

Acanthoscyphus (Oxytheca) parishii var. *goodmaniana*
(Cushenbury oxytheca)

**5-Year Review:
Summary and Evaluation**



Photo courtesy of Scott Eliason

**U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, California**

August 13, 2009

5-YEAR REVIEW

Acanthoscyphus (Oxytheca) parishii var. *goodmaniana* (Cushenbury oxytheca)

I. GENERAL INFORMATION

Purpose of 5-Year Reviews:

The U.S. Fish and Wildlife Service (Service) is required by section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), to conduct a review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review). Based on the 5-year review, we recommend whether the species should be removed from the list of endangered and threatened species (delisted), be changed in status from endangered to threatened (downlisted), or be changed in status from threatened to endangered (uplisted). Our original listing of a species as endangered or threatened is based on the existence of threats attributable to one or more of the five threat factors described in section 4(a)(1) of the Act, and we must consider these same five factors in any subsequent consideration of reclassification or delisting of a species. In the 5-year review, we consider the best available scientific and commercial data on the species, and focus on new information available since the species was listed or last reviewed. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process defined in the Act that includes public review and comment.

Species Overview:

Acanthoscyphus (Oxytheca) parishii var. *goodmaniana* (Cushenbury oxytheca) is an annual plant and a member of the (Polygonaceae) buckwheat family. Cushenbury oxytheca generally occurs with soils derived from limestone, dolomite, or a mixture of limestone and dolomite (Tierra Madre Consultants 1992, p. 33). Cushenbury oxytheca is endemic to the San Bernardino Mountains, San Bernardino County, California, and occupies the second-smallest area of the five federally listed carbonate plants in the San Bernardino Mountains (USFWS 1997, p. 3).

Methodology Used to Complete This Review:

This review was prepared by the Carlsbad Fish and Wildlife Office following the Region 8 guidance issued in March 2008. We used information from the draft San Bernardino Mountains Carbonate Endemic Plants Recovery Plan (draft Recovery Plan) (USFWS 1997), and we considered available literature, office files, and information from researchers and land managers knowledgeable about Cushenbury oxytheca. Additionally, we received one comment letter on May 6, 2008 (J. Potter, State of California Department of Justice, *in litt.* 2008), addressing a number of species, including Cushenbury oxytheca, recommending that we explore and evaluate the potential effects of global warming. This 5-year review contains updated information on the species' biology and threats, and an assessment of that information compared to that known at the time of listing or since the last 5-year review. We focus on current threats to the species that are attributable to the Act's five listing factors. The review synthesizes all this information to evaluate the listing status of the species and provide an indication of its progress towards recovery. Finally, based on this synthesis and the threats identified in the five-factor analysis, we

recommend a prioritized list of conservation actions to be completed or initiated within the next 5 years.

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Federal Register (FR) Notice Citation Announcing Initiation of This Review: A notice announcing initiation of the 5-year review of this taxon and the opening of a 60-day period to receive information from the public was published in the *Federal Register* on March 5, 2008 (USFWS 2008, pp. 11945–11950).

Listing History:

Original Listing

FR Notice: 59 FR 43652

Date of Final Listing Rule: August 24, 1994

Entity Listed: *Oxytheca parishii* var. *goodmaniana* (Cushenbury oxytheca), a plant variety. The current name is *Acanthoscyphus parishii* var. *goodmaniana* (see “Changes in Taxonomic Classification or Nomenclature”, below).

Classification: Endangered

Associated Rulemakings:

Critical Habitat

FR notice: 67 FR 78569

Date of Final Critical Habitat Designation: December 12, 2002

Review History: No 5-year reviews have previously been conducted for this species.

Species’ Recovery Priority Number at Start of 5-Year Review: The recovery priority number for Cushenbury oxytheca is 3C according to the Service’s 2008 Recovery Data Call for the Carlsbad Fish and Wildlife Office, based on a 1 to 18 ranking system where 1 is the highest-ranked recovery priority and 18 is the lowest (Endangered and Threatened Species Listing and Recovery Priority Guidelines, 48 FR 43098, September 21, 1983). This number indicates that the taxon is a plant variety facing a high degree of threat and has a high potential for recovery. The “C” indicates conflict with construction or other development projects or other forms of economic activity.

Recovery Plan or Outline:

Name of Plan or Outline: San Bernardino Mountains Carbonate Endemic Plants Recovery Plan (draft)

Date Issued: September 1997

II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) Policy

The Endangered Species Act defines “species” as including any subspecies of fish or wildlife or plants, and any distinct population segment (DPS) of any species of vertebrate wildlife. This definition of species under the Act limits listing as distinct population segments to species of vertebrate fish or wildlife. Because the species under review is a plant, the DPS policy is not addressed further in this review.

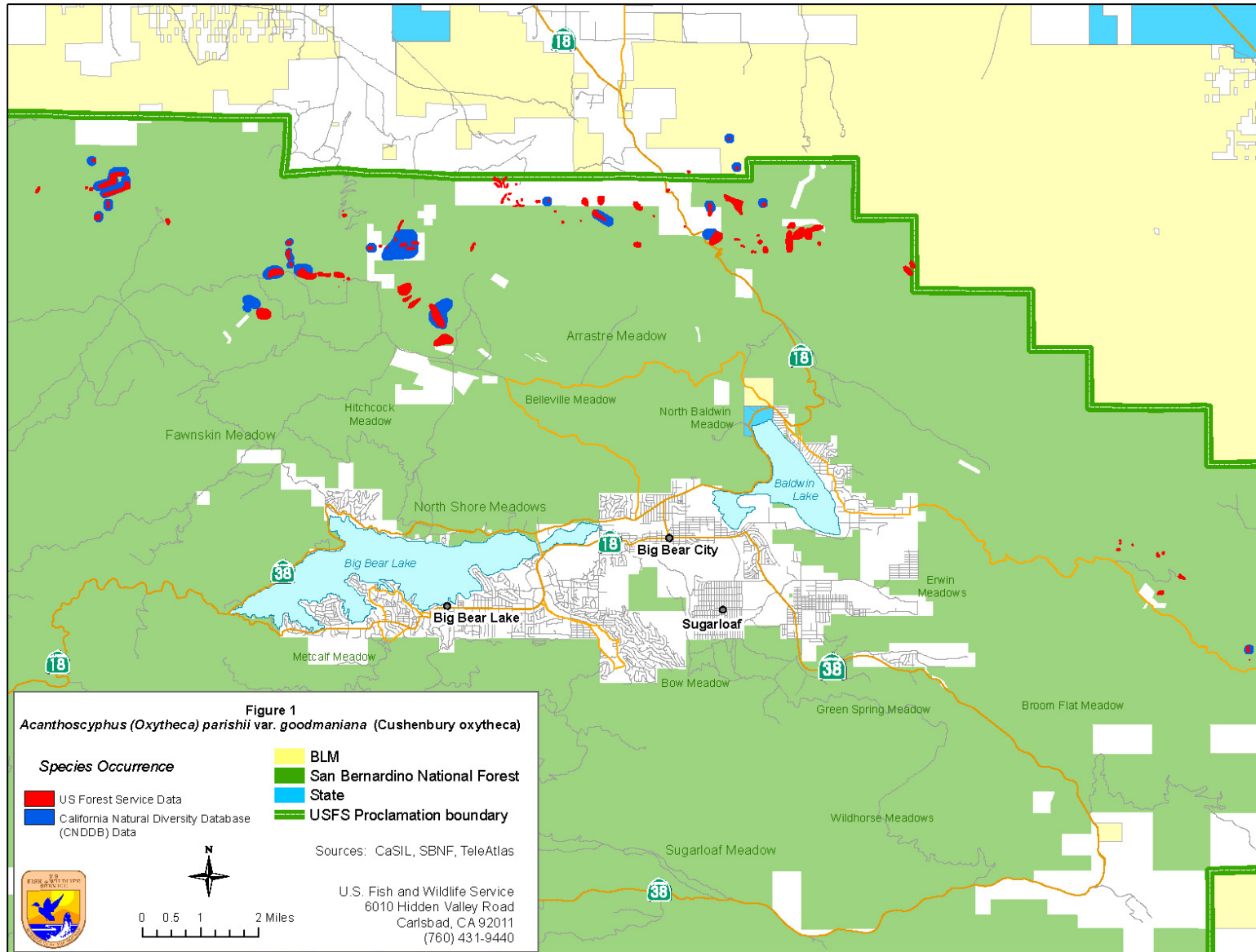
Information on the Species and its Status

Species Biology and Life History

Cushenbury oxytheca is an annual plant in the Polygonaceae (buckwheat family). The plant stands 2 to 24 inches (5 to 60 centimeters) tall with a basal rosette of 0.4 to 3 inches (1 to 7 centimeters) long leaves (Hickman 1993, p. 886). The flowers have of six small white to rose or greenish-yellow sepals (USFWS 1997, pp. 9–10). Flowers occur in clusters of 3 to 20 that are surrounded at the base by a funnel-shaped involucre (Hickman 1993, p. 886). Cushenbury oxytheca is best distinguished from the other three *Acanthoscyphus (Oxytheca) parishii* varieties by having 4 to 5, ivory, involucre awns rather than seven or more (Hickman 1993, p. 886). Based on observations in 1998, insect pollinators appear to be generalists (USFS 2008). Beyond the habitat traits of Cushenbury oxytheca, relatively little is known about its population structure, breeding system, or seed bank.

Spatial Distribution

Cushenbury oxytheca plants are located within the “belt” of carbonate soils that predominantly occur along the northern edge of the San Bernardino Mountains, north and east of Big Bear Lake, San Bernardino County, California (USFWS 1997, p. 3) (Figure 1). According to the final listing rule (USFWS 1994), Cushenbury oxytheca was known from seven occurrences. One occurrence was known from near Cushenbury Spring, two occurrences were known from near the abandoned Green Lead gold mine, another occurrence was known from near the north side of Holcomb Valley, and three occurrences were known from the Helendale Fault in the vicinity of Tip Top Mountain, Mineral Mountain, and Rose Mine.



Cushenbury oxytheca currently occupies approximately the same range as it did at listing, which is approximately 500 acres (200 hectares) (Olson 2003, p. 19). Cushenbury oxytheca is distributed from South Peak on White Mountain east to Terrace Springs, a range of 15 miles (24 kilometers) (Figure 1). Other sites where Cushenbury oxytheca occurs include Cushenbury Springs; Cushenbury, Marble, Arctic, Wild Rose and Furnace Canyons; near the abandoned Green Lead gold mine; north of Holcomb Valley; and White Mountain (USFS 2008).

Abundance

Cushenbury oxytheca is an annual species. This means the number of individuals will naturally fluctuate from year to year due to variations in weather, such as rainfall and temperature (USFWS 1994, p. 43655). Therefore, abundance is better measured by the number of occurrences than the number of individuals. It is difficult to specify the change in the abundance of Cushenbury oxytheca since listing due to subjectivity and variation in the definition of what constitutes an “occurrence”. At listing, we noted the California Natural Diversity Data Base (CNDDDB) had mapped seven occurrences of Cushenbury oxytheca (USFWS 1994, p. 43655). Later, we noted the CNDDDB listed 16 occurrences, while the San Bernardino National Forest had mapped 93 occurrences (USFWS 2002, p. 78573). The definition of an occurrence used by CNDDDB has remained fairly constant. Thus, the number of detected occurrences may have increased since listing. However, this increase likely reflects greater survey effort since listing rather than an actual increase in abundance.

Habitat or Ecosystem

In the final listing rule, Cushenbury oxytheca was described as occurring on limestone or a mixture of limestone and dolomite with the exception of the north Holcomb Valley population that occurred on dolomite (Tierra Madre Consultants 1992, p. 33). Similar to the other carbonate soil-associated plants in the San Bernardino Mountains, Cushenbury oxytheca grows in areas characterized by an open canopy structure and little or no accumulation of organic material at the soil surface. It generally occurs in areas with gentle slopes between 10 to 25 degrees with no apparent preference for aspect, at elevations ranging from 4,724 to 7,782 feet (1,440 to 2,372 meters) in elevation (Neel 2000, p. 129).

The Carbonate Habitat Management Strategy (Olson 2003) uses several terms to distinguish among types of habitat for the carbonate plant species: *occupied habitat* is habitat currently known to be occupied by one or more species of carbonate plants based on field survey information; *critical habitat* is federally designated pursuant to the Act and may be occupied or unoccupied (see below); and *suitable habitat* has been defined by the San Bernardino National Forest based upon a combination of plant associations, carbonate substrate and soils derived from carbonate substrate (Redar and Eliason 2001). Suitable habitat is not currently known to be occupied; however, in some areas it does overlap with unoccupied critical habitat.

There is one unit of critical habitat designated for Cushenbury oxytheca (the Northeastern Slope Unit). It includes 3,150 acres (1,275 hectares) along the northeastern slope of the San Bernardino Mountains and includes the White Mountain at the western edge to Rattlesnake Canyon at the eastern edge (USFWS 2002, p. 78580). The San Bernardino National Forest and Bureau of Land Management lands include 2,675 acres (1,085 hectares) of critical habitat, while

475 acres (190 hectares) are on private land (USFWS 2002, p. 78580). The Northeastern Slope Unit is essential to Cushenbury oxytheca because it provides suitable carbonate substrates and carbonate-derived soils with intact natural surfaces, associated plant communities, and important core occurrences.

The primary constituent elements of Cushenbury oxytheca designated critical habitat include: 1) soils derived primarily from upslope limestone, a mixture of limestone and dolomite, or limestone talus substrates with parent materials that include Bird Spring Formation, Bonanza King Formation, middle and lower members of the Monte Cristo Limestone, and the Crystal Pass member of the Sultan Limestone Formation at elevations between 4,724 and 7,782 feet (1,440 and 2,372 meters); 2) soils with intact, natural surfaces that have not been substantially altered by land use activities (e.g., graded, excavated, re-contoured, or otherwise altered by ground-disturbing equipment); and 3) associated plant communities that have areas with a moderately open canopy cover (generally between 25 and 53 percent) (USFWS 2002, p. 78577).

Changes in Taxonomic Classification or Nomenclature

At the time of listing, Cushenbury oxytheca was recognized as *Oxytheca parishii* var. *goodmaniana* first described by Ertter (1980, p. 90). Ertter recognized *O. parishii* as so distinct as to warrant its own section of the genus, *Acanthoscyphus*. An analysis of molecular as well as morphological data have shown that the sections recognized by Ertter (1980, pp. 70–102) are distinct from each other and in fact are more closely related to other taxa in the Eriogonoideae subfamily of the Polygonaceae (buckwheat family) than to each other (Pant 2000, pp. 1–94). In reviewing the taxonomic and nomenclatural status of the Eriogonoideae, Reveal (2004, p. 144) published names for the taxa found to be distinct from *Oxytheca* by Pant (2000, pp. 1–94). This systematic treatment was followed by Reveal (2005, p. 438) in his contribution to the Flora of North America and will be followed in the upcoming revision of the Jepson Manual Higher Plants of California.

The name now recognized for Cushenbury oxytheca is *Acanthoscyphus parishii* (Parry) Small var. *goodmaniana* (Ertter) Reveal. The name change in no way changes the description or range of the taxon. The common name for the taxon will likewise remain the same. Based on Service convention and the need for continuity with the history of this taxon, 50 CFR 17.12 will be revised to read as follows “*Acanthoscyphus (Oxytheca) parishii* var. *goodmaniana*”.

Genetics

Cushenbury oxytheca has not experienced bottlenecks of sufficient severity nor duration to reduce genetic diversity and does not appear to be at increased risk of extinction due to lack of genetic diversity (Neel 2000, p. 140). Additionally, the occurrences at the southeastern end of the belt of carbonate soils are intermediate between Cushenbury oxytheca and Cienega Seca oxytheca (*Acanthoscyphus parishii* var. *cienegeensis*) (USFS 2008). Terrace Springs is the easternmost area where Cushenbury oxytheca occurs without Cienega seca oxytheca (S. Eliason, San Bernardino National Forest, *in litt.* 2002). From Terrace Springs to Rattlesnake Canyon, these species occur together along with morphological intermediates (S. Eliason, *in litt.* 2002). This suggests there is some interchange of genes between these two closely related plant varieties.

Species-specific Research and/or Grant-supported Activities

Padgett et al. (2007) conducted a study examining dust deposition from mining activities and potential effects to Cushenbury oxytheca and other carbonate plant species. The study documented lower photosynthetic activity and less growth for plants near mining activities due to dust. The authors provided the following recommended mitigation measures: 1) maintain vegetation buffers around mining operations, 2) keep mining activities contained and contiguous, and 3) cover and replant mining areas no longer in use.

Five-Factor Analysis

The following five-factor analysis describes and evaluates the threats attributable to one or more of the five listing factors outlined in section 4(a)(1) of the Act.

FACTOR A: Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

At the time of listing, habitat destruction associated with mining was described as the major threat to Cushenbury oxytheca (USFWS 1994, p. 43658). Additional threats to its habitat included off-highway vehicle use, a hydroelectric project, and a 115-kilovolt powerline proposed for construction through Cushenbury Canyon (USFWS 1994, p. 43659). Much of the approximately 32,620 acres (13,200 hectares) of carbonate substrates in the San Bernardino Mountains are under claim for mining, or in private ownership and subject to mining, or are threatened by other disturbances, including 79 percent of Cushenbury oxytheca-occupied habitat (USFWS 1997, pp. 14 and 24).

Mining activity remains the primary threat for Cushenbury oxytheca (USFWS 2005a, p. 246). Mining activities can impact habitat for the plants through the removal of mined materials, disposal of overburden, and road construction. Other impacts to the plants are associated with dust and artificial lighting (USFWS 1997, pp. 13, 15–18). Dust can affect Cushenbury oxytheca's habitat by altering soil chemistry and light penetration into seedbanks (USFWS 1997, pp. 17-18). Artificial lighting may affect Cushenbury oxytheca's growing conditions by altering the photoperiod response or the behavior of pollinators or seed dispersers (USFWS 1997, p. 18).

Since listing of Cushenbury oxytheca, the U.S. Forest Service and Bureau of Land Management have partnered to develop the Carbonate Habitat Management Strategy (Olson 2003), as described in Factor D. Upon successful implementation of the Carbonate Habitat Management Strategy, habitat preservation will meet or exceed recovery criteria 1 and 2 in the draft Recovery Plan (USFWS 2005a, p. 247). However, mining projects can still be proposed and implemented outside the confines of the Carbonate Habitat Management Strategy (Olson 2003, p. 6).

The final listing rule indicated off-road vehicle use and energy development projects were a threat to Cushenbury oxytheca and its habitat. Such activities could impact the species' habitat through ground disturbance or dust creation. About 7 acres (3 hectares) of occupied habitat and 36 acres (15 hectares) of designated critical habitat for Cushenbury oxytheca overlap with roads and motorized vehicle trails (USFWS 2005a, p. 267). The San Bernardino National Forest closed road 3N77 and placed signs and barriers on the other roads (USFWS 2001, p. 18), which should limit impacts due to off-road vehicle use. Additionally, road 3N11A is proposed for

decommissioning, and roads 3N03D, 3N54, 3N88, and 3N88B are proposed for reclassification as administrative use only (USFWS 2009, p. 2), which should reduce vehicle activity in the area and further reduce the threat to the species. We are unaware of any energy development projects occurring since listing that affect Cushenbury oxytheca.

Several threats such as dispersed target shooting, dispersed camping areas, fuelwood collection, and fire suppression activities have been identified since listing (USFWS 2001, pp. 4–11). These activities can result in trampling of Cushenbury oxytheca and can impact its habitat through ground disturbance or dust creation. Additionally, fire suppression activities can result in ground disturbance through fire line construction, retardant and water drops, and establishment of fire camps. For example, suppression of the Willow Fire in 1999 impacted Cushenbury oxytheca when a “dozer line” was cut through approximately 0.3 miles (0.5 kilometers) of occupied habitat and 1 mile (1.6 kilometers) (7.5 acres (3 hectares)) of suitable habitat. However, subsequent monitoring visits indicated regrowth of Cushenbury oxytheca on the dozer line (D. Volgarino, San Bernardino National Forest, pers. comm. 2002).

The U.S. Forest Service has taken steps to avoid or minimize impacts due to threats identified since listing (USFWS 2001). The San Bernardino National Forest has prohibited fuelwood collection and target shooting in carbonate plant habitat (USFWS 2001, pp. 20–21). Upon successful implementation of these policies, these threats should be eliminated. Also, the U.S. Forest Service has distributed maps of Cushenbury oxytheca occurrences to fire-fighting personnel and provided direction to avoid these areas to the extent practicable during fire suppression activities (USFWS 2001, p. 19). Additionally, due to the rugged and remote terrain where Cushenbury oxytheca occurs, dispersed recreational activities such as camping should have a low level of impact.

Since listing of Cushenbury oxytheca, the U.S. Forest Service has adopted additional guidance and proposals to protect this species. The revised Land Management Plans for the four southern California National Forests (USFWS 2005a) included strategic direction in the form of land use zoning and standards. The land use zoning and standards indicated that for projects on U.S. Forest Service lands under the Land Management Plans, new activities will be neutral or beneficial to Cushenbury oxytheca, and expansion of existing facilities or new facilities will focus recreational use away from Cushenbury oxytheca. Exceptions were included for fire abatement activities (“fuel treatments”) in wildland-urban interface areas and to allow for projects with short-term effects but long-term benefits (USFWS 2005a, p. 15). Although we anticipate implementation of the revised Land Management Plans will reduce threats to carbonate species, these plans are strategic; that is, projects could still occur outside the parameters of these documents.

In addition to the adoption of land use zoning and standards, the U.S. Forest Service proposed the Blackhawk Research Natural Area in the revised Land Management Plans, which covers about 116 acres (47 hectares) of occupied habitat and 524 acres (212 hectares) of designated critical habitat for Cushenbury oxytheca (USFWS 2005a, p. 267). If designated, this area would be subject to the U.S. Forest Service policy for Research Natural Areas, which indicates that “Research Natural Areas may only be used for research, study, observation, monitoring, and those educational activities that maintain unmodified conditions” (USFWS 2005a, p. 327). This

proposed Research Natural Area has not been finalized (S. Eliason, San Bernardino National Forest, pers. comm. 2008).

Other land use designations are also protective of Cushenbury oxytheca. The Bighorn Wilderness Area includes 137 acres (55 hectares) of designated critical habitat for Cushenbury oxytheca and is not subject to mining (USFWS 2005a, p. 267). Additionally, 35 acres (14 hectares) of occupied habitat and 143 acres (58 hectares) of designated critical habitat for Cushenbury oxytheca is in the Baldwin Lake/Holcomb Valley Special Interest Area designated for botanical, zoological, prehistorical, and historical values (USFWS 2005a, p. 267).

Summary of Factor A

In summary, mining, the primary threat identified at listing, remains the main threat to Cushenbury oxytheca. Mining can impact this species' habitat through removal and burial of suitable soils that eliminates habitat areas, through creation of dust that can alter soil chemistry and light availability for seeds, and through artificial lighting that may alter the species' growing conditions. Off-road vehicle use and energy development projects could impact the species' habitat through ground disturbance or dust creation. Several threats such as dispersed target shooting, dispersed camping areas, fuelwood collection, and fire suppression activities have been identified since listing. However, the magnitude of these threats has been reduced through regulatory mechanisms, including implementation of the Act and actions taken by the U.S. Forest Service. Additionally, the Carbonate Habitat Management Strategy and revised Land Management Plans are anticipated to reduce the threats from mining, provided their non-mandatory measures are implemented.

FACTOR B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The final rule listing Cushenbury oxytheca indicated that some of the taxa may become vulnerable to collecting by curiosity seekers as a result of the increased publicity following listing. However, we have no information that overutilization or collection has been or is currently a threat to Cushenbury oxytheca.

FACTOR C: Disease or Predation

Disease is not known to be threat affecting Cushenbury oxytheca. The threat of predation from burro grazing was identified after listing (USFWS 2001). However, burros are expected to have minimal effects to Cushenbury oxytheca due to the low numbers of burros present (about 60), the dispersal of the burros across a large area, the burros preference for wetter habitats, and the short stature and scarce nature of carbonate plants, which makes foraging on them unlikely (USFWS 2001, p. 39).

FACTOR D: Inadequacy of Existing Regulatory Mechanisms

State Protections

The State's authority to conserve rare wildlife and plants is composed of four major pieces of legislation: the California Endangered Species Act, the Native Plant Protection Act, the

California Environmental Quality Act, and the Natural Community Conservation Planning (NCCP) Act.

At the time of listing, the Native Plant Protection Act and the California Endangered Species Act were noted as potentially offering some protection for Cushenbury oxytheca. However, the plant is not listed under the California Endangered Species Act or Native Plant Protection Act, nor is it addressed under any existing NCCP Plan under the NCCP Act. Thus, these State laws are not adequate regulatory mechanisms to protect this species.

The only State law providing protection to Cushenbury oxytheca is the California Environmental Quality Act (CEQA). This law requires review of any project that is undertaken, funded, or permitted by the State or a local governmental agency. If significant effects are identified, the lead agency has the option of requiring mitigation through changes in the project. Cushenbury oxytheca is on the California Native Plant Society Inventory as List 1B. Under CEQA, impacts to List 1B plants are considered significant and must be addressed. However, under CEQA, the lead agency may decide that overriding considerations make mitigation infeasible (CEQA section 21002). Therefore, this regulatory mechanism may not be adequate to protect the species because protection of listed species through CEQA is dependent upon the discretion of the lead agency involved.

Federal Protections

National Environmental Policy Act (NEPA): NEPA (42 U.S.C. 4371 *et seq.*) provides some protection for listed species that may be affected by activities undertaken, authorized, or funded by Federal agencies. Prior to implementation of such projects with a Federal nexus, NEPA requires the Federal agency to analyze the project for potential impacts to the human environment, including natural resources. In cases where that analysis reveals significant environmental effects, the Federal agency must propose mitigation alternatives that would offset those effects (40 C.F.R. 1502.14(f)). These mitigations can provide some level of protection for listed species. However, NEPA does not require that environmental impacts be avoided, only that effects be assessed and the analysis disclosed to the public. Therefore, this regulatory mechanism may not be adequate to fully protect the species.

Endangered Species Act of 1973, as amended (Act): Since listing, the Act is the primary Federal law that may provide protection for this species. The Service's responsibilities include administering the Act, including sections 7, 9, and 10. Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that actions they fund, authorize, or carry out do not "jeopardize" a listed species or result in the "destruction or adverse modification" of habitat in areas designated by the Service to be "critical". Critical habitat has been designated for this taxon (USFWS 2002, pp. 78569–78610). A jeopardy determination is made for a project that is reasonably 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 its reproduction, numbers, or distribution (50 C.F.R. § 402.02). A non-jeopardy opinion may include reasonable and prudent measures that minimize the amount or extent of incidental take of listed species associated with a project. Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely

modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 C.F.R. § 402.02).

Under Section 9(a)(2) of the Act, with respect to endangered plant taxa, it is unlawful to remove and reduce to possession (*i.e.*, collect) any such taxon from areas under Federal jurisdiction; maliciously damage or destroy any such taxon on any such area; or remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law.

The Service has addressed certain projects that resulted in impacts to Cushenbury oxytheca through section 7 consultations with the U.S. Forest Service. In 2001, non-jeopardy biological opinions were issued addressing the effects of Land and Resource Management Plan program direction and activities that were occurring in Cushenbury oxytheca habitat (USFWS 2001). The primary activities included mining, roads, and trails. In 2005, non-jeopardy biological and conference opinions were issued that addressed the revised Land Management Plans for the four southern California National Forests (see Factor A). However, at the time of this 5-year review, aspects of this opinion are being challenged in court. The Act also contributes to the species' conservation through avoidance, minimization, and conservation measures incorporated into project descriptions through implementation of section 7. In sum, the Act is the primary regulatory mechanism protecting the species.

Carbonate Habitat Management Strategy: Since Cushenbury oxytheca was listed, the U.S. Forest Service, U.S. Fish and Wildlife Service, and Bureau of Land Management have collaborated with mining companies, major claim holders, San Bernardino County, and the California Native Plant Society to develop the Carbonate Habitat Management Strategy (Olson 2003). The goals of the Carbonate Habitat Management Strategy are: 1) to protect the listed plants and the habitat components they require; 2) to guide impact minimization and compensation for unavoidable impacts; 3) to streamline reviews of mining activities in carbonate plant habitat; 4) to guide habitat restoration; and 5) to plan and provide for long-term needs of both the mining industry and listed species conservation. One of the primary objectives of the Carbonate Habitat Management Strategy is to establish conservation areas for carbonate plants. The Carbonate Habitat Management Strategy provides parameters for allowing mining while ensuring the protection of listed carbonate plant species in perpetuity through the establishment of habitat reserves. The Service provided a programmatic non-jeopardy and no adverse modification biological opinion on May 2, 2005, for the Carbonate Habitat Management Strategy regarding potential effects to federally listed carbonate plant species except the San Bernardino Mountains bladderpod. Projects can still be proposed and implemented outside the confines of the Carbonate Habitat Management Strategy (Olson 2003, p. 6).

National Forest Management Act (NFMA): The National Forest Management Act (36 C.F.R. 219.20(b)(i)) has required the U.S. Forest Service to incorporate standards and guidelines into Land and Resource Management Plans, including provisions to support and manage plant and animal communities for diversity and for the long-term, range-wide viability of native species. Recent changes to NFMA may affect future management of listed species, particularly rare plant occurrences, on National Forests. On January 5, 2005, the Forest Service revised National Forest land management planning under NFMA (USFS 2005). The new planning rule changed the nature of Land Management Plans so that plans generally would be strategic in nature and could

be categorically excluded from NEPA analysis, and thus not subject to public review. Under this new planning rule, the primary means of sustaining ecological systems, including listed species, would be through guidance for ecosystem diversity. If needed, additional provisions for threatened and endangered species could be provided within the overall multiple-use objectives required by NFMA. The final rule did not include a requirement to provide for viable populations of plant and animal species, which had previously been included in both the 1982 and 2000 planning rules. However, on March 30, 2007, the United States District Court in *Citizens for Better Forestry et al. v. USDA* (N.D. Calif.) enjoined the United States from implementing and utilizing the 2005 rule until it complies with the court's opinion regarding the Administrative Procedure Act, the Act, and the NEPA. On May 14, 2007, the Forest Service published a Notice of Intent to prepare an environmental impact statement to analyze and disclose potential environmental consequences associated with a National Forest System land management planning rule. On April 28, 2008, the Forest Service replaced previous National Forest System land management planning rules after completing a Final Environmental Impact Statement. However, on June 30, 2009, the United States District Court in *Citizens for Better Forestry et al. v. USDA* (N.D. Calif.) enjoined the Forest Service from implementing and utilizing the 2008 rule due to violations of NEPA and the Act. Because of the uncertainty regarding the future of regulations under the NFMA, the impact of any revisions of this rule to listed species is unknown at this time.

Summary of Factor D

In summary, while both CEQA and NEPA may provide some discretionary conservation benefit to Cushenbury oxytheca, the Act is the primary regulatory mechanism mandating Cushenbury oxytheca conservation. With the majority of suitable and occupied habitat on U.S. Forest Service lands (Figure 1), the Act remains the primary regulatory mechanism for ensuring that Cushenbury oxytheca is addressed during planning efforts for land management actions potentially affecting this species.

FACTOR E: Other Natural or Manmade Factors Affecting Its Continued Existence

The final rule indicates the risk of stochastic extinction of Cushenbury oxytheca resulting from random events was considered high due to the low numbers of plants (USFWS 1994, p. 43662). Because this species is restricted to certain, limited soils, it is likely that its population has always been small. Despite this, the population has persisted. This suggests even though the magnitude of this threat may be high, its immediacy is low. However, the potential for stochastic extinction could be increased by habitat loss, fragmentation, and drought. Habitat fragmentation can result in areas too limited and isolated to support pollinators or other seed dispersal agents (USFWS 1997, p. 16). Global climate change may further increase likelihood of stochastic extinction (see below).

Climate change was not mentioned as a potential threat in the final listing rule for Cushenbury oxytheca. This concern was raised in a letter received by the Service on May 6, 2008 (Potter, *in litt.* 2008). Current climate change predictions for terrestrial areas in the Northern Hemisphere indicate warmer air temperatures, more intense precipitation events, and increased summer continental drying (Field et al. 1999, Cayan et al. 2005, IPCC 2007). However, predictions of climatic conditions for smaller sub-regions such as California remain uncertain.

Some evidence suggests that global climate change may be a particular concern to montane species. Summary papers have cited studies documenting shifts in the distribution of various taxa in response to climatic warming trends. These shifts are often found from the southern and lower elevation ends of the species' range to the northern or higher elevation of the range (Field et al. 1999, pp. 38–39). In a local effort to document these types of shifts in range, the Deep Canyon Transect in the Santa Rosa Mountains (Riverside County) about 50 miles (80 kilometers) southeast of the San Bernardino Mountains was surveyed in 2006–2007. Data gathered on plant elevational distribution was compared to that from a 1977 survey (Kelly and Goulden 2008, pp. 11823–11826). For ten dominant plant taxa the elevational distribution of all but one moved up during the intervening period. The average increase in elevational range for all taxa was about 215 feet (65 meters) (Kelly and Goulden 2008, p. 11824–11825). The authors attribute the upward elevational shifts to climate change impacts and discount fire frequency and air pollution as causal agents (Kelly and Goulden 2008, p. 11825).

Cushenbury oxytheca is endemic to isolated occurrences of particular carbonate soils in the San Bernardino Mountains. Therefore, any combination of environmental conditions, such as those attributed to climate change above, that force an upward shift in the distribution of the species, poses a profound threat to the taxon's persistence and recovery. If this species is affected by elevational shifts resulting from climate change, then there will be no suitable habitat when the elevational range exceeds the species' maximum elevation. As this occurs, the density and distribution may concentrate the species into a smaller area. This, in turn, may make the species even more susceptible to stochastic extinction. To date, no species-specific monitoring has been conducted to detect an elevational shift in its range.

III. RECOVERY CRITERIA

No final recovery plan has been completed for this species. However, a draft San Bernardino Mountains Carbonate Endemic Plants Recovery Plan from September 1997 includes Cushenbury oxytheca (USFWS 1997). Recovery plans provide guidance to the Service, States, and other partners and interested parties on ways to minimize threats to listed species, and on criteria that may be used to determine when recovery goals are achieved. There are many paths to accomplishing the recovery of a species and recovery may be achieved without fully meeting all recovery plan criteria. For example, one or more criteria may have been exceeded while other criteria may not have been accomplished. In that instance, we may determine that, over all, the threats have been minimized sufficiently, and the species' status is robust enough to downlist or delist. In other cases, new recovery approaches and/or opportunities unknown at the time the recovery plan was finalized may be more appropriate ways to achieve recovery. Likewise, new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery is a dynamic process requiring adaptive management, and assessing a species' degree of recovery is likewise an adaptive process that may, or may not, fully follow the guidance provided in a recovery plan. We focus our evaluation of species status in this 5-year review on progress that has been made toward recovery since the species was listed (or since the most recent 5-year review) by eliminating or reducing the threats discussed in the five-factor analysis. In that context, progress towards fulfilling recovery criteria serves to indicate the extent to which threat factors have been reduced or eliminated.

Since the draft recovery plan was prepared the Service has shifted to preparing threats-based recovery plans in which actions are directly tied to reducing or eliminating identified threats to the species. As such, the criteria listed below may be of limited relevance or in need of revision.

Downlisting Criterion #1:

The priority ranked habitat areas have been protected. Priority for protection shall be determined according but not limited to: 1) population size; 2) habitat quality; 3) manageability/defensibility of site; and 4) connectivity. The initial preserve area should be 5,000 acres (2,000 hectares) based on known areas occupied by the plants and should include protection for the threatened species, *Erigeron parishii* (which is discussed separately under the delisting objective and criteria).

Priority areas and populations include, but are not limited to, the following: 1) Sites within the White Mountain Management Unit; 2) populations just north/northeast of Hitchcock Spring; 3) upper Crystal Creek Drainage; 4) Upper Furnace Canyon and prioritized populations in the lower Furnace Canyon area; 5) populations just north of Holcomb Valley; 6) Arctic Canyon; 7) Marble Canyon; 8) Bertha Ridge and slopes to Big Bear Lake; 9) Monarch Flats and northern slopes; 10) eastern and western slopes of Cushenbury Canyon including the vicinity of Whiskey Springs; 11) Burnt Flat; 12) Blackhawk Mountain and slopes; 13) Round Mountain; 14) Grapevine Creek; 15) Top Spring/Lone Valley/Squirrel Spring; 16) Granite Spring; 17) Arrastre Creek/Rose Mine Valley; 18) Rattlesnake Canyon; 19) Sugarlump/Sugarloaf Mountain; and 20) the outlying populations of *Erigeron parishii* in the Little San Bernardino Mountains. The species and ecosystem-level attributes of these priority areas make them necessary for the survival and recovery of these species. Taxonomic assessment of the eastern populations of *Oxytheca parishii* var. *goodmaniana* may affect the recovery priority and reserve needs of this variety.

To count toward reclassification of the plants, reserves must have been designed to minimize or eliminate indirect threats due to adjacent land uses. This includes protection of carbonate plant habitat from human disturbance to hydrology, soil integrity, fire ecology, habitat microclimates, and light regimes. Appropriate management and restorative measures should reduce habitat-degrading effects such as surface disturbances, windblown sediments, fugitive night lighting, and off-highway vehicle use.

This criterion implicitly addresses listing Factors A (habitat loss) and E (stochastic events). The U.S. Forest Service and Bureau of Land Management have partnered to develop the Carbonate Habitat Management Strategy. The goals of the Carbonate Habitat Management Strategy are to: 1) protect the listed plants and the habitat components they require; 2) guide impact minimization and compensation for unavoidable impacts; 3) streamline reviews of mining activities in carbonate plant habitat; 4) guide habitat restoration; and 5) plan and provide for long-term needs of both the mining industry and listed species conservation. One of the primary goals of the Carbonate Habitat Management Strategy is the establishment of conservation areas for carbonate plants. The Carbonate Habitat Management Strategy provides parameters for

allowing mining while ensuring the protection of listed carbonate plant species in perpetuity through the establishment of habitat reserves. The Service provided a programmatic non-jeopardy and no adverse modification biological opinion on May 2, 2005, for the Carbonate Habitat Management Strategy regarding potential effects to Cushenbury oxytheca and other federally listed carbonate plant species. Upon successful implementation of the Carbonate Habitat Management Strategy, habitat preservation will meet or exceed Downlisting Criterion #1 (USFWS 2005a, p. 247). This includes preservation of at least 425 acres (172 hectares) (82 percent) of occupied habitat and 2,157 acres (873 hectares) (69 percent) of designated critical habitat for Cushenbury oxytheca (USFWS 2005b, pp. 24 and 27). However, the Carbonate Habitat Management Strategy is a programmatic strategy to allow mining and protect carbonate plants; participation by mining interests is voluntary. The reserve system under the Carbonate Habitat Management Strategy is not yet developed and future projects may or may not be implemented under the provisions of the Carbonate Habitat Management Strategy. This criterion has not been met at this time.

Downlisting Criterion #2:

Protect additional lands needed to complete otherwise isolated reserves, to protect new populations that may be discovered in the future, and to provide strategic buffer zones and potential population reintroduction and/or expansion areas. The interim estimate of additional lands needed to secure habitat connectivity, buffers, and natural community context is 4,600 acres (1,860 hectares), including lands to meet Delisting Criterion #2 for *Erigeron parishii*. This figure may be further refined as additional information becomes available.

This criterion implicitly addresses listing Factors A (habitat loss) and E (stochastic events). In addition to the protection of occupied areas, the Carbonate Habitat Management Strategy provides for the conservation of suitable habitat including about 14,709 acres (5,953 hectares) for Cushenbury oxytheca (USFWS 2005b, p. 28). Because the Carbonate Habitat Management Strategy is only a programmatic strategy, these lands are not yet conserved. This criterion has not been met at this time.

Downlisting Criterion #3:

Adaptive population monitoring/adaptive management programs must be functioning so that early detection is assured for any population instability or other problems in the reserve system. Studies will have shown whether there is a need for reintroductions and/or augmentations of existing populations. Research results to support adaptive management will be available, including at least preliminary results on pollination ecology, seed dispersal mechanisms, population dynamics, microclimate effects of vegetation removal/bare areas, seedbank dynamics, and fire ecology.

This criterion addresses listing Factors A (habitat loss) and E (stochastic events). Because the reserve system is not yet in place, this criterion is not yet applicable. Further, focused research on pollination ecology, seed dispersal mechanisms, population dynamics, microclimate effects of

vegetation removal/bare areas, seedbank dynamics, and fire ecology of Cushenbury oxytheca has not yet occurred. This criterion has not been met at this time.

Delisting Criteria for the Endangered Taxa:

The reserve system designed to allow downlisting is intended to suffice for delisting, provided that monitoring and research demonstrate that the reserves work as planned to remove the threats identified during the listing process. As monitoring and research results become available, delisting criteria will be established.

As documented above, a reserve system is planned, but not established. Thus, the necessary monitoring and research associated with the reserve has not been completed. This criterion has not been met at this time.

IV. SYNTHESIS

It is possible the number of detected occurrences has increased since listing, but variation in how occurrences have been defined over time makes this difficult to assess. It is likely that any increase in detections is not the result of an actual increase in abundance in Cushenbury oxytheca, but instead an increase in survey effort. Cushenbury oxytheca, like other carbonate plant species, is confined to certain soils in a relatively small area of habitat in the northeastern San Bernardino Mountains. The final rule documents that Cushenbury oxytheca was in danger of extinction throughout all or a significant portion of its range due to the threat of mining, off-road vehicle and other recreational use, energy development projects, and the effects of stochