower consists of six population centers, two of which are in Texas and four that are in New Mexico (U.S. Fish and Wildlife Service, 2005: 5). The species is currently known from locations in Cibola, Valencia, Socorro, Guadalupe, and Chaves counties in New Mexico and from Pecos and Reeves counties in Texas (New Mexico Rare Plant Technical Council, 2007; Figure 3).

1.4.2.3 Reproduction and Life History Persistence of Pecos sunflower populations depends upon annual re-establishment by seed (U.S. Fish and Wildlife Service, 2005: 6). Viable seed may persist in the soil seed bank until germination conditions are suitable. Optimal conditions for seed germination are when high water tables or precipitation reduce surface soil salinity (U.S. Fish and Wildlife Service, 2005: 6; Grunstra and Van Auken, 2007), similar to seed of other halophytic plant species which often remain dormant under conditions of high salinity and delay germination until surface salinity is reduced (Ungar, 1978). Pecos sunflower blooms in September through October and seeds mature during October and November. A two- to three-month after-ripening period is required before germination (U.S. Fish and Wildlife Service, 2005: 7). Distribution of individuals within

populations is patchy and varies spatially from year to year, depending on seed dispersal, suitable germination sites, adequate soil moisture in the rooting zone, and occurrence of propagules in the seed bank. Pecos sunflower is shade intolerant and requires relatively open ground for germination and growth (U.S. Fish and Wildlife Service, 2004: 7).

1.4.2.4 Habitat Habitat of Pecos sunflower is saturated, saline soils of desert wetlands associated with rivers and spring systems (*cieneegas*) from about 3,300 to 6,600 feet elevation. The species is restricted to saline wetland habitats and requires saturated soils for seed germination; adult plants grow well in standing water (New Mexico Rare Plant Technical Council, 2007). At the Diamond Y Spring *cieneega* in Texas, Pecos sunflower is found in locations where surface soil salinity is approximately 10 parts per thousand (Van Auken and Bush, 1998). The species is typically distributed along a moisture gradient where it is closely associated with saltgrass and infrequently associated with alkali sacaton, which occurs on sites drier than those occupied by saltgrass, or bulrush (*Scirpus olneyi*), which occurs on sites wetter than those occupied by saltgrass (Van Auken and Bush, 1998). Pecos sunflower patch densities and locations are determined by a combination of factors including soil moisture regime, salinity, disturbance, and competing vegetation (Van Auken and Bush, 1995; Bush and Van Auken, 1997; Bush, 2002).

Figure 3. Current distribution of Pecos sunflower. Yellow circles indicate locations of known populations of Pecos sunflower.



1.5 Permits Required for Implementation

No permits are required for critical habitat designation. Designation of critical habitat occurs through a rule-making process under the Administrative Procedures Act and the ESA.

1.6 Related Laws, Authorizations, and Plans

Related provisions of the ESA require federal agencies to consult with the Service when there are potential effects to endangered or threatened species, independent of critical habitat.

Pecos sunflower is listed as endangered under the New Mexico Plant Species Act (New Mexico Administrative Code §19.21.2). State law prohibits taking of listed plants without a permit from the State (New Mexico Administrative Code §19.21.2.15), where taking is defined as "removal, with the intent to possess, transport, sell, or offer for sale any ...[listed plant]... from places in the State of New Mexico where they naturally grow" (New Mexico Administrative Code §19.21.2.7.C). New Mexico State law does not provide for protection of habitat of listed species.

Pecos sunflower is also listed as a threatened species in Texas (Texas Administrative Code §31.2.69.A.8.b). Texas state law specifies that no person may "take, possess, transport or sell an endangered, threatened, or protected native plant" from public lands in the State without a valid scientific plant permit that authorizes such activity (Texas Administrative Code §31.2.69.A.1). Similar to New Mexico, Texas law does not contain any provisions for protection of habitat of listed species.

Section 404 of the federal Clean Water Act (33 U.S.C. 1251-1376) regulates dredge and fill activities in waters of the United States, including jurisdictional wetlands. Those habitats occupied by Pecos sunflower that are also jurisdictional wetlands are therefore subject to regulation under section 404 of the Clean Water Act. The National Environmental Policy Act requires federal agencies to analyze and disclose to the public the environmental impacts of their actions, including potential effects on listed species such as Pecos sunflower.

A recovery plan for Pecos sunflower was completed in 2005 (Service, 2005). The goal of the plan is to remove Pecos sunflower from the list of federal endangered and threatened species (*i.e.* delisting of the species). Recommended actions for achieving the goal include: 1) identifying and establishing core conservation areas and isolated stands; 2) identifying and addressing information gaps, compatible uses, and management actions regarding Pecos sunflower distribution, biology, and aquifer stability; 3) protecting core conservation areas and isolated stands through landowner education, implementation of management plans, conservation easements, and land acquisition; and 4) monitoring Pecos sunflower conservation areas and management actions as needed to satisfy delisting criteria (Service, 2005: 16-23). The two delisting or recovery criteria specified in the plan are: 1) establishing one core conservation area in each of the four distinct recovery regions plus one additional isolated stand in each region; and 2) assuring long-term protection of designated core conservation areas and designated isolated stands in perpetuity (Service, 2005: 15-16). None of the actions specified in the recovery plan are mandatory; implementation of the plan is discretionary.

1.7 Issues

The following issues associated with designation of critical habitat were identified in written and recorded oral comments received during the public comment period on the 27 March 2007 proposed rule to designate critical habitat for Pecos sunflower (72 Federal Register 14328).

- Critical habitat designation should include unoccupied habitat necessary for recovery of the species.
- Critical habitat designation should include all occupied habitat, including areas with population size less than 1,600 plants.
- Critical habitat designation should include federal lands adjacent to Bitter Lake National Wildlife Refuge that encompass the source-water area for springs on the refuge.
- Critical habitat designation should consider areas needed for populations to withstand adverse impacts such as extended drought, livestock grazing, groundwater depletion, and groundwater contamination.
- A management plan is currently being developed by the New Mexico Department of Game and Fish for the La Joya Wildlife Management Area. The plan will include measures for the conservation of Pecos sunflower and is expected to be completed by Fall 2007.

2.0 ALTERNATIVES, INCLUDING THE NO ACTION ALTERNATIVE

2.1 Development of Alternatives

Identification of areas essential for the conservation of Pecos sunflower is the cornerstone of critical habitat designation. The Service made an assessment of areas needed for the conservation of Pecos sunflower based on the best scientific and commercial information available concerning the present and historic range of the species, its habitat and biology, and threats (72 Federal Register 14328: 14332-14333). This assessment and issues identified during comment on the proposed rule served as the basis for developing critical habitat designation alternatives.

Of the 33 locations where Pecos sunflower is known to occur (Service, unpubl. data), only those that met occupancy, stability, and species conservation criteria were considered for designation of critical habitat (72 Federal Register 14328: 14332-14333). Occupancy was defined as plants being present at a site within the last two years. Stability was defined as a minimum population size of 1,600 plants, non-negative population growth, and a non-negative trend in the size of occupied habitat area. The conservation criterion was based on maintenance of existing levels of genetic diversity present in Pecos sunflower. Application of these criteria resulted in identification of 12 sites potentially suitable for critical habitat designation (Table 1).

2.2 No Action Alternative

The No Action alternative is defined as no designation of critical habitat for Pecos sunflower. Analysis of the No Action alternative is required by NEPA, and it serves as a baseline for analyzing effects of action alternatives. However, it is not clear that the Service could, under the law, adopt the No Action alternative.

2.3 Alternative I

Alternative I would designate critical habitat at all 12 of the locations that meet occupancy, stability, and species conservation criteria (*cf.* section 2.1), regardless of existing or proposed management plans (Table 1; Figure 4 and Figures 5 through 11). A total of 2,159.1 acres, plus an undefined acreage on the Pueblo of Laguna, would be designated as critical habitat for Pecos sunflower with Alternative I.

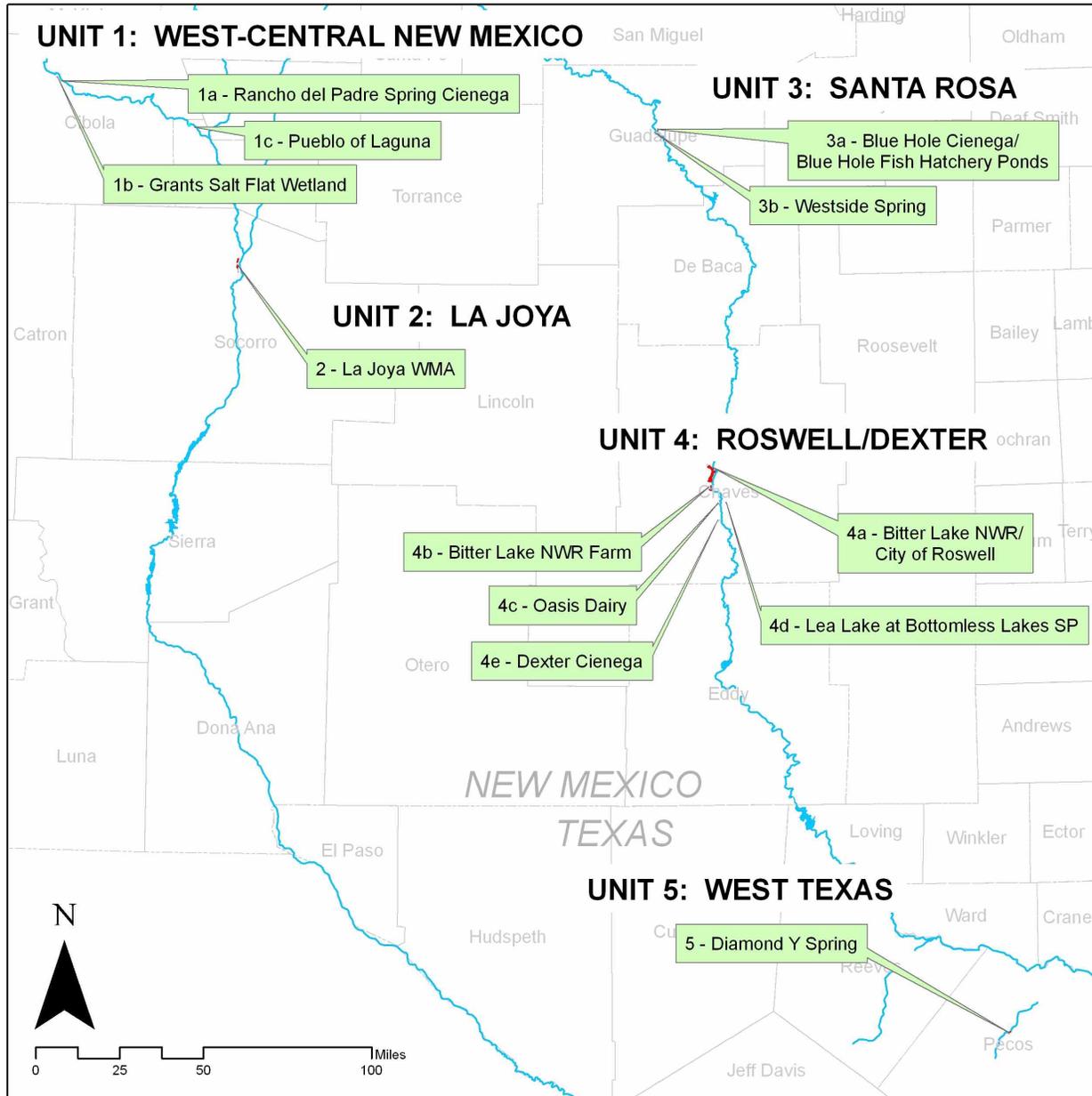
2.3.1 Unit 1: West-Central New Mexico

Alternative I would designate critical habitat in three subunits in west-central New Mexico (Figure 4), totaling more than 88 acres (Table 1; Figure 5).

Table 1. Pecos sunflower proposed critical habitat units and component subunits in each of the three critical habitat designation action alternatives analyzed in the EA. The + sign indicates an undefined acreage on the Pueblo of Laguna.

Critical Habitat Subunit	County	Land Ownership	Acres by Alternative		
			I	II	III
UNIT 1: WEST-CENTRAL NEW MEXICO					
1a Rancho del Padre Spring Cienega	Cibola	Private/Tribal	25.5	25.5	25.5
1b Grants Salt Flat Wetland	Cibola	Private	62.5	62.5	62.5
1c Pueblo of Laguna	Valencia	Tribal	undefined	undefined	0.0
Unit 1 Totals			88.0+	88.0+	88.0
UNIT 2: LA JOYA					
2 La Joya Waterfowl Area	Socorro	State	854.3	854.3	0.0
Unit 2 Totals			854.3	854.3	0.0
UNIT 3: SANTA ROSA					
3a Blue Hole Cienega/Blue Hole Fish Hatchery Ponds	Guadalupe	State	127.6	127.6	127.6
	Guadalupe	City	6.3	6.3	6.3
3b Westside Spring	Guadalupe	Private	6.4	6.4	6.4
Unit 3 Totals			140.3	140.3	140.3
UNIT 4: ROSWELL/DEXTER					
4a Bitter Lake National Wildlife Refuge/ City of Roswell Land	Chaves	Federal	483.9	0.0	0.0
	Chaves	City	92.2	92.2	92.2
4b Bitter Lake NWR Farm	Chaves	Federal	95.9	0.0	0.0
4c Oasis Dairy	Chaves	Private	103.9	103.9	103.9
4d Lea Lake at Bottomless Lakes SP	Chaves	State	19.5	19.5	19.5
4e Dexter Cienega	Chaves	Private	41.4	41.4	41.4
Unit 4 Totals			836.8	257.0	257.0
UNIT 5: WEST TEXAS					
5 Diamond Y Spring	Pecos	Private	239.7	239.7	239.7
Unit 5 Totals			239.7	239.7	239.7
Grand Totals			2,159.1+	1,579.3+	725.0

Figure 4. Critical habitat designation proposed in Alternative I. Acreage by land ownership for each subunit is shown in Table 1.



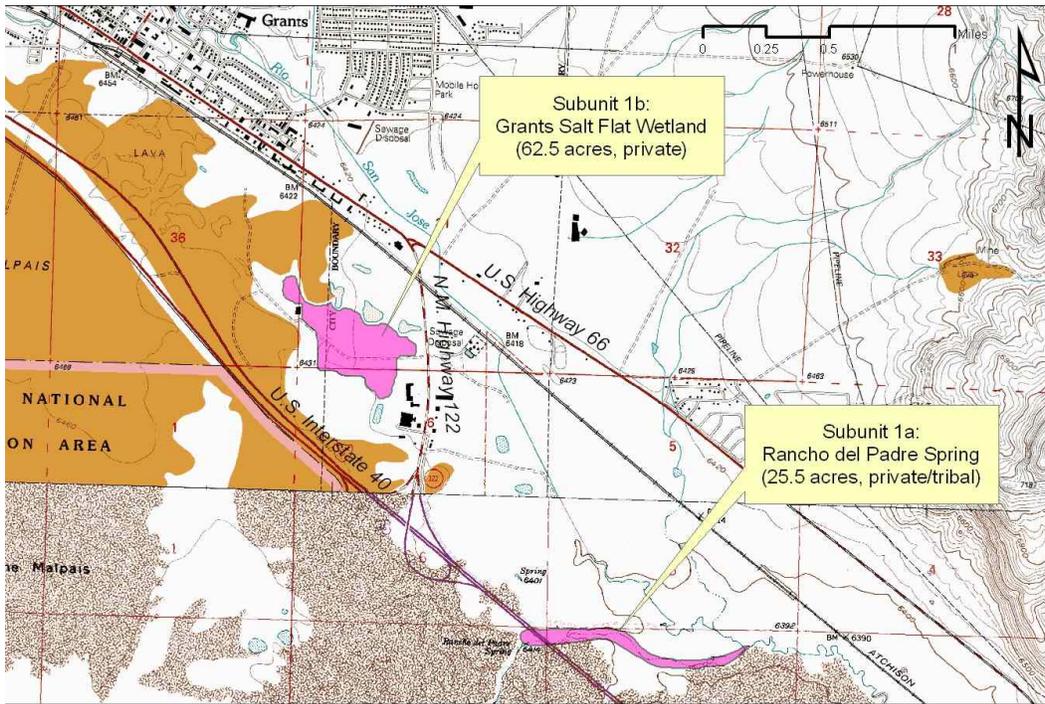


Figure 5. Proposed critical habitat subunits 1a and 1b, located southeast of Grants in Cibola County, New Mexico.

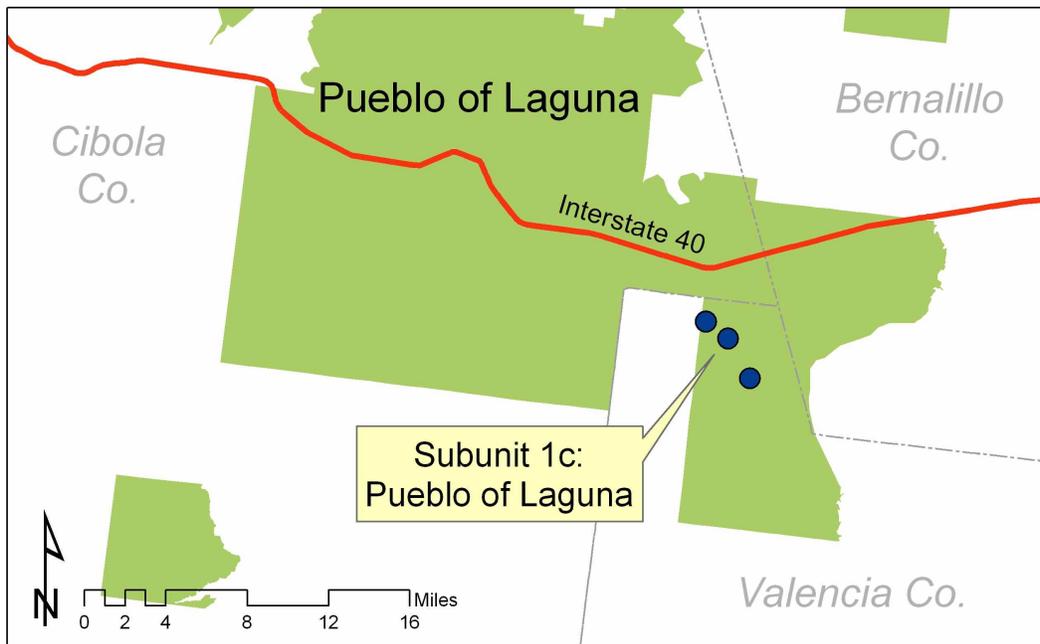


Figure 6. Proposed critical habitat subunit 1c, located on the Pueblo of Laguna in Valencia County, New Mexico.

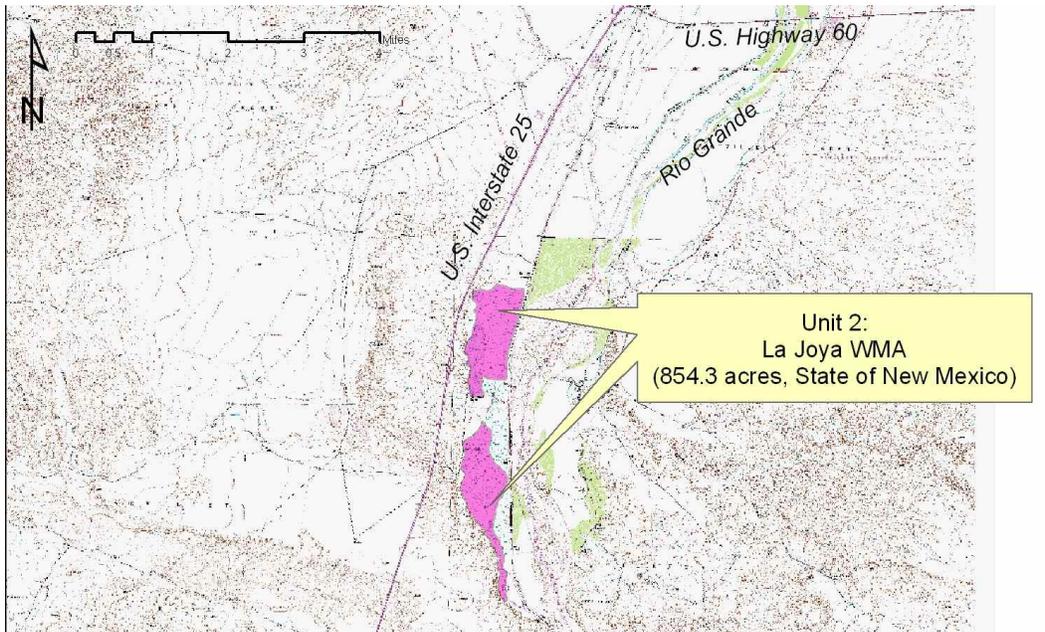


Figure 7. Proposed critical habitat subunit 2, located at the La Joya Waterfowl Management Area south of Bernardo in Socorro County, New Mexico.

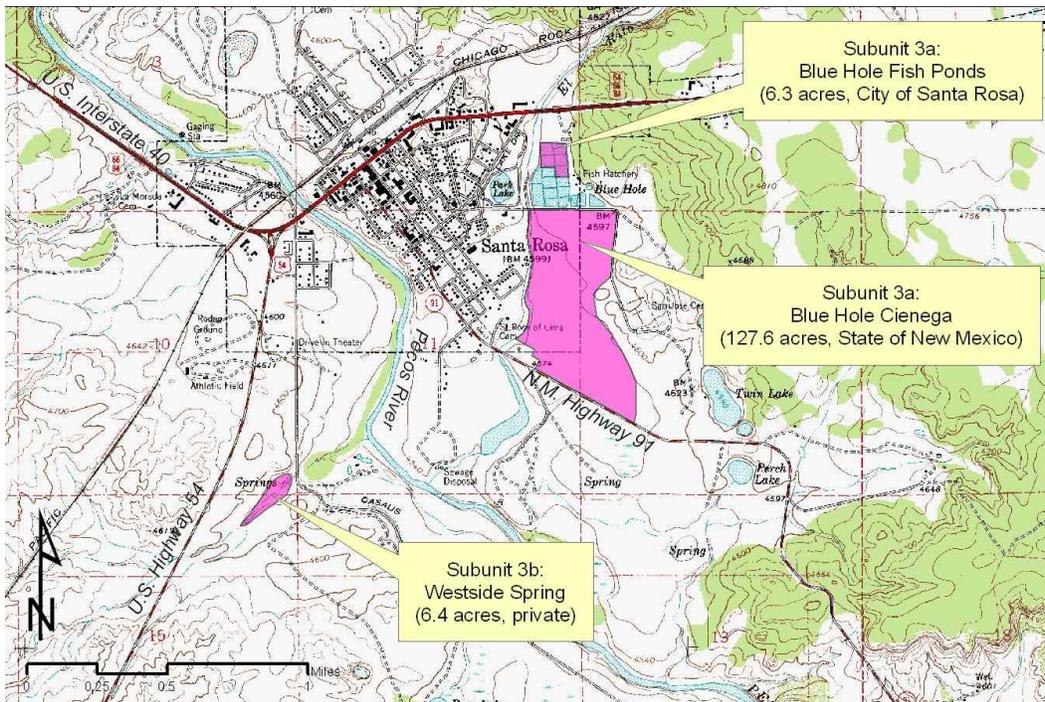


Figure 8. Proposed critical habitat subunits 3a and 3b, located at Santa Rosa in Guadalupe County, New Mexico.

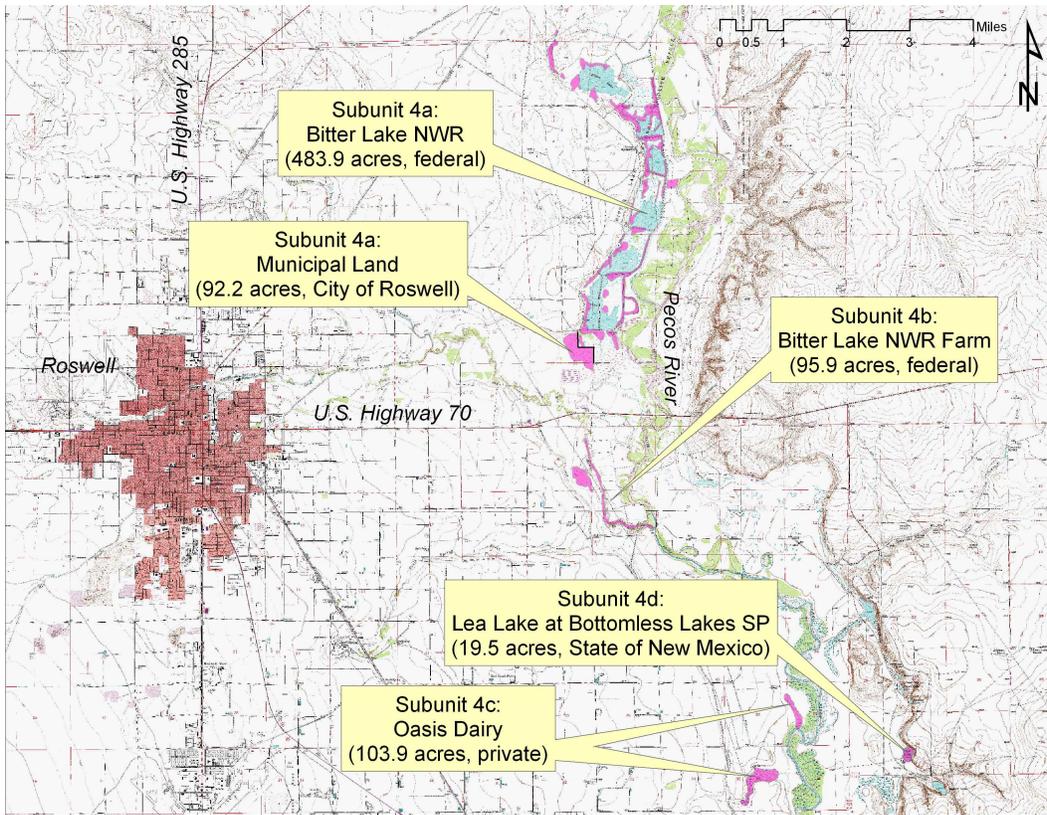


Figure 9. Proposed critical habitat subunits 4a through 4c, located east of Roswell in Chaves County, New Mexico.

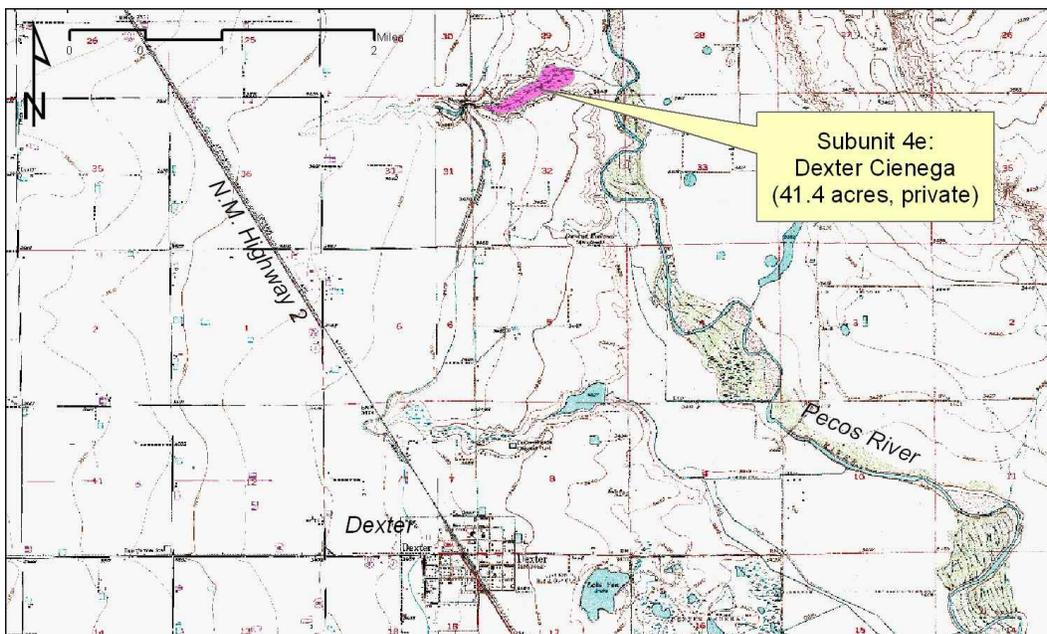


Figure 10. Proposed critical habitat subunit 4e, located northeast of Dexter in Chaves County, New Mexico.

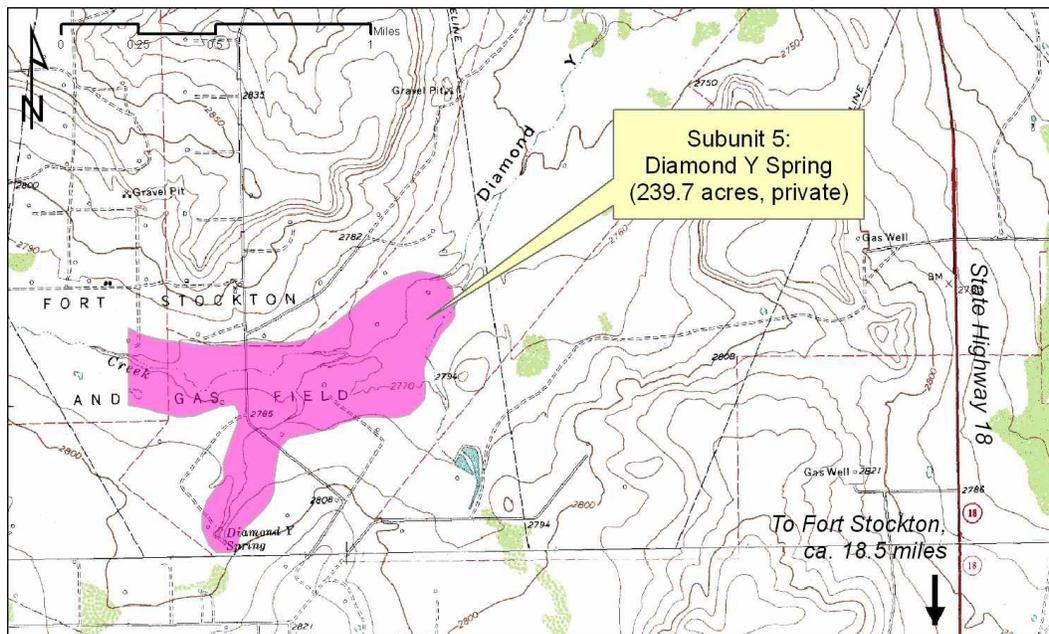


Figure 11. Proposed critical habitat subunit 5, located on The Nature Conservancy's Diamond Y Spring Preserve north of Fort Stockton in Pecos County, Texas.

Critical habitat subunit 1a, which is the Rancho del Padre Spring Cienega, would consist of 25.5 acres of private or tribal lands (Table 1; Figure 5). The wetland habitat occupied by Pecos sunflower in this subunit begins on Acoma Pueblo land on the south side of Interstate 40 and continues on the north side of the highway in a broad northeast-trending swale that descends gradually to the Rio San Jose. A large population occurs throughout this spring-fed wetland.

Critical habitat subunit 1b, the Grants salt flat wetland, consists of 62.5 acres of private land on the east side of Grants (Figure 5). This subunit is located west of East Santa Fe Avenue (N.M. Highway 122) and is bisected by Roberta Road. This wetland area is maintained by a high water table influenced by precipitation.

Critical habitat subunit 1c is an undefined acreage along the Rio San Jose near South Garcia on the

Pueblo of Laguna (Figure 6). Patches of Pecos sunflower are found at springs along the river in this location. The acreage of land that would be designated on the Pueblo of Laguna is undefined because detailed mapping of the distribution of Pecos sunflower there is not available.

2.3.2 Unit 2: La Joya

A total of 854.3 acres of critical habitat would be designated in Unit 2: La Joya, under Alternative I (Figure 4; Table 1). All of the proposed critical habitat in Unit 2 is on lands owned and managed by the New Mexico Department of Game and Fish as the La Joya Waterfowl Area (Figure 7).

One of the largest known populations of Pecos sunflower occurs at this site, with abundance typically exceeding 100,000 plants. Hydrology of the wetlands at the La Joya Waterfowl Area is supported by irrigation return flow diverted from

a drain (New Mexico Department of Game and Fish, 2007), as well as natural springs and seeps along the west side of the Rio Grande.

2.3.3 Unit 3: Santa Rosa

Alternative I would designate 140.3 acres of critical habitat in two subunits in Unit 3: Santa Rosa (Figure 4).

Subunit 3a, encompassing 133.9 acres, consists of Blue Hole Cienega and the Blue Hole Fish Hatchery Ponds (Figure 8). The wetlands in these subunits are maintained by an artesian groundwater system that supports a high water table. There are numerous seeps and springs in the Blue Hole Cienega and patches of Pecos sunflower are concentrated around these discharge points. Blue Hole Cienega is owned and managed by the New Mexico Forestry Division and encompasses 127.6 acres. The Blue Hole Fish Hatchery Ponds consist of a 6.3-acre area that is owned by the City of Santa Rosa.

Subunit 3b, the Westside Spring Cienega, consists of 6.4 acres of private land (Table 1; Figure 8). A wetland area supported by a zone of seeps and springs is located in an unnamed ephemeral drainage at this site.

2.3.4 Unit 4: Roswell/Dexter

A total of 836.8 acres consisting of five subunits would be designated as critical habitat in Unit 4: Roswell/Dexter with Alternative I (Table 1; Figure 4). The component subunits are 92.2 acres of land owned by the City of Roswell and 483.9 acres on Bitter Lake National Wildlife Refuge that are managed by the U.S. Fish and Wildlife Service (subunit 4a), 95.9 acres on the Bitter Lake National Wildlife Refuge Farm (subunit 4b), 103.9 acres of private land at Oasis Dairy (subunit 4c), 19.5 acres of land around Lea Lake at

Bottomless Lakes State Park (subunit 4d), and 41.4 acres of private land at the Dexter Cienega (subunit 4e; Figures 9 and 10).

These five subunits consist of wetlands that are supported by the artesian aquifer in the Roswell basin. The Bitter Lake National Wildlife Refuge/City of Roswell and Bitter Lake National Wildlife Refuge Farm subunits (4a and 4b) consist of an extensive saline wetland area along the west side of the Pecos River that is maintained by numerous springs and seeps. The Oasis Dairy and Dexter Cienega subunits are saline marshes along the Pecos River that are associated with zones of groundwater seepage. The Lea Lake subunit is a *cenote*, or sinkhole, that discharges groundwater to adjacent wetlands.

2.3.5 Unit 5: West Texas

Critical habitat at Unit 5: West Texas that would be designated for Pecos sunflower with Alternative I consists of 239.7 acres of private land at the Diamond Y Spring Preserve. This land is owned and managed by The Nature Conservancy (Table 1; Figure 4). The Diamond Y Spring area is an extensive marsh fed by Diamond Y Spring and numerous other smaller springs and seeps. The marsh occupies the bottom of a broad draw that drains to the northeast (Figure 11).

2.4 Alternative II

Alternative II would designate 1,579.3 acres of critical habitat, plus an undefined acreage on Pueblo of Laguna lands. This alternative includes designation of critical habitat in five units comprising 11 locations, or subunits, in New Mexico and Texas (Table 1). It includes all of the subunits described in Alternative I except for the portion of subunit 4a that is located on Bitter Lake

National Wildlife Refuge and subunit 4b, the Bitter Lake National Wildlife Refuge Farm.

The rationale for excluding Bitter Lake National Wildlife Refuge lands from critical habitat designation in Alternative II is that the benefits of excluding these lands may outweigh the benefits of their inclusion in the critical habitat designation, pursuant to section 4(b)(2) of the ESA. The Refuge is managed according to a final Comprehensive Conservation Plan that addresses conservation of Pecos sunflower. Critical habitat designation therefore is not likely to provide any additional conservation benefit to Pecos sunflower above existing conditions. The added administrative costs that may be incurred by the Refuge with designation of critical habitat may outweigh the potentially minimal benefits of including those lands.

Bitter Lake National Wildlife Refuge was established on 8 October 1937 by Executive Order 7724 “as a refuge and breeding ground for migratory birds and other wildlife.” The Refuge Recreation Act (16 U.S.C. 460-1) identifies the refuge as being “suitable for incidental fish and wildlife-oriented recreational development, the protection of natural resources, and the conservation of endangered species or threatened species.” The Wilderness Act of 1964 (P.L. 88-577) directs the Service to “maintain wilderness as a naturally functioning ecosystem” on portions of the Refuge. While the Refuge was originally established to save wetlands vital to the perpetuation of migratory birds, the isolated gypsum springs, seeps, and associated wetlands protected by the Refuge have been recognized as providing the last known habitats in the world for several unique species.

The Refuge is located at a juncture between the Roswell Artesian Groundwater Basin and the

Pecos River. These two systems and their interactions account for the diversity of water resources on the Refuge including sinkholes, springs, wetlands, oxbow lakes, and riverine habitats. Bitter Lake National Wildlife Refuge has a federally reserved water right that essentially protects ground water levels of the Roswell Basin in the Refuge vicinity. The Refuge has undergone adjudication of their federally reserved water rights by the State of New Mexico (order signed May 1997). The Refuge is currently in negotiations with the New Mexico Interstate Stream Commission, a State agency responsible for administering New Mexico’s water resources, to quantify these reserved rights.

Management emphasis of the Refuge is placed on the protection and enhancement of habitat for endangered species and federal candidate species, maintenance and improvement of wintering crane and waterfowl habitat, and monitoring and maintenance of natural ecosystem values. The Refuge has in place a Final Comprehensive Conservation Plan (Plan) that was approved in September 1998 (Service, 1998a). The Plan serves as a management tool to be used by the Refuge staff and its partners in the preservation and restoration of natural resources on the Refuge. The plan is intended to guide management decisions over the next five to ten years and sets forth strategies for achieving Refuge goals and objectives within that time frame. Key goals of the Plan related to conservation of Pecos sunflower include the following:

- 1) restore, enhance and protect the natural diversity on the Refuge including threatened and endangered species by a) appropriate management of habitat and wildlife resources on refuge lands and b) strengthening existing, and establishing new cooperative efforts with public and private stakeholders and partners; and

2) restore and maintain selected portions of a hydrological system that more closely mimics the natural processes along the reach of the Pecos River adjacent to the Refuge by a) restoration of the river channel, as well as restoration of threatened, endangered and special concern species; and b) control exotic species and manage trust responsibilities for maintenance of plant and animal communities and to satisfy traditional recreational demands.

Objectives of the Plan related to these goals are to restore populations of listed or candidate species to sustainable levels and to follow existing recovery plan objectives for listed species. These objectives apply directly to conservation of Pecos sunflower.

2.5 Alternative III

Alternative III would designate 725 acres of critical habitat for Pecos sunflower. Alternative III would include all of the subunits described under Alternative II except for Pueblo of Acoma lands (subunit 1a), Pueblo of Laguna lands (subunit 1c), and the La Joya Waterfowl Area (854.3 acres).

The rationale for excluding these three subunits is that their exclusion would foster partnerships and improve working relationships with land owners of the subunits. Under section 4(b)(2) of the ESA, the Service may exclude areas from critical habitat designation if it is determined that the benefit of excluding the area outweighs the benefit of its inclusion in the designation. As described in the proposed rule (72 Federal Register 14328: 14343) exclusion of tribal lands on the pueblos of Acoma and Laguna may outweigh the benefits of including those lands in critical habitat designation. The benefits of excluding these lands may include maintaining

effective government-to-government relationships and fostering development and implementation of effective management plans for Pecos sunflower on tribal lands. These benefits may not be realized if critical habitat designation includes tribal lands. Critical habitat designation on tribal lands may be counterproductive in that it could discourage development and implementation of conservation plans for the species and strain the relationship between the Service and tribal governments.

Laguna Pueblo developed a Pecos Sunflower Management Plan in January 2008 (Pueblo of Laguna, 2008). Major components of the plan include surveys and monitoring of populations, monitoring of spring and stream flows, restoration of springs and seeps, controlling salt cedar encroachment, limiting access to populations of Pecos sunflower, and adopting a trespass ordinance to provide greater levels of protection of Pecos sunflower populations. The management plan provides significant conservation benefit to the species and is consistent with the Pecos sunflower recovery plan (Service, 2005). Based on past voluntary, proactive conservation actions conducted by the Pueblo of Laguna and their acquisition of funding through the Tribal Wildlife Grant program to implement conservation measures, there is a reasonable expectation that the conservation plan for Pecos sunflower will be implemented.

Exclusion of the La Joya Waterfowl Area may provide more benefits to conservation of Pecos sunflower than would inclusion of the area in the critical habitat designation. Existing management of the La Joya Waterfowl Area is compatible with conservation of Pecos sunflower (New Mexico Department of Game and Fish, 2007). The New Mexico Department of Game and Fish has developed and is implementing a management plan for Pecos sunflower on the La Joya

Waterfowl Area (New Mexico Department of Game and Fish, 2007b). The management plan involves controlling non-native invasive species such as salt cedar, Russian olive (*Elaeagnus angustifolia*), and perennial pepperweed (*Lepidium latifolium*) while ensuring protection of Pecos sunflower. Furthermore, off-road vehicle travel is prohibited in the waterfowl management area. Designation of the area as critical habitat may be counterproductive if it strains working relationships between the Service and the Department of Game and Fish regarding management of the area and complicates implementation of current management schemes.

2.6 Comparison of Alternatives

Table 1 compares acreage by unit and subunit for Alternatives I, II and III. This table also provides landownership information for each parcel under consideration for critical habitat designation. Table 2 summarizes the potential effects or characteristics of the alternative critical habitat designations on the environment. Potential effects on resources are summarized from the analyses presented in Chapter 3.

2.7 Preferred Alternative

Alternative III is the alternative preferred by the Service.

Table 2. Comparison of potential effects of alternative critical habitat designations.

Resource Category	No Action Alternative	Alternative I	Alternative II	Alternative III
Conservation of Pecos Sunflower	<ul style="list-style-type: none"> - §7 consultation on potential effects of proposed federal actions on Pecos sunflower under the jeopardy standard - No §7 consultation on potential effects to critical habitat under the destruction or adverse modification standard - Non-regulatory or educational benefits from critical habitat designation may not occur 	<ul style="list-style-type: none"> - §7 consultation on potential effects to critical habitat under the destruction or adverse modification standard for federally supported actions would ensure that habitat essential for conservation of Pecos sunflower retains its suitability - Non-regulatory and educational benefits to conservation of Pecos sunflower would occur, including informing the public of areas important for conservation of the species, and focusing attention on and awareness of those areas - For Pecos sunflower, consultations under the jeopardy and adverse modification standards are not likely to have materially different outcomes 	<ul style="list-style-type: none"> - Exclusion of Bitter Lake National Wildlife Refuge subunits (part of 4a and all of 4b) would not reduce protection of habitat of Pecos sunflower on the Refuge compared to Alternative I, because all proposed critical habitat is occupied by the species and is already subject to section 7 consultation under the jeopardy standard and the Refuge is already managed, in part, to conserve Pecos sunflower - Non-regulatory and educational benefits associated with critical habitat designation are already realized on the Refuge; exclusion of the Refuge from critical habitat designation would not change the occurrence of these benefits - For Pecos sunflower, consultations under the jeopardy and adverse modification standards are not likely to have materially different outcomes 	<ul style="list-style-type: none"> - Exclusion of Bitter Lake National Wildlife Refuge lands, tribal lands, and the La Joya WMA would not reduce protection of habitat of Pecos sunflower compared to Alternative I because the excluded areas are occupied by Pecos sunflower and are already subject to section 7 consultation under the jeopardy standard - Critical habitat designation may interject additional conservation recommendations in section 7 consultation but would not be likely to substantially improve the conservation status of the affected population - Non-regulatory and educational benefits associated with critical habitat designation may not accrue on the excluded tribal and state lands - For Pecos sunflower, consultations under the jeopardy and adverse modification standards are not likely to have materially different outcomes

Table 2, continued

Resource Category	No Action Alternative	Alternative I	Alternative II	Alternative III
Water Supply and Use	<ul style="list-style-type: none"> - §7 consultation on effects to Pecos sunflower under the jeopardy standard would be required for federally supported water projects - Federally supported water projects that could substantially increase the depth to soil saturation would likely trigger formal consultation under the jeopardy standard for Pecos sunflower - There have not been any consultations on Pecos sunflower involving water supply or development projects since the species was listed in 1999 	<ul style="list-style-type: none"> - §7 consultation on effects to Pecos sunflower under the jeopardy and critical habitat adverse modification standards would be required for federally supported water projects - Minor changes in section 7 consultations may occur in the form of additional conservation recommendations to reduce impacts to primary constituent elements - Substantive changes to reasonable and prudent alternatives developed under the jeopardy standard for federally supported water projects would not be likely to occur with addition of critical habitat designation - Low potential for federal nexus water projects in any of the critical habitat subunits 	<ul style="list-style-type: none"> - All of the excluded critical habitat subunits on Refuge lands are occupied by Pecos sunflower, so §7 consultation under jeopardy standard would still be required - §7 consultation on effects to Pecos sunflower under the adverse modification of critical habitat standard would not be required for federally supported water projects on Bitter Lake National Wildlife Refuge lands - No plans by Refuge to withdraw water from aquifer that supports springs and seeps maintaining wetlands occupied by Pecos sunflower - Refuge manages water levels in impoundments to benefit conservation of Pecos sunflower 	<ul style="list-style-type: none"> - All of the excluded critical habitat subunits on Refuge lands, tribal lands, and La Joya WMA are occupied by Pecos sunflower, so §7 consultation under jeopardy standard would still be required - §7 consultation on effects to Pecos sunflower under the adverse modification of critical habitat standard would not be required for federally supported water projects on Refuge lands, tribal lands, or La Joya WMA. - Potential for federal-nexus water development projects on excluded subunits is low; none have occurred since species was listed in 1999
Livestock Grazing	<ul style="list-style-type: none"> - §7 consultation on effects to Pecos sunflower under the jeopardy standard may be required for grazing actions on federal lands - Grazing activities on private or tribal lands not in violation of state law are not subject to §7 consultation - Subunits subject to livestock grazing are all privately owned and there have been no consultations involving Pecos sunflower and grazing activities since the species was listed in 1999 	<ul style="list-style-type: none"> - Designation of critical habitat would have no effect compared to No Action Alternative because current grazing activities within proposed critical habitat occur on private lands and in compliance with state law; therefore these activities are not prohibited activities under §9 of the ESA 	<ul style="list-style-type: none"> - Exclusion of Bitter Lake National Wildlife Refuge lands, which do not have any grazing activity, would result in no changes compared to No Action Alternative 	<ul style="list-style-type: none"> - Exclusion of Bitter Lake NWR lands and the La Joya Waterfowl Area from critical habitat designation would have no effect compared to No Action Alternative because no grazing occurs on these subunits - Exclusion of Pueblo of Acoma lands in subunit 1a and Pueblo of Laguna lands in subunit 1c would have no effect on grazing compared to No Action Alternative because the activity takes place on land owned in fee and in compliance with state law, and is therefore not a prohibited activity under §9 of the ESA. Tribal lands in proposed critical habitat units are not held in trust by the United States and therefore are not subject to Bureau of Indian Affairs leasing regulations.

Table 2, continued

Resource Category	No Action Alternative	Alternative I	Alternative II	Alternative III
Land Development	<ul style="list-style-type: none"> - Subunits with potential for development are privately owned and include Rancho del Padre Spring Cienega (1a), Grants Salt Flat Wetland (1b), Westside Spring (3b), and Dexter Cienega (4e) - No §7 consultations have been conducted on land development projects since species was listed in 1999 - Potential federal nexus in land development projects on private land could include section 404 of the federal Clean Water Act or federal funding for low-income housing or infrastructure - In the event of a federally supported land development project proposed in any of the subunits, §7 consultation may be triggered under the jeopardy standard because all subunits are occupied by the species 	<ul style="list-style-type: none"> - Critical habitat designation would not trigger any additional §7 consultations because all subunits are occupied by the species and any federally supported land development projects that affect habitat would also affect Pecos sunflower plants - In the event of a federally supported land development project proposed in Pecos sunflower critical habitat, §7 consultation may include additional conservation recommendations to minimize impacts to habitat but the effect of the consultation on the project would not be likely to be materially different with or without critical habitat designation 	<ul style="list-style-type: none"> - No difference from the effects of Alternative I, because land development projects would not be proposed on Bitter Lake National Wildlife Refuge lands 	<ul style="list-style-type: none"> - No difference from the effects of Alternative I for Bitter Lake National Wildlife Refuge lands or the La Joya Waterfowl Area because land development projects would not be proposed on these units - Effects on Pueblo of Laguna lands (subunit 1c) similar to Alternative I because unit is not suitable for land development due to its remoteness and rugged topography - Exclusion of Pueblo of Acoma lands from critical habitat designation would mean that analysis under the adverse modification standard would not be required in §7 consultations on federally supported land development projects on those lands
Recreation	<ul style="list-style-type: none"> - Recreation uses occur on publicly-owned subunits including the La Joya Waterfowl Area (subunit 2), Bitter Lake National Wildlife Refuge lands (subunits 4a and 4b), and Lea Lake at Bottomless Lakes State Park (subunit 4d) - §7 consultation on effects to Pecos sunflower under the jeopardy standard would be required for federally supported recreation actions 	<ul style="list-style-type: none"> - Analysis under both adverse modification and jeopardy standards in §7 consultations on federally supported recreation projects would be required - Outcomes of §7 consultations would not be materially different whether or not critical habitat is designated because all subunits are occupied by Pecos sunflower and actions that would detrimentally affect primary constituent elements would also impact reproduction, growth, and survival of Pecos sunflower plants - Critical habitat designation may interject additional, discretionary conservation recommendations in §7 consultations 	<ul style="list-style-type: none"> - Recreation-related projects undergoing §7 consultation on Bitter Lake National Wildlife Refuge would not require analysis under the adverse modification standard 	<ul style="list-style-type: none"> - Recreation-related projects undergoing §7 consultation on Bitter Lake National Wildlife Refuge, tribal lands, or the La Joya Waterfowl Management Area would not require analysis under the adverse modification standard - Potential for federally supported recreation projects on La Joya Waterfowl Management Area or tribal lands is low because predominant management activities on these lands are wildlife management and livestock grazing, respectively

Table 2, continued

Resource Category	No Action Alternative	Alternative I	Alternative II	Alternative III
Socioeconomic Conditions and Environmental Justice	- §7 consultation on effects to Pecos sunflower under the jeopardy standard would be required for federally supported actions	<ul style="list-style-type: none"> - §7 consultation on effects to Pecos sunflower under both the jeopardy and adverse modification standards would be required for federally supported projects - Economic impacts due to critical habitat designation alone are estimated at \$605,000 (discounted at three percent) over a 20-year period - Other economic impacts would occur regardless of critical habitat designation -No measurable detrimental effects from the designation of critical habitat are anticipated in regards to communities or individuals (e.g., loss of homes, businesses, or jobs; disruption of community services or community cohesion). No disproportionate adverse effects on low-income or minority populations. 	<ul style="list-style-type: none"> - §7 consultation on effects under the adverse modification standards would not be required for federally supported projects on Bitter Lake National Wildlife Refuge lands - Additional effort required by federal agency staff to include critical habitat considerations in section 7 consultations would be required only for projects potentially affecting other subunits -No measurable detrimental effects from the designation of critical habitat are anticipated in regards to communities or individuals (e.g., loss of homes, businesses, or jobs; disruption of community services or community cohesion). No disproportionate adverse effects on low-income or minority populations. 	<ul style="list-style-type: none"> - §7 consultation on effects under the adverse modification standards would not be required for federally supported projects on Bitter Lake National Wildlife Refuge lands, tribal lands, or the La Joya Waterfowl Management Area - Additional effort required by federal agency staff to include critical habitat considerations in section 7 consultations would be required only for projects potentially affecting other subunits -No measurable detrimental effects from the designation of critical habitat are anticipated in regards to communities or individuals (e.g., loss of homes, businesses, or jobs; disruption of community services or community cohesion). No disproportionate adverse effects on low-income or minority populations.

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3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes aspects of the environment that may potentially be impacted by designating critical habitat for Pecos sunflower. Potential effects of critical habitat designation under each alternative are then described for the various resource categories. Resource categories addressed in the analysis were selected based on issues identified during the public comment period on the proposed rule (*cf.* section 1.7) and conservation considerations for Pecos sunflower.

3.1 Assessment of Impacts

3.1.1 Nature of Impacts from Critical Habitat Designation

Impacts on the environment from designation of critical habitat stem from the section 7 consultation requirements of the ESA (*cf.* section 1.4.1.2). Under section 7(a)(2) of the ESA, federal agencies are required to consult with the Service on actions that they fund, implement, or authorize, which may affect listed species or critical habitat (50 CFR §402). The purpose of section 7 consultation, with respect to critical habitat, is to ensure that the actions of federal agencies do not destroy or adversely modify critical habitat. Critical habitat is defined as habitat that is essential for the conservation of a listed species.

Critical habitat designation does not have any impact on the environment other than through the section 7 consultation process. Critical habitat designation alone does not establish blanket rules or restrictions on land use, nor does it automatically prohibit or modify any activity. Each proposed federal action that may potentially

affect designated critical habitat is analyzed individually during the section 7 consultation process. Individuals, organizations, states, local governments, and other non-federal entities are potentially affected by the designation of critical habitat only if their actions occur on federal lands, require a federal permit, license, or other authorization, or involve federal funding.

The potential for destruction or adverse modification of critical habitat is assessed by determining the effects of the proposed action on primary constituent elements or habitat qualities that are essential to conservation of the species. These anticipated affects are then analyzed to determine how they will influence the function and conservation role of the affected critical habitat unit. This analysis provides the basis for determining the significance of anticipated effects of the proposed action on critical habitat. The threshold for destruction or adverse modification is evaluated in the context of whether or not the critical habitat would remain functional (or retain the current potential for primary constituent elements to be functionally established) to serve the intended conservation role for the species.

Critical habitat is defined in section 3(5)(A) of the ESA as those areas that are essential for conservation of the species, and the definition of conservation includes species recovery. In the case of Pecos sunflower, all of the proposed critical habitat subunits harbor populations of the species that meet occupancy, stability, and species conservation criteria (*cf.* section 2.1). Conservation of Pecos sunflower requires, in part, sustaining "core conservation areas" and an additional isolated stand in each of four recovery regions (*i.e.* West Texas, Dexter/Roswell, Santa

Rosa, West-Central New Mexico; Service, 2005: 15-17). Therefore, the primary conservation value of proposed critical habitat for Pecos sunflower is to sustaining core conservation area populations and at least one additional isolated population in each of the four recovery regions.

The threshold for destruction or adverse modification of designated critical habitat for Pecos sunflower would likely be a reduction in the capability of the habitat in any of the core areas or isolated stands to sustain existing populations, in terms of the recent natural range in variation in distribution and abundance. Application of the adverse modification analysis to individual core areas and isolated stands, as opposed to the entire critical habitat designation, is appropriate because these areas fulfill essential geographic distribution and genetics requirements (*cf.* Service, 1998*b*: 4-34 to 4-39).

Jeopardy and adverse modification are not equivalent standards. However, in practice, for Pecos sunflower, there is not likely to be any difference in project modifications made under the jeopardy standard and the adverse modification standard. In other words, the material outcomes of consultations completed under the two standards are not likely to differ. As explained below, whether consulting under either standard, in order to reach a conclusion of jeopardy or adverse modification, the proposed action would have to make the habitat unsuitable to support plants. Pecos sunflower is an annual plant species that re-establishes populations of adult plants each year from seed produced during the previous year or years of reproductive efforts. Roots and seeds of Pecos sunflower are present in the soil year round, even when plants are not flowering. Because the plant grows in patches and sprouts from seeds left in the ground the year before, harming or killing existing plants would not likely result in jeopardy to the species.

Alternatively, in order to conclude that a proposed action jeopardizes the continued existence of Pecos sunflower, an action would have to make the habitat unsuitable within critical habitat units or core areas. Temporary effects to this fairly hardy plant would not have lasting effects at the population level, and likely would not jeopardize the continued existence of the species as long as the habitat remained suitable. For example, an area that is completely mowed would result in adverse effects to individual plants, but likely would not jeopardize the species because the plants should re-establish from seeds in the soil.

If consultation were to reach the conclusion that the action jeopardized the continued existence of Pecos sunflower, the reasonable and prudent alternative which would be required if the project was to proceed would have to reduce impacts to both plants and the biological and physical features of the habitat. Consequently, the outcome of section 7 consultations in such cases may not be substantially different with designation of critical habitat compared to existing consultations conducted under the jeopardy standard. Additionally, the outcome of formal consultation that does not determine jeopardy or adverse modification results only in discretionary conservation recommendations. Critical habitat designation may interject additional considerations for protection of habitat function, suitability, or capability over the long term into section 7 consultations. This could result in additional discretionary conservation recommendations.

Activities involving a federal action that may destroy or adversely modify critical habitat are those that would alter the primary constituent elements to the degree that the conservation value of critical habitat for Pecos sunflower is appreciably reduced (72 FR 14328:14339). Such activities include, but are not limited to, those that

alter or result in the loss of wetland habitats of Pecos sunflower or that remove, reduce, or destroy plants. Examples of activities that may destroy or adversely modify critical habitat include drying of wetlands from groundwater depletion, wetland filling or draining, inundation of wetlands by impoundments, livestock management that results in elimination of a population or substantial reduction in abundance below a viability threshold, land clearing or disturbance, improperly planned and implemented chemical or mechanical vegetation control measures, introduction of nonnative plants, creating conditions conducive to colonization of nonnative plants, and others.

3.1.2 Overlap With Other Listed Species

Some of the proposed critical habitat subunits are currently occupied by other listed aquatic or wetland-associated species. The following listed species may occur at Bitter Lake National Wildlife Refuge (part of subunit 4a and subunit 4b): Pecos gambusia (*Gambusia nobilis*), Interior Least Tern (*Sterna antillarum*), Roswell springsnail (*Pyrgulopsis roswellensis*), Koster's springsnail (*Juturnia kosteri*), Pecos assiminea (*Assiminea pecos*), Noel's amphipod (*Gammarus desperatus*), and Pecos bluntnose shiner (*Notropis simus pecosensis*). Two listed species may occur at the La Joya Waterfowl Area: Rio Grande silvery minnow (*Hybognathus amarus*) and Southwestern Willow Flycatcher (*Empidonax traillii extimus*). Leon Springs pupfish and Pecos assiminea both occur at Diamond Y Spring (subunit 5).

Many of the habitat requirements of these listed species overlap with those of Pecos sunflower. Consequently, many of the habitat elements relevant to conservation of Pecos sunflower may already be considered in section 7 consultations

for other listed species at these three subunits. This reduces the probability of there being additional conservation recommendations arising from section 7 consultations that include consideration of designated critical habitat for Pecos sunflower in these subunits.

3.1.3 Impact Assessment Method

Many projects analyzed in the context of NEPA involve a specific action with well-defined parameters, such as control of saltcedar (*Tamarix chinensis*) in a wetland area using a combination of mechanical removal techniques and herbicide applications. Such a project has a specific implementation time frame and well-defined project boundary. Accordingly, potential impacts can be specifically identified and forecasted relatively accurately in terms of their intensity, extent, and duration. In contrast, critical habitat designation is a complex action with effects that may vary substantially depending on location and the resource area being considered.

The consequences of section 7 consultation on potential effects on Pecos sunflower and critical habitat may be highly variable, depending on the characteristics, context, location, duration, geographic extent, and timing of each proposed action subject to consultation. This complexity is heightened by the dynamic nature of the natural environment. Biological conditions that influence the magnitude of potential impacts may change over time and from place to place. The complexity of the effects of critical habitat designation was addressed by using past section 7 consultations that involved Pecos sunflower as a basis for the impact assessment. Although these consultations did not include critical habitat considerations, they do reflect the types of activities that are commonly subject to section 7 consultations involving Pecos sunflower. These

consultations are summarized in the following section.

A separate analysis of the economic impacts of all conservation activities for Pecos sunflower was conducted and relevant results were incorporated into this EA (Industrial Economics, Inc., 2007). The economic analysis considered impacts that were "*attributable coextensively to other causes*" (New Mexico Cattle Growers Ass'n v. U.S. Fish and Wildlife Service, 248 F.3d 1277 [10th Cir. 2001]; Industrial Economics, Inc., 2007: 1-1). This broadened the scope of the economic analysis to include effects resulting from all conservation actions conducted for Pecos sunflower since the species was listed. In contrast, the analysis in this EA focuses on effects that are specifically associated with the critical habitat designation alternatives.

The proposed action analyzed in this EA is designation of critical habitat. Therefore, the No Action alternative is defined as no designation of critical habitat for Pecos sunflower, but the species would continue to be listed as threatened under the ESA. Listing of Pecos sunflower and designation of critical habitat are associated actions. It is possible that Pecos sunflower could continue to be listed without designation of critical habitat. However, the opposite is not possible: critical habitat cannot be designated without Pecos sunflower being listed under the ESA.

3.1.4 Summary of Section 7 Consultation Case Studies

There have been about 24 consultations with the Service on projects that included analysis of potential effects on Pecos sunflower since the species was listed in October 1999. Records are available for 18 of these 24 consultations. These

18 consultation records constitute the pool of case studies that form the basis of the analysis.

A majority of the case studies (67 percent) are intra-Service consultations on projects proposed on Bitter Lake National Wildlife Refuge. The subject of these 12 consultations was almost exclusively vegetation management through use of herbicides, mechanical removal methods, and prescribed burning. Only one of the Refuge consultations dealt with an issue other than vegetation management. This consultation addressed the potential impacts to Pecos sunflower and other species from rehabilitation of a ditch and various water-control structures and channels on the Refuge.

Ten of the intra-Service consultations on Refuge projects were informal and concluded with a "may affect, is not likely to adversely affect" determination and subsequent concurrence. Two of the consultations were formal, involving a "may affect, is likely to adversely affect" determination. These two case studies were the aforementioned ditch rehabilitation project and a project involving application of an herbicide to control Russian knapweed (*Acroptilon repens*), which was found intermixed with Pecos sunflower at some proposed treatment locations.

The consultation record contained one other intra-Service consultation for a Partners for Fish and Wildlife Program project. This project involved construction of a fence on private land for habitat protection. The project was funded by the Service under the Partners program. This was the only project in the record that involved private lands. The State Coordinator of the New Mexico Partners for Fish and Wildlife Program concluded that the project may affect, is not likely adversely affect, Pecos sunflower and the Service's New Mexico Ecological Services Field Supervisor concurred with that determination.

The remaining five case studies were consultations on projects proposed by entities other than the Service. These entities included the Animal Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture, the Bureau of Land Management (BLM), the Federal Emergency Management Agency (FEMA), and the U.S. Army Corps of Engineers (COE).

The APHIS consultation addressed potential impacts of the proposed New Mexico Rangeland Grasshopper and Mormon Cricket Suppression Program. The proposed project involved pesticide applications and included establishing buffer areas around known locations of listed species to ensure that they would not be affected. APHIS concluded that the project may affect, is not likely to adversely affect Pecos sunflower and the Service concurred with that finding.

Two BLM projects are in the consultation record for Pecos sunflower. Both involve the potential effects of land management plans developed for large areas. The first BLM consultation addressed the potential impacts of implementing management actions in an area designated as the Bitter Lake National Wildlife Refuge Habitat Protection Zone. The management actions were developed to protect groundwater in the source area that feeds springs and seeps on the Refuge. The second project addressed potential impacts to Pecos sunflower and other species associated with revisions to the Socorro Resource Management Plan, which addressed land ownership adjustments, vegetation uses, off-road vehicle use, transportation, special management areas, wild horse management, coal leasing in Catron County, fluid mineral leasing, and right-of-way exclusion and avoidance areas. In both cases, the BLM determined that the proposed action may affect, is not likely to adversely affect Pecos sunflower. The Service concurred with the determinations, thereby concluding these two consultations.

The FEMA consultation addressed potential effects of the Public Assistance Program in 19 counties in New Mexico. The program provides funding to assist with infrastructure losses associated with flooding in late July and August 2006. FEMA determined that the program may affect, is not likely to adversely affect Pecos sunflower. The Service concurred with this finding and consultation was concluded.

Finally, the COE consultation addressed proposed restoration of Lea Lake Marsh, a wetland area near Roswell with a known population of Pecos sunflower. The proposed action involved salt cedar control using mechanical and chemical methods, increasing the diversity of water depths and flows in the marsh, and replacing a culvert on a small stream that feeds the marsh. The COE included in the project measures to protect Pecos sunflower during implementation. It was determined that the action may affect, is not likely to adversely affect Pecos sunflower. The Service concurred with this determination.

3.2 Conservation of Pecos Sunflower

3.2.1 Existing Conditions

Existing conditions are defined as no critical habitat designation for Pecos sunflower. Under these conditions, section 7 consultation with the Service under the jeopardy standard would continue to be triggered when a proposed federal action is likely to affect Pecos sunflower. This could include actions that directly or indirectly affect occupied habitat. All of the potential critical habitat subunits discussed in this EA are currently occupied by the species and therefore are currently subject to section 7 consultation under the jeopardy standard. The requirement for section 7 consultation on potential effects to

Pecos sunflower under the jeopardy standard has been in effect since the species was listed on 20 October 1999 (64 Federal Register 56582).

Federal agencies must ensure that their actions do not jeopardize the continued existence of a listed species (ESA §7[a][2]). The standard for jeopardy is an action that reasonably would be expected, either directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of the species. In the case of Pecos sunflower, survival and recovery is a function of: 1) protecting and maintaining one core conservation area in each of the four distinct recovery regions plus one additional isolated stand in each region; and 2) assuring long-term protection of designated core conservation areas and designated isolated stands in perpetuity (Service, 2005: 15-16). Accordingly, the jeopardy analysis for formal consultation would likely address the potential for substantial reduction in population size of any core area or isolated stand.

Under existing conditions, defined as the species being listed without any designated critical habitat, a federal action agency makes the initial determination of whether or not their action would affect Pecos sunflower. If the action agency determines that there would be no effect on the species, they are not required to consult with the Service. Section 7 consultation is triggered when it is determined that the proposed federal action under consideration has the potential to affect Pecos sunflower. Although there are no prohibitions of "take" for plant species under section 9(a)(1) of the ESA, pursuant to section 9(a)(2) of the ESA listed plants such as Pecos sunflower do receive protection from removal and malicious damage or destruction on areas under federal jurisdiction and from removing, cutting, digging up, damaging or destroying plants on any

other areas in knowing violation of any state law or regulation or in the course of any violation of a state criminal trespass law.

New Mexico state law prohibits taking of listed plants, which includes Pecos sunflower, without a permit from the State (New Mexico Administrative Code §19.21.2.15), where taking is defined as "removal, with the intent to possess, transport, sell, or offer for sale any ...[listed plant]... from places in the State of New Mexico where they naturally grow" (New Mexico Administrative Code §19.21.2.7.C). The law does not apply to tribal lands in the state or to federal employees working on lands within their jurisdiction.

Texas state law specifies that no person may "take, possess, transport or sell an endangered, threatened, or protected native plant" from public lands in the State without a valid scientific plant permit that authorizes such activity (Texas Administrative Code §31.2.69.A.1). Pecos sunflower is listed as threatened by the State of Texas. Removal or destruction of plants on private lands in Texas would not violate state law and therefore would not be prohibited by the ESA unless it is associated with violation of state criminal trespass law.

The consultation record does not include any biological opinions that concluded with a jeopardy finding. All of the past consultations were on actions in New Mexico; no consultations involving Pecos sunflower have been conducted in Texas (Nathan Allen, Service, pers. comm., 8 August 2007). There have been only two formal consultations involving Pecos sunflower since the species was listed (*i.e.* actions that were determined to likely have an adverse affect on the species). Both of these actions were proposed on Bitter Lake National Wildlife Refuge and both had the potential for unintentionally but directly

destroying small numbers of plants (Table 3). Neither of the actions was considered to result in a reduction in reproduction, numbers, or distribution of Pecos sunflower that would appreciably reduce the likelihood of its survival and recovery.

Table 3. Past section 7 consultations in the record that involved Pecos sunflower, categorized by potential critical habitat subunits where the consulted action was proposed. Consultations are broken down to show how many were informal (I) and how many were formal (F).

Area	Past Consult.	
	I	F
1a Rancho del Padre Spring ^a	0	0
1b Grants Salt Flat Wetland ^a	0	0
1c Pueblo of Laguna ^a	0	0
2 La Joya Waterfowl Area ^a	0	0
3a Blue Hole Cienega/Fish Ponds	0	0
3b Westside Spring	0	0
4a Bitter Lake NWR/City Land ^b	11	2
4b Bitter Lake NWR Farm		
4c Oasis Dairy	0	0
4d Lea Lake - Bottomless Lakes SP	1	0
4e Dexter Cienega	0	0
5 Diamond Y Spring	0	0
Other areas	1	0
Other consultations ^c	3	0

^a These subunits are located in counties that were addressed in the FEMA consultation, which was programmatic in nature and did not address site-specific actions. This consultation covered 19 counties in New Mexico and it was determined that the program was not likely to affect Pecos sunflower because the contemplated flood-relief work would occur in previously developed areas.

^b None of the consultations in critical habitat subunit 4a involved actions on the portion of the subunit located on City of Roswell land.

^c This includes: 1) the FEMA consultation described in footnote a; 2) the BLM consultation, in which it was acknowledged that Pecos sunflower was not known to occur in the project area; 3) the APHIS consultation which was statewide in scope and therefore potentially applies to all subunits.

Several of the consultation case studies addressed, under the jeopardy standard, the potential for impacts to habitat of Pecos sunflower in currently unoccupied but suitable habitat. An intra-Service consultation on a Partners for Fish and Wildlife Program project near Santa Rosa in Guadalupe County, New Mexico, addressed the effects of proposed boundary fencing (consultation #22420-2005-I-0530). The Service determined that the boundary fence, which would exclude livestock from the fenced area, "has the potential to benefit the sunflower as it could result in the protection/restoration of either currently occupied or unoccupied suitable sunflower habitat."

Similarly, several consultations on Bitter Lake National Wildlife Refuge determined that there may be beneficial effects to sunflower by removing the saltcedar overstory and other competing vegetation through herbicide application and prescribed burning in areas that were unoccupied, but suitable habitats for Pecos sunflower. These areas are not within the proposed critical habitat designation. For example, a wetland area on the Refuge was proposed for saltcedar cutting, cut-stump herbicide treatment, and herbicide treatment of Russian knapweed (consultation #22420-2005-I-0215). The knapweed and saltcedar stands did not contain Pecos sunflower, but it was expected that the sunflower would colonize the treated areas following removal of the nonnative species.

The primary threat to Pecos sunflower is destruction or modification of wetland habitats

from filling, groundwater pumping, aquifer depletion, and surface water diversion. Other threats include competition from non-native plant species, excessive livestock grazing, mowing, and highway maintenance (64 Federal Register 56582). Lands owned by the U.S. Fish and Wildlife Service, The Nature Conservancy, New Mexico State Parks, New Mexico Forestry Division, and the New Mexico Department of Game and Fish that are occupied by Pecos sunflower are managed, at least in part, to conserve the species by reducing threats and protecting and improving its habitat.

Pecos sunflower was recognized as occurring at Bitter Lake National Wildlife Refuge in 1991. Management at the Refuge is credited with increasing the population size of Pecos sunflower by an estimated 300 percent from 1993, when a new water-level management plan was implemented at the Refuge, to 1997 (Service, 2006: 8). The water-level management strategy introduced in 1993 has created conditions that are ideal for germination of Pecos sunflower seeds and growth of seedlings (Service, 2007: 4-6). Additionally, other habitat management measures including removal and control of nonnative invasive plants (*e.g.* saltcedar and Russian knapweed) have benefitted Pecos sunflower on the Refuge.

The New Mexico Forestry Division purchased the 127.6-acre Blue Hole Cienega in 2005 to protect a large population of Pecos sunflower. The tract was formerly privately owned. Management of the cienega consists of maintaining the boundary fence and removing nonnative Russian olive (*Elaeagnus angustifolia*; Bob Sivinski, New Mexico State Botanist, pers. comm., 26 December 2006). The New Mexico State Parks Division currently protects habitat occupied by Pecos sunflower on the perimeter of Lea Lake, at Bottomless Lakes State Park, by not mowing the

area (Bob Sivinski, New Mexico State Botanist, pers. comm., 27 December 2006). Additionally, the State Parks Division has entered into a cost-share agreement with the U.S. Army Corps of Engineers under Section 206 of the Water Resources Development Act to restore wetland habitat at Lea Lake Marsh. This project will protect existing stands of Pecos sunflower and create additional suitable habitat for the species to expand into (Blue Earth & Mussetter, LLC, 2006: 74). Funding has recently been secured to implement the project (Steve Patterson, Park Manager, pers. comm., 25 July 2007).

The New Mexico Department of Game and Fish manages the La Joya Waterfowl Area primarily for the benefit of wintering waterfowl (New Mexico Department of Game and Fish, 2007a). Pecos sunflower was recognized as occurring at the La Joya Waterfowl Area in 2004, and the Department of Game and Fish has monitored the spatial extent of the population there on an annual basis since its discovery. The Department of Game and Fish developed a management plan for Pecos sunflower in December 2007 (New Mexico Department of Game and Fish, 2007b). Management activities at the La Joya Waterfowl Area that will benefit Pecos sunflower include control of non-native invasive plants such as saltcedar, Russian olive and perennial pepperweed and continuing prohibition of off-road vehicle travel. Additionally, the Department of Game and Fish is pursuing negotiations to secure water supplies for the waterfowl management area. Currently, the Department of Game and Fish has an agreement with the Middle Rio Grande Conservancy District to use water from the riverside drain during the non-irrigation season (*ca.* October 1 through February 1) to flood wetland areas (New Mexico Department of Game and Fish, 2007b: 3). None of the past consultations in the record involved actions

proposed on the La Joya Waterfowl Management Area (Table 3).

The Nature Conservancy manages the Diamond Y Preserve to protect Pecos sunflower and other endangered species that occur at the site (The Nature Conservancy, 2007). Management is conducted through cooperative partnerships with academic and agency researchers, oil and gas companies, and local ranchers. Active management that benefits conservation of Pecos sunflower includes control of saltcedar and prescribed burning. A management plan that addresses conservation of Pecos sunflower is being developed (J. Karges, Conservation Biologist, pers. comm.).

The Pueblo of Laguna has developed a management plan for Pecos sunflower on tribal lands (Pueblo of Laguna, 2008). The plan addresses monitoring of spring and stream flow near habitats of Pecos sunflower, controlling non-native invasive plants, and managing livestock grazing to minimize impacts on Pecos sunflower.

There do not appear to be any special management programs in place for Pecos sunflower conservation on lands managed by the City of Santa Rosa, the City of Roswell, or private entities that own occupied habitat at the Oasis Dairy, Dexter Cienega, Westside Spring, Grants Salt Flat Wetland, or Rancho del Padre Spring. There have been no Pecos sunflower section 7 consultations involving any of these municipal or private properties (Table 3).

3.2.2 Effects on Pecos Sunflower

3.2.2.1 No Action Alternative No section 7 consultations pursuant to the critical habitat provisions of the ESA would be conducted for Pecos sunflower.

In general, critical habitat designation provides a regulatory mechanism, through section 7 consultation, to evaluate the effects of proposed actions on primary constituent elements within areas that are essential to the conservation of the species. The prohibition against destruction or adverse modification of critical habitat can help to ensure that the habitat continues to fully contribute to recovery of a listed species. Therefore, generally, critical habitat adverse modification analysis may be more sensitive to the recovery needs of a species, whereas the jeopardy analysis addresses the extinction end of the conservation continuum (*cf.* 57 FR 1796: 1822). However, as discussed in section 3.1.1, the outcomes of consultations under the jeopardy and adverse modification standards are not likely to differ materially for the Pecos sunflower.

Critical habitat designation also clarifies the habitat attributes that are needed for conservation of a species, which makes it easier for project proponents to assess the potential impacts of their actions and proactively plan to avoid or otherwise minimize impacts. These benefits to conservation of Pecos sunflower may not occur with the No Action Alternative.

The non-regulatory aspects of critical habitat designation that would contribute to conservation of Pecos sunflower may also not be realized with the No Action Alternative. These non-regulatory aspects include informing the public and private sector of areas that are important for species recovery, focusing attention on specific geographic areas that are essential to conservation of Pecos sunflower, identifying areas that may require special management considerations or protection, and providing protection to areas where significant threats to the species have been identified to help avoid accidental damage to such areas.

3.2.2.2 Alternative I Alternative I would have the effect of requiring section 7 consultation when proposed federal actions may affect primary constituent elements within the boundaries of designated critical habitat, which comprises over 5,745.5 acres on federal, tribal, municipal, and private lands in New Mexico and west Texas (Table 1). Section 7 consultation on potential effects to primary constituent elements associated with actions on private lands would occur only when a federal action, such as funding or permitting, is involved.

Critical habitat designation would require evaluation of the effects of proposed actions on primary constituent elements within areas that are essential to the conservation of the species, even off-site federal actions that may indirectly affect primary constituent elements in the critical habitat units described for Alternative 1 (Table 1). Prohibition of destruction or adverse modification of critical habitat would be in effect and would help to ensure that essential habitat continues to fully contribute to recovery of Pecos sunflower.

The non-regulatory aspects of critical habitat designation that would contribute to conservation of Pecos sunflower may be realized with implementation of Alternative I. These benefits may include informing the public and private sector of areas that are important for species recovery and where conservation actions may be most effective. Critical habitat designation focuses attention to and awareness of specific geographic areas that are essential to conservation of Pecos sunflower. Critical habitat also identifies areas that may require special management considerations or protection, and may help provide protection to areas where significant threats to Pecos sunflower have been identified to help to avoid accidental damage to such areas. When a federal agency proposes an action and can see that the action is located within the boundaries

of a critical habitat unit or is off-site and may indirectly affect primary constituent elements of proposed critical habitat, they can plan their projects in a proactive fashion consistent with section 7(a)(1) of the ESA.

3.2.2.3 Alternative II Excluding the two subunits (4a and 4b) on Bitter Lake National Wildlife Refuge from critical habitat designation would not be likely to reduce the degree of habitat protection on the Refuge for Pecos sunflower. All of the proposed critical habitat on the Refuge lands is occupied by Pecos sunflower. Consequently, section 7 consultation is triggered under the jeopardy standard when an action has the potential to impact Pecos sunflower, which includes impacts to its habitat that may affect reproduction, growth, or survival of plants. Also, the Refuge is managed expressly for conservation of wildlife and listed species, including Pecos sunflower. The Refuge would continue to implement management measures for the conservation of Pecos sunflower even if subunits 4a and 4b are not designated as critical habitat. Management measures that have been conducted for the benefit of Pecos sunflower in the past have included removal and control of nonnative invasive plant species such as saltcedar and Russian knapweed and management of water levels on the Refuge to promote germination of sunflower seeds and growth of seedlings.

The non-regulatory aspects of critical habitat designation are currently being realized on the Refuge. Interpretive information at the Refuge describes the occurrence and ecology of Pecos sunflower. Areas important for the conservation of Pecos sunflower on the Refuge are currently known and delineated. Exclusion of the Refuge units from critical habitat designation would have the benefit of avoiding increased administrative costs associated with inclusion of critical habitat

considerations in intra-Service section 7 consultations.

3.2.2.4 Alternative III Effects of Alternative III on conservation of Pecos sunflower would include the effects described under Alternative II and the following effects associated with exclusion of tribal lands (part of subunit 1b and all of subunit 1c) and the La Joya Waterfowl Management Area (subunit 2). The excluded areas in Alternative III are all occupied by Pecos sunflower. Therefore, any action with a federal nexus (*i.e.* funding, permitting, or authorization) in these areas is subject to section 7 consultation under the jeopardy standard if there is a potential to affect Pecos sunflower. As noted in section 3.2.2.3, the jeopardy analysis would take into consideration impacts to habitat that may affect reproduction, growth, or survival of Pecos sunflower plants. Critical habitat designation may interject additional conservation recommendations in the course of consultation, but these are not likely to materially influence the conservation status of the affected area.

3.3 Water Supply and Use

3.3.1 Existing Conditions

There have not been any consultations on proposed water use or water source development projects involving potential effects to Pecos sunflower. All of the areas proposed for critical habitat designation are currently occupied by Pecos sunflower. Therefore, federal actions that may affect groundwater levels or wetland hydrology in occupied habitats would trigger section 7 consultation under the jeopardy standard because such impacts could adversely affect reproduction, growth, or survival of Pecos sunflower plants (Eric Hein, Service Biologist, pers. comm., 9 August 2007).

3.3.1.1 Unit 1: West-Central New Mexico

Subunits 1a and 1b are located on the southeast side of Grants in Cibola County, New Mexico (Figure 5). The Grants Domestic Water System serves a population of about 14,000 and the water supply is from groundwater wells located on the north side of the city (City-data.com, 2007; U.S. Environmental Protection Agency, 2007). Groundwater is pumped from the San Andreas aquifer, which is a deep aquifer. There are no groundwater wells in the vicinity of critical habitat subunits 1a or 1b (New Mexico Office of the State Engineer, 2007). Wetland hydrology at subunit 1a appears to be a function of precipitation and a shallow, saline aquifer associated with the Rio San Jose drainage (Sivinski, 1995). This shallow, saline aquifer does not appear to have much potential for human use due to the poor quality of the water.

The wetland occupied by Pecos sunflower at subunit 1b, the Rancho del Padre Spring, is supported by a diffuse system of springs and seeps and no groundwater wells appear to be located in that area either (J. Pittenger, pers. obs., 27 February 2007; New Mexico Office of the State Engineer, 2007). As described above, these springs and seeps discharge from a shallow saline aquifer with poor water quality for human uses. Subunit 1c is undeveloped land along the Rio San Jose near the Valencia-Bernalillo county line. There do not appear to be any groundwater wells in the area (New Mexico Office of the State Engineer, 2007).

3.3.1.2 Unit 2: La Joya

Subunit 2, the La Joya Wildlife Management Area, is located in the valley of the Rio Grande. The wetlands occupied by Pecos sunflower at this site are supported by natural seeps and springs along the west side of the valley (J. Pittenger, pers. obs., 9 February 2007) and a high water table associated with the river stage of the Rio Grande and winter-time

water diversions from an agricultural drain (New Mexico Department of Game and Fish, 2007b: 3-4). Water diversion from the drain is conducted pursuant to an agreement with the Middle Rio Grande Conservancy District. The relative importance of the various water sources (*i.e.* diversions from the drain, springs, high water table associated with the river) in maintaining habitat for Pecos sunflower at the waterfowl management area are unknown (New Mexico Department of Game and Fish, 2007b: 3). The La Joya Waterfowl Management Area is bounded on the west by Sevilleta National Wildlife Refuge. There are no substantial groundwater wells in the vicinity that potentially draw water from the same aquifer that supplies the springs and seeps on the La Joya Waterfowl Management Area.

3.3.1.3 Unit 3: Santa Rosa The Santa Rosa area is underlain by karst formations and an artesian aquifer, which produces unusual features such as Blue Hole and numerous other sinkhole lakes (Figure 8). Wetland habitats at Blue Hole Cienega and the Blue Hole Hatchery Fish Ponds (subunit 3a) are maintained by high water tables associated with numerous small springs and seeps. The Santa Rosa Water Supply system serves approximately 2,500 people and comes from two wells that draw from a deep aquifer (New Mexico Environment Department, 2007). There are four domestic wells in the vicinity of Blue Hole Cienega that draw up to three acre-feet per year and one larger irrigation supply well that draws up to 45 acre-feet per year. There are two domestic wells in the vicinity of Westside Spring (subunit 3b) that draw up to three acre-feet of groundwater per year (New Mexico Office of the State Engineer, 2007). All of these wells are owned by non-federal entities and their uses do not involve any federal nexus.

3.3.1.4 Unit 4: Roswell/Dexter The 500-year source-water capture zone for the springs and

seeps feeding the wetlands occupied by Pecos sunflower on Bitter Lake National Wildlife Refuge was delineated in 1999 (Wolford *et al.*, 1999). In 2002, there were 4,119 wells that withdrew 221,350 acre-feet of groundwater annually within the 12-township block that encompasses this source-water capture zone (New Mexico Department of Game and Fish, 2005). Irrigation accounted for 89 percent of the groundwater use, while domestic wells accounted for slightly less than three percent of groundwater use from the wells (New Mexico Department of Game and Fish, 2005).

The New Mexico Office of the State Engineer acknowledged a federal water right serving Bitter Lake National Wildlife Refuge "limited to existing conveyance depletions, as determined following a five year monitoring study pursuant to a Reserved Water Rights Stipulation dated December 6, 1996" (State of New Mexico, 2002: 10). A settlement agreement for a reserved water right for the Refuge has been reached with the State and is currently being reviewed by the Department of Justice (P. Tashjian, Service Hydrologist, pers. comm., 10 August 2007).

Current and future regulation of groundwater pumping in the Roswell Basin by the New Mexico Office of the State Engineer is likely to prevent any impacts to spring flows on the Middle Tract of Bitter Lake National Wildlife Refuge from groundwater withdrawal (State of New Mexico, 2002: 5). The New Mexico Office of the State Engineer has stated that "Administration of the basin protects all water users, including the Service, in times of drought and against overdiversion" and that "as a fully administered basin, any future effects on the water supply for these habitats would be due to a lack of recharge resulting from drought, and not from overpumping" (State of New Mexico, 2002: 10).

The wetland habitats that support Pecos sunflower at Oasis Dairy (subunit 4c) are located along the west side of the Pecos River (Figure 9). The hydrology of these wetlands appears to be a combination of a high water table associated with the Pecos River and groundwater seeps. There are no wells in the vicinity of the wetlands at this site (New Mexico Office of the State Engineer, 2007). The wetlands at Bottomless Lakes State Park that support Pecos sunflower (subunit 4d) are maintained by Lea Lake and its outflow, which has steadily increased from 1976 to the present time (Blue Earth & Mussetter, LLC, 2006: 8). There are no wells or diversions from Lea Lake or its outflow (Blue Earth & Mussetter, LLC, 2006: 17).

Dexter Cienega (subunit 4e) is located just east of the Hagerman Canal north of Dexter (Figure 10). There are eight wells in the vicinity of the cienega. Six of these wells are for irrigation and draw up to 1,287.65 acre-feet of groundwater per year. The other two wells are for domestic use and draw up to three acre-feet of groundwater per year (New Mexico Office of the State Engineer, 2007). Groundwater withdrawal was the cause of wetland loss at a nearby cienega, which also harbored a population of Pecos sunflower that was extirpated when the wetlands were dewatered (Service, 2005: 8). However, none of the well development or use actions involved a federal nexus.

3.3.1.5 Unit 5: West Texas Diamond Y Spring discharges relatively saline water (Service, 1985: 6; 64 FR 56581: 56582) from the Rustler Aquifer (Boghici and Van Broekhoven, 2001: 212). Groundwater at the spring apparently is not suitable for irrigation, municipal, or domestic use because of the high salinity and mineral content (Service, 1985: 6). However, diversion of spring water and groundwater pumping in the area was implicated in the loss of flow at Leon Springs and

the upper reaches of Leon Creek (45 FR 54678). Over 90 percent of the water used in Pecos County, Texas is obtained from groundwater, and irrigation accounts for about 85 to 90 percent of water use in these counties (Boghici, 1999). The principal source of groundwater for irrigation, municipal, and industrial uses in Pecos County, Texas, is the Cenozoic Pecos Alluvium aquifer (Boghici, 1999). Anticipated demand for groundwater from this aquifer to the year 2030 is in excess of the estimated recharge rate. However, the Cenozoic Pecos Alluvium aquifer should have enough fresh water to meet anticipated needs although aquifer storage will likely be reduced. It is expected that aquifer storage would be reduced by about 561,459 acre-feet (6.8 percent) from 2000 to 2030 (Boghici, 1999).

3.3.2 Effects on Water Supply and Use

3.3.2.1 No Action Alternative Section 7 consultations on the effects of water projects would be required under the jeopardy standard when there is a federal nexus (*e.g.*, federal lands, permitting, or funding is involved). Federally supported water projects that could substantially reduce or eliminate flow from springs, seeps, outflow channels, or wetlands occupied by Pecos sunflower would likely trigger formal consultation under the jeopardy standard. However, since Pecos sunflower was listed in 1999, there have been no consultations on water supply or use projects.

3.3.2.2 Alternative I Critical habitat designation under any of the action alternatives is not likely to have any substantial additional affect on water development projects compared to the No Action alternative because consultations under the jeopardy and adverse modification standards are not likely to differ materially. All of the critical

habitat subunits proposed under Alternative I are occupied by Pecos sunflower and their primary conservation value is to sustain populations.

Critical habitat designation could focus analysis of potential impacts to habitat characteristics as defined by the primary constituent elements, thereby ensuring that the designated habitat maintains the characteristics necessary for conservation of Pecos sunflower, particularly at the recovery end of the spectrum. For example, it may be difficult to conclusively draw a cause-and-effect relationship between a relatively small change in the depth of soil saturation and an adverse effect upon individual plants. The adverse modification standard, by focusing solely on habitat characteristics rather than the plants themselves, may provide a more directed analysis to ensure that habitat remains suitable for the species. However, a federal action that detrimentally alters wetland hydrology to the point that capability of a subunit to support Pecos sunflower is adversely affected would probably result in an adverse effect determination under the jeopardy standard. This is because such an impact would be likely to adversely affect reproduction, growth, and survival of Pecos sunflower plants. Critical habitat designation may result in additional discretionary conservation recommendations to reduce impacts to primary constituent elements related to wetland hydrology. However, it is unlikely that reasonable and prudent alternatives developed under the jeopardy standard for a federally supported water project would be changed substantially with the addition of critical habitat designation.

The potential for federal-nexus water supply or use projects in proposed critical habitat subunits with Alternative I is remote. Most of the existing groundwater developments in the vicinity of critical habitat subunits are small, privately owned domestic wells that withdraw no more than three

acre-feet per year. There are larger-yield irrigation wells near Blue Hole Cienega (subunit 3a) and Dexter Cienega (subunit 4e), but these too are privately owned and the probability of there being a federal-nexus action associated with these wells or new irrigation wells does not appear likely. However, it is conceivable that a federal nexus water development project could occur in the future, such as a federal Community Development Block Grant funded municipal water supply improvement project. However, the potential for this type of action to occur in a location that may affect Pecos sunflower is not known.

3.3.2.3 Alternative II Exclusion of Bitter Lake National Wildlife Refuge lands would result in the Refuge not having to address analysis of effects on critical habitat in section 7 consultations. The Refuge does not pump groundwater from aquifers that support springs and seeps along Bitter Creek or on the west side of the impoundments, which support wetlands occupied by Pecos sunflower. Similarly, the Refuge already manages water levels in the impoundments to benefit conservation of Pecos sunflower (*cf.* section 3.2.1).

3.3.2.4 Alternative III Exclusion of Bitter Lake National Wildlife Refuge lands, tribal lands, and the La Joya Waterfowl Management Area from critical habitat designation would have the effect of not requiring section 7 consultation under the adverse modification standard for federally supported water supply or use projects on these areas. However, as noted in section 3.3.2.2, the potential for federal-nexus water development projects on these areas is remote. If a federal-nexus water development project were proposed on any of these excluded areas, potential effects to Pecos sunflower would still be required under the jeopardy standard because the excluded subunits are all occupied by the species. As described for

Alternative I, addition of the critical habitat adverse modification analysis would be unlikely to materially change the outcome of such consultations.

3.4 Livestock Grazing

3.4.1 Existing Conditions

Livestock grazing occurs in portions of the West-Central New Mexico, Santa Rosa, and Roswell/Dexter units (Table 4). No livestock grazing occurs at the La Joya Wildlife Management Area (subunit 2) or at Blue Hole area in Santa Rosa (subunits 3a and 3b). No grazing occurs on Bitter Lake National Wildlife Refuge or adjacent City of Roswell land (subunit 4a), the Refuge Farm (subunit 4b), or at Lea Lake at Bottomless Lakes State Park (subunit 4d). Livestock grazing occurred at the Diamond Y Springs Preserve until 1990 (J. Karges, The Nature Conservancy, pers. comm., 22 March 2005). Livestock grazing, consistent with habitat management goals at the preserve, could be resumed again in the future, but there are currently no plans to do so (J. Karges, The Nature Conservancy, pers. comm., 22 March 2005).

Livestock grazing uses occur only in five subunits, which are privately owned or are tribal lands owned in fee that are not held in trust by the United States (Table 4; Pueblo of Laguna, 2008; G. Petuuche, Realty Officer, Pueblo of Acoma, pers. comm., 28 February 2008). Of the total area considered for critical habitat designation, only about 5 percent is subject to livestock grazing. Livestock grazing can have a substantial impact on Pecos sunflower populations (Figure 12; Sivinski, 1995) because the plant is an annual and chronic herbivory of seed heads can limit the potential for a population to persist. Grazing at Rancho del Padre Spring and cienega has been described as "severe" in the past (Sivinski, 1995,

1998). However, recent observation indicate that the portion of the subunit owned by the Pueblo of Acoma has an apparently healthy stand of Pecos sunflower around the main spring as does the downstream wetland area on private land north of Interstate 40 (J. Pittenger, pers. obs., 22 February 2007). The Grants Salt Flat Wetland is at least periodically subject to intensive grazing (Sivinski, 1995, 1998; J. Pittenger, pers. obs., 22 February 2007). Similarly, the Westside Spring area (subunit 3b) appears to be subject to moderate grazing pressure (J. Pittenger, pers. obs., 27 December 2006). The Oasis Dairy habitat (subunit 4c), which consists of marshy areas along the west side of the Pecos River, is only lightly grazed, if at all (Sivinski, 1998). Dexter Cienega appears to be subject to only moderate grazing and a large population of Pecos sunflower persists there (Sivinski, 1995; J. Pittenger, pers. obs., 27 December 2006).

3.4.2 Effects on Livestock Grazing

3.4.2.1 No Action Alternative Without designation of critical habitat, section 7 consultation would be triggered under the jeopardy standard only for a federal-nexus action involving livestock grazing. All of the subunits subject to livestock grazing are on private or tribal lands (Table 4). Proposed critical habitat units on the pueblos of Acoma and Laguna are owned in fee and are not held in trust by the United States (Pueblo of Laguna, 2008; G. Petuuche, Realty Officer, Pueblo of Acoma, pers. comm., 28 February 2008). Therefore they are not subject to Bureau of Indian Affairs leasing regulations. Livestock grazing impacts to Pecos sunflower on private land are not a prohibited action pursuant to section 9 of the ESA because they are not in violation of any state law. There have been no consultations on specific grazing actions since the species was listed in 1999.

Table 4. Critical habitat subunits that have livestock grazing.

Critical Habitat Subunit		Acres Subject to Grazing
1a	Rancho del Padre Spring	25.5
1b	Grants Salt Flat Wetland	62.5
1c	Pueblo of Laguna	undefined
2	La Joya Waterfowl Area	0
3a	Blue Hole Cienega/Blue Hole Fish Ponds	0
3b	Westside Spring	6.4
4a	Bitter Lake National Wildlife Refuge/Roswell City Land	0
4b	Bitter Lake NWR Farm	0
4c	Oasis Dairy	103.9
4d	Lea Lake at Bottomless Lakes State Park	0
4e	Dexter Cienega	41.4
5	Diamond Y Spring	0
Total		239.7



Figure 12. Impacts of intensive livestock grazing on Pecos sunflower in the Leon Creek drainage adjacent to the Diamond Y Spring Preserve in Pecos County, Texas (photo by J. Pittenger, 29 December 2007).

3.4.2.2 Alternatives I, II and III Designation of critical habitat under any of the three critical habitat designation alternatives would have no effect on livestock grazing. All of the subunits subject to livestock grazing are under private or tribal ownership. Ongoing livestock grazing actions in these subunits have no federal nexus, are therefore are not subject to section 7 consultation. That condition would not change with critical habitat designation.

3.5 Land Development

3.5.1 Existing Conditions

The public lands considered for critical habitat designation are not proposed for any type of development. These areas include the La Joya Waterfowl Area (subunit 2), Blue Hole Cienega/Blue Hole Fish Ponds (subunit 3a), Bitter Lake National Wildlife Refuge/City of Roswell Land (subunit 4a), Bitter Lake NWR Farm (subunit 4b), and Lea Lake at Bottomless Lakes State Park (4e). Additionally, the Diamond Y Springs Preserve, owned by The Nature Conservancy, is managed for its ecological attributes and is not proposed for development.

Critical habitat subunits that could potentially be subject to development include Rancho del Padre Spring Cienega (subunit 1a), Grants Salt Flat Wetland (subunit 1b), Pueblo of Laguna land (subunit 1c), Westside Spring (subunit 3b), Oasis Dairy (subunit 4c), and Dexter Cienega (subunit 4e). Of these subunits, the Pueblo of Laguna land and Oasis Dairy sites are unlikely to have any future development. The Pueblo of Laguna land is in a remote rural area in Valencia County, New Mexico (Figures 4 and 6). The area occupied by Pecos sunflower is located along the Rio San Jose drainage and is characterized by relatively rugged topography and abrupt relief, which render it relatively unsuitable for development. The Oasis

Dairy habitat consists of two marshy sites along the west side of the Pecos River (Figure 9). The high water table at the site severely limits its suitability for development.

Rancho del Padre Spring Cienega (subunit 1a) is primarily privately-owned (22.6 acres) but also includes 2.9 acres of land owned by the Pueblo of Acoma. The private parcel, located adjacent to the north side Interstate 40 just outside of Grants, New Mexico is used for livestock grazing. There is also a home on one corner of the property. The home was for recently advertised for sale (K. Yori, pers. obs., 22 February 2007). The landowner has indicated an interest in developing the property, possibly as an industrial park (Industrial Economics, 2007:3-8). The Pueblo of Acoma land, which is adjacent to south side Interstate 40, may possibly be developed at some time but there were no definitive plans in place to do so as of June 2007 (Industrial Economics, Inc., 2007:3-8). The boundaries of subunit 1a encompass the cienega habitat, which may constitute wetlands subject to the jurisdiction of section 404 of the Clean Water Act (J. Pittenger, pers. obs., 22 February 2007).

The Grants Salt Flat Wetland (subunit 1b) borders a strip of recently developed land at the southeast entry into the City of Grants (Figure 13). The private landowner of the area has indicated that the property was recently sold to the Pueblo of Acoma, but this has not been confirmed (Industrial Economics, Inc., 2007:3-9). As described above for the Rancho del Padre Spring Cienega, the Grants Salt Flat Wetland subunit may also contain wetlands subject to jurisdiction under section 404 of the federal Clean Water Act.

Westside Spring (subunit 3b) is located on the southwest side of Santa Rosa in a semi-rural area. One residential home has been constructed on high ground on the north side of the cienega

habitat (J. Pittenger, pers. obs., 26 December 2006). The potential for development of the cienega habitat itself appears to be remote, as it has a relatively high water table and there are extensive tracts of undeveloped upland areas in the vicinity of the site. Similarly, the Dexter Cienega subunit encompasses the marshy habitat located in the bottom of an unnamed draw at the site (Figure 14) and there are extensive undeveloped upland areas in the vicinity. Both of these sites may have wetlands subject to jurisdiction under the federal Clean Water Act (J. Pittenger, pers. obs.), in which case placement of fill would require Clean Water Act section 404 authorization (*i.e.* there would be a federal nexus). There are no section 7 consultations in the record that involve Pecos sunflower and land development projects.

3.5.2 Effects on Land Development

3.5.2.1 No Action Alternative Private land development proposals that have a federal nexus (*i.e.* federal permitting, funding, or authorization) and that may potentially affect Pecos sunflower would trigger section 7 consultation under the jeopardy standard, even if no critical habitat is designated for the species. Although there have not been any section 7 consultations on private land development projects since the species was listed, it is foreseeable that such a proposal could require Clean Water Act section 404 authorization from the U.S. Army Corps of Engineers, which would constitute a federal nexus and therefore trigger section 7 consultation if there is a potential to affect the species. Other than section 404 permitting, potential federal involvement could include funding for low-income housing or infrastructure improvement.

3.5.2.2 Alternative I Because all of the proposed critical habitat subunits are occupied by Pecos sunflower, critical habitat designation would not trigger additional section 7 consultations compared to the No Action Alternative. Federally supported land development actions (*e.g.* a federal Community Development Block Grant funded project) that may potentially affect habitat characteristics would also result in impacts to Pecos sunflower.

For example, a typical land development project would involve building structures on undeveloped habitat, which would render the habitat unsuitable for continued reproduction, growth, and survival of Pecos sunflower plants. In such a case, section 7 consultation would be triggered under the jeopardy standard (assuming there is a federal nexus), regardless of whether or not critical habitat is designated. Critical habitat designation may interject additional conservation recommendations directed at minimizing impacts to primary constituent elements, but the effect of section 7 consultation on the federally supported land development project is unlikely to be materially different with or without critical habitat designation.

3.5.2.3 Alternatives II and III Effects on land development from excluding Bitter Lake National Wildlife Refuge lands, tribal lands, and the La Joya Waterfowl Area would substantially not be different from the effects of Alternative I. Of the excluded areas, only the Pueblo of Acoma lands are potentially suitable for or may be considered for development. Exclusion of Pueblo of Acoma lands would have the effect of not requiring analysis under the adverse modification standard in the event that a federally supported land development project is proposed in subunit areas owned by the tribe.



Figure 13. Development on the east side of the Grants Salt Flat Wetland. Commercial developments along N.M. Highway 122 (Santa Fe Avenue) are visible through the center of the photograph (photo by K. Yori, 22 February 2007).

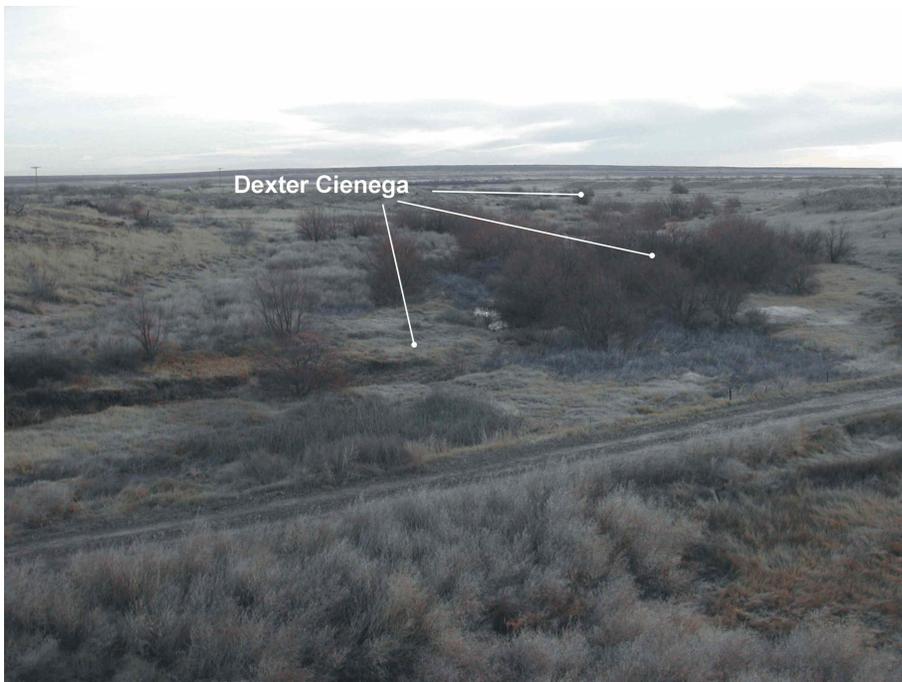


Figure 14. Dexter Cienega, subunit 4e (photo by J. Pittenger, 27 December 2006).

3.6 Recreation

3.6.1 Existing Conditions

Public recreation takes place only on three units or subunits: La Joya Waterfowl Management Area (unit 2), Bitter Lake National Wildlife Refuge (subunit 4a); and Lea Lake at Bottomless Lakes State Park (subunit 4d). The remaining subunits are privately owned and not open to public recreation or are municipal lands not used for recreation. For example, the Blue Hole Fish Ponds portion of subunit 3a consists of abandoned ponds that are now occupied by marsh vegetation (Figure 15).

At the La Joya Waterfowl Management Area, hunting is permitted during open season and fishing is open in the summer. There are no developed recreation facilities at this site. Other recreation activities include bird-watching which can be undertaken year-round.

Bitter Lake National Wildlife Refuge provides several types of public recreation opportunities that are available during normal hours of operation (*i.e.*, daylight hours). At the Middle Tract of the refuge, where critical habitat is proposed, recreation activities include hunting, bird-watching, hiking, bicycling, and wildlife observation and photography. The wildlife refuge averages 40,000 visitors annually (Service, 2001). Visitor estimates for the years 1991 through 2001 are shown in Table 5.

A wildlife viewing route, which can be followed by auto, bicycle, or on foot, begins at the visitors' center and makes an eight-mile loop. The route encircles the impoundments in the central portion of the Refuge's Middle Tract. In the Middle Tract, public access is prohibited from the north boundary of the tract south to the wildlife viewing loop, which effectively excludes Unit 3, Sago

Springs, and Bitter Creek from public access. Wildlife viewing tours guided by refuge staff are conducted once a month from October through May. These tours allow participants into areas normally closed to the public.

Four short walking trails are located in the Middle Tract. Unit 5, nearest the Visitor Center, has a short walking trail (Butterfly Trail) leading from Visitor Center to the Unit 5 overlook. Some spurs to this trail below the viewing platform encroach into the proposed critical habitat. Three other trails (Dragonfly, Desert Upland, and Oxbow) with viewing platforms are also in the Middle Tract in Units 6 and 7, but they are also generally outside of the proposed critical habitat boundaries. The Dragonfly Trail, for example, terminates at a viewing platform in Unit 6 that is located on the edge of critical habitat above the spring ditch. Hunting waterfowl, upland birds, and deer is allowed only within certain portions of the Refuge. Within the proposed critical habitat boundaries, hunting is allowed only in Hunter Marsh. Other hunting areas are in the Middle Tract, but outside of the critical habitat boundaries, and on the North Tract. About 250 hunters use the Middle Tract each year to hunt waterfowl. The Refuge is the focus of a dragonfly festival one weekend each year. The event is sponsored by Friends of Bitter Lake National Wildlife Refuge, a non-profit group.



Figure 15. The Blue Hole Fish Ponds area in subunit 3a (photo by J. Pittenger, 26 December 2006).

Table 5. Annual visitor estimates at Bitter Lake National Wildlife Refuge, 1991 - 2001 (Service, 2001).

Calendar Year	No. of Visitors
2001	43,570
2000	38,676
1999	36,680
1998	32,093
1997	41,385
1996	52,713
1995	35,698
1994	33,571
1993	36,585
1992	43,482
1991	40,051

Common recreational activities offered at Lea Lake in Bottomless Lakes State Park include swimming, boating, scuba diving, fishing, hiking, bird watching, camping, and picnicking. Lea Lake has the largest array of developed recreation facilities of any of the lakes in the park. These facilities include: 1) a swimming beach, bathhouse with showers and toilets, a small dock, pedal boat rentals, vending machines, and a gift shop; 2) an RV campground with hook-ups, dump station, flush toilets, and showers; and 3) a tent campground and day-use picnic area with volleyball courts, playground, and covered picnic tables.

Throughout the year, special recreational events take place at the park, many around Lea Lake, such as a fishing tournament, a sand sculpture contest, and paddleboard races. Additionally, the park hosts a series of interpretive programs at the Lea Lake beach every Saturday evening from Memorial Day through Labor Day generally featuring nature-oriented topics (State Parks Division, 2001).

Natural lakes are in limited supply in New Mexico and quite rare at low elevations. Thus, park visitation for day-use is highest during summer months when recreationists flock to the pleasant aquatic setting to enjoy the swimming, boating, scuba diving, and picnicking. Camping has historically been most popular in spring months, but year-round use has been steadily increasing due to increased capacity for RV hook-ups. The total number of annual visitors to the park has been steadily increasing in recent years, but the park's highest visitor count of more than 162,000 occurred in 1998, the year that coincided with the fiftieth anniversary of the "Roswell incident" (State Parks Division, 2001). Use of the shoreline area around Lea Lake (*i.e.* critical habitat subunit4d) by recreationists is intensive but does not appear to influence the population size of

Pecos sunflower, which grows along the wet edges of the lake (Sivinski, 1995). The Park staff have excluded the area from mowing in order to protect Pecos sunflower (R. Sivinski, State Botanist, pers. comm., 27 December 2006).

Recreation activities at Diamond Y Spring are allowed only by permission from The Nature Conservancy to ensure protection of the sensitive plant and animal species that occur on these lands. The Nature Conservancy hosts tours of the area for groups making such request. Diamond Y Springs Preserve annually has about eight to 10 tours. Tour groups have ranged in size from as few as three to as many as 40 participants (J. Karges, The Nature Conservancy, pers. comm., 29 March 2005).

3.6.2 Effects on Recreation

3.6.2.1 No Action Alternative Section 7 consultation on federally supported recreation actions would be required under the jeopardy standard in all habitats occupied by Pecos sunflower when there is a potential effect to the species. Analysis under the adverse modification standard would not be required because no critical habitat would be designated. One consultation in the record involved recreation-related developments. This was the section 7 consultation on restoration of Lea Lake Marsh (consultation no. 22420-2007-I-0007). The Service concurred with a determination of may affect, not likely to adversely affect because the project included measures to protect existing Pecos sunflower plants and would improve habitat conditions for the species.

3.6.2.2 Alternative I Designation of critical habitat under Alternative I would require analysis under both the adverse modification and jeopardy standards in section 7 consultations on federally supported recreation projects proposed in critical

habitat. Such actions would already trigger section 7 consultation under the jeopardy standard alone because all critical habitat subunits are occupied by Pecos sunflower. Critical habitat designation may result in the addition of other conservation measures to ensure protection of Pecos sunflower habitat, but the outcomes of section 7 consultations are unlikely to be materially different whether or not critical habitat is designated. This is because actions that would detrimentally affect primary constituent elements (e.g. a lowering of the water table) would also impact reproduction, growth, and survival of Pecos sunflower plants.

3.6.2.3 Alternatives II and III Federally supported, recreation-related projects proposed in Pecos sunflower habitat on excluded lands would not be subject to analysis under the adverse modification standard during section 7 consultations. However, such actions would still potentially trigger section 7 consultation under the jeopardy standard. Consequently, the effects of Alternatives II and III on recreation would not be substantially different from the effects of Alternative I.

3.7 Socioeconomic Conditions and Environmental Justice

Regulations for implementing NEPA require analysis of social effects when they are interrelated with effects on the physical or natural environment (40 CFR §1508.14). Federal agencies are also required to "*identify and address disproportionately high and adverse human health or environmental effects*" of their programs and actions on minority populations and low-income populations, as directed by Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations).

3.7.1 Existing Conditions

The more than 5,745.5 acres proposed as critical habitat for the Pecos sunflower includes five units - four in New Mexico and one in Texas. Fourteen individual parcels comprise the four units in New Mexico; the unit in Texas has just one land parcel. Units 1 through 4, the New Mexico units, consist of 5,505.8 acres located in five counties: Chaves, Cibola, Guadalupe, Socorro, and Valencia. Unit 5, the Diamond Y Spring Unit in Pecos County, Texas, is 239.7 acres of private land owned by The Nature Conservancy. Unit landownership and acreages are shown in Table 1.

Major land uses include natural resource conservation (including conservation of Pecos sunflower), livestock grazing, and recreation. More than 5,407 acres (94 percent) of the areas proposed as critical habitat for the Pecos sunflower are currently being managed in part or wholly for natural resource conservation.

3.7.1.1 Communities Four of the proposed critical habitat subunits are located within or on the outskirts of developed communities in New Mexico. These include:

- subunits 1a (Rancho del Padre Spring) and 1b (Grants Salt Flat Wetland) which are located in and around Grants, New Mexico (Figure 5); and
- subunits 3a (Blue Hole Cienega/Blue Hole Fish Hatchery Ponds) and 3b (Westside Spring) which are in or near Santa Rosa, New Mexico (Figure 8).

The remaining units are located in rural surroundings, ranging from about 9 to 26 miles from the nearest “full-service” community (*i.e.* one with services such as medical centers, schools, emergency services, and other community resources; Table 6). Fort Stockton, Texas and the New Mexico cities of Los Lunas, Roswell, and Socorro are the communities fitting this description which are closest to the remaining proposed critical habitat units.

Table 6. Full-service communities nearest each proposed critical habitat subunit with Census 2000 population estimates (U.S. Census Bureau, 2007a). Distances between unit and nearest community are approximate.

Critical Habitat Unit	County	Nearest Communities	Census 2000 Population	Distance Between Unit and Nearest Community
1a Rancho del Padre Spring Cienega	Cibola	Grants, NM	8,806	<2 miles
1b Grants Salt Flat Wetland	Cibola	Grants, NM	8,806	<1 mile
1c Pueblo of Laguna	Valencia	Los Lunas, NM	10,034	26 miles
2 La Joya State Wildlife Refuge	Socorro	Socorro, NM	8,877	21 miles
3a Blue Hole Cienega/Blue Hole Fish Hatchery Ponds	Guadalupe	Santa Rosa, NM	2,744	0 miles
3b Westside Spring	Guadalupe	Santa Rosa, NM	2,744	<1 mile
4a Bitter Lake NWR	Chaves	Roswell, NM	45,293	9 miles
4b Bitter Lake NWR Farm	Chaves	Roswell, NM	45,293	9 miles
4c Oasis Dairy	Chaves	Roswell, NM	45,293	12 miles
4d Lea Lake (Bottomless Lakes State Park)	Chaves	Roswell, NM	45,293	17 miles
4e Dexter Cienega	Chaves	Roswell, NM	45,293	17 miles
5 Diamond Y Springs Complex	Pecos	Fort Stockton, TX	7,846	19 miles

In some cases, there are several small villages and towns, such as Dexter, New Mexico near the Dexter Cienega, which are located enroute to the nearest city. Full-service communities closest to each of the proposed critical habitat units are identified in Table 6 along with their populations and approximate distance from their respective units.

There are few private residences associated with the proposed critical habitat units. Of the five privately-owned parcels of land included in the proposed critical habitat units, just three have homes located on the private land (Oasis Dairy, Dexter Cienega, and Rancho del Padre Spring). These homes are outside of the actual boundary of the proposed critical habitat within each private parcel. The Rancho del Padre Spring home was listed for sale in February 2007. Neither Acoma Pueblo nor Laguna Pueblo has residents located within the proposed critical habitat boundary on these reservations.

3.7.1.2 Economy Primary occupations in counties with proposed critical habitat units closely correlate with those of New Mexico and Texas. Management, professional, service, and sales occupations are predominate (U.S. Census Bureau, 2007e). Major industries in the six counties, as well as in Texas and New Mexico, are education, health care and social services followed by arts, entertainment, recreation, accommodation and food services, retail trade, public administration, and manufacturing (U.S. Census Bureau, 2007e).

3.7.1.3 Environmental Justice The population of New Mexico and Texas and the combined population of their associated counties with land proposed for critical habitat are shown in Table 7.

Table 7. Population characteristics in the project area. The table shows population of the two states and population of counties within each state that are included in the areas proposed for designation of critical habitat for the Pecos sunflower (U.S. Census Bureau, 2007a).

State	Total State Population	Chaves Co.	Cibola Co.	Guadalupe Co.	Socorro Co.	Valencia Co.	Pecos Co.	Combined County Population
New Mexico	1,818,046	61,382	25,595	4,680	18,078	66,152	-	175,887
Texas	20,851,820	-	-	-	-	-	16,809	16,809

Selected population demographics of these states are compared to the demographics of the combined potentially-affected counties within each state in Figure 16. The demographics selected for comparison include the composition of populations based on: 1) race (Figure 16A); 2) persons of Hispanic or Latino origin versus other origins (Figure 16B); and 3) persons with income below and above the poverty level (Figure 16C). The purpose of selecting these demographics is for making a determination as to whether or not implementation of the proposed action would disproportionately adversely affect minority or low-income groups in accordance with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.

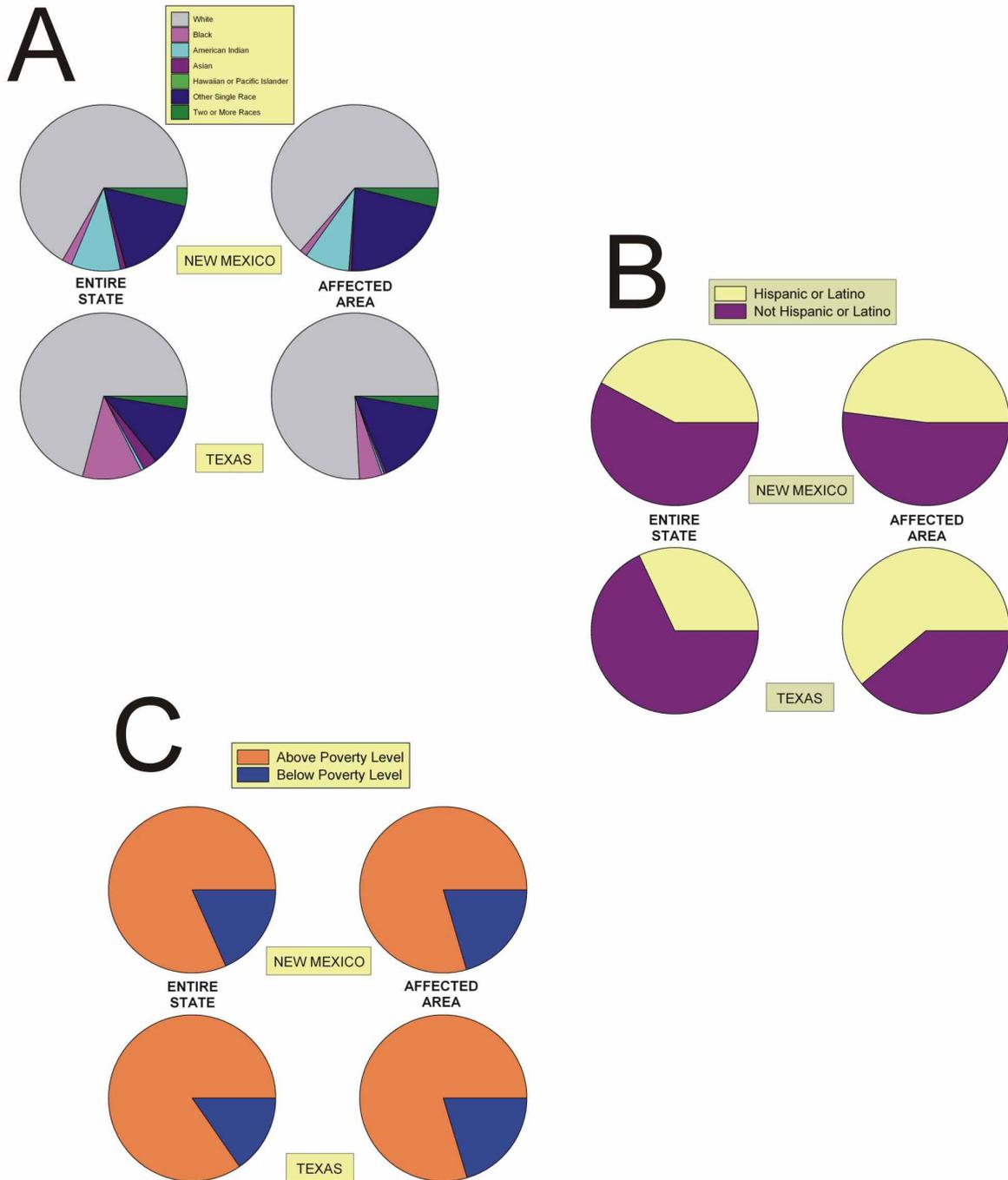
With respect to race, the overall Texas population has a slightly lower percentage of white persons than in Pecos County (U.S. Census Bureau, 2007a). New Mexico's statewide white population is slightly higher than that of the combined five potentially-affected counties in New Mexico (Figure 16A). Conversely, the combined population of the five New Mexico counties has a higher percentage of racial minorities than in the statewide New Mexico population while Pecos County, Texas has a lower percentage of racial minorities than the overall Texas population. About 66.8 percent of all New Mexicans are white while 63.8 percent of citizens in the five-county area combined are white. Statewide, 71 percent of the Texas population is white while 75.8 percent of the combined population of Pecos counties is white.

About 42 percent of New Mexico citizens are Hispanic or Latino while 48 percent of the combined populations of Cibola, Chaves, Guadalupe, Socorro, and Valencia counties identify themselves as Hispanic or Latino (Figure 16B; U.S. Census Bureau, 2007b). There is a

substantial difference, though, between the population of Texas and its potentially-affected counties when comparing Hispanic or Latino populations. About 32 percent of the population of Texas is Hispanic or Latino, but nearly twice as many (61 percent) people in Pecos County are Hispanic or Latino (Figure 16B).

In 1999, all six counties analyzed for critical habitat designation effects reported, on average, over 20 percent of their respective populations living below the poverty level. This number was higher than either the entire state of New Mexico, which reported 18.4 percent and the state of Texas with 15.4 percent (Figure 16C; U.S. Census Bureau, 2007d). Per capita income in Pecos County (\$12,212) was substantially below that of the average Texas resident (\$19,617) in 1999 (U.S. Census Bureau, 2007c). In New Mexico, the \$17,261 per capita income in 1999 was also well above the average per capita income for residents of the combined five potentially-affected counties of \$13,107.

Figure 16. Demographic characteristics of the project area. Selected demographics for populations in the state are compared with demographics for combined populations in the counties containing proposed critical habitat subunits. See text for discussion and references for data sources.



3.7.2 Effects on Socioeconomic Conditions and Environmental Justice

3.7.2.1 No Action Alternative Section 7 consultation under the jeopardy standard would be required on federal actions that have the potential to affect Pecos sunflower. No analysis under the adverse modification standard would be required with no designation of critical habitat.

3.7.2.2 Alternatives I, II and III Designation of critical habitat with any of the three action alternatives would not affect community services or community cohesion. No residences or businesses would be displaced. Community resources such as schools, law enforcement, medical services, and social services, would not change as a result of designation of critical habitat.

An economic study of the effects of the proposed critical habitat designation did not identify loss of jobs or reduction of industry production in any of the six counties with selection of any of the three critical habitat designation alternatives (Industrial Economics, 2008). There would be an estimated total economic impact of \$3.3 to \$3.6 million (discounted at three percent) over a 20-year period from all conservation activities for Pecos sunflower (Industrial Economics, 2008). About 55 to 60 percent of these impacts were attributable to La Joya Waterfowl Management Area and Bitter Lake National Wildlife Refuge. Incremental impacts associated specifically with critical habitat designation were estimated at \$605,000 (discounted at three percent) over a 20-year period. These forecasted impacts consisted of the costs associated with additional administrative efforts required to include critical habitat considerations in section 7 consultations, property value impacts associated with wetland

filling and development, and impacts associated with potential changes in tribal land management.

Often the designation of critical habitat on private land is associated with the perception of a “stigma” attached to that property after designation. Opponents of critical habitat designation often use this as an argument against designation, stating that it will result in a loss of property values. Other arguments against designation, particularly in more urban settings, is that the designation will curtail development of designated lands, increase costs of development, and hinder economic development.

McKenney (2000) found that, contrary to predictions by the Southern Arizona Home Builders Association that designation of critical habitat for the Cactus Ferruginous Pygmy-owl would result in decreased economic activity, post-designation economic activity continued at the same or at even a higher rate in two critical habitat units located in Pima County, Arizona around the town of Marana. McKenney (2000) analyzed changes in vacant land values, tax revenues, construction activity and employment, and housing starts. In each instance, dire predictions from the Southern Arizona Home Builders Association of immediate loss of construction jobs, decline in housing starts, and depreciation of property values were completely unsubstantiated after one year. Similarly, designation of critical habitat for the Pecos sunflower is unlikely to substantially alter local economies or result in depreciation of property values. In fact, measurable economic benefits may be associated with natural resources restoration, which could include endangered species recovery and habitat restoration (Baker, 2005).

As no measurable detrimental effects from the designation of critical habitat are anticipated in regards to communities or individuals (e.g., loss

of homes, businesses, or jobs; disruption of community services or community cohesion), there would be no disproportionate adverse effects on low-income or minority populations. The proposed action is in compliance with E.O. 12898.

3.8 Cumulative Effects

Cumulative effects are the effects from other projects that are not part of this proposed action, which may have an additive effect when combined with the effects expected from the proposed action. The geographic extent for which cumulative effects are considered vary for each resource. The past, present, and reasonably foreseeable future actions in the proposed critical habitat analysis area that, combined with the proposed action, could contribute to cumulative effects include:

- effects of listing, critical habitat designation, and section 7 consultations for other species and other designated critical habitats; and
- existing land management policies and plans.

Effects of proposed critical habitat designation on most resource areas generally consist primarily of the potential for minor increases in federal agency staff effort during section 7 consultations to incorporate critical habitat considerations and addition of discretionary conservation measures to reduce impacts to primary constituent elements. These potential impacts are not likely to result in substantial cumulative effects, when added to the effects of existing section 7 consultations for other species and existing land management plans and policies.

3.9 Relationship Between Short-Term and Long-Term Productivity

Proposed designation of critical habitat is a programmatic policy that would have no effect on short-term or long-term productivity.

3.10 Irreversible and Irretrievable Commitment of Resources

Irreversible commitments of resources are those effects that cannot be reversed. For example, the extinction of a species is an irreversible commitment. Irretrievable commitments of resources are those that are lost for a period of time, but may be reversed, such as building a shopping center on farmland. The land cannot be used for farming again until the pavement is removed and soils are restored to productivity. Designation of critical habitat for Pecos sunflower would result neither in irreversible or irretrievable commitments of resources.

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4.0 COUNCIL ON ENVIRONMENTAL QUALITY ANALYSIS OF SIGNIFICANCE

Pursuant to the Council on Environmental Quality regulations for implementing NEPA, preparation of an environmental impact statement is required if an action is determined to significantly affect the quality of the human environment (40 CFR §1502.3). Significance is determined by analyzing the context and intensity of a proposed action (40 CFR §1508.27).

Context refers to the setting of the proposed action and includes consideration of the affected region, affected interests, and locality (40 CFR §1508.27[a]). The context of both short- and long-term effects of proposed designation of critical habitat are the proposed critical habitat subunits and the surrounding areas. The effects of proposed critical habitat designation at this scale, although long-term, would be small.

Intensity refers to the severity of an impact and is evaluated by considering ten factors (40 CFR §1508.27[b]). The intensity of potential impacts that may result from designation of critical habitat for Pecos sunflower under Alternatives I, II or III is low.

- The potential impacts may be both beneficial and adverse, but minor.
- There would be no effects to public health or safety from proposed designation of critical habitat, and the proposed action would not affect unique characteristics of the geographic area.
- Potential impacts from critical habitat designation on the quality of the environment are unlikely to be highly controversial and do

not involve any uncertain, unique, or unknown risks.

- Proposed designation of critical habitat for Pecos sunflower does not set a precedent for future actions with significant effects and would not result in significant cumulative impacts.
- Significant cultural, historical, or scientific resources are not likely be affected by proposed designation of critical habitat.
- Proposed critical habitat designation may have a beneficial effect on Pecos sunflower
- Proposed critical habitat designation would not violate any federal, state, or local laws or requirements imposed for the protection of the environment.

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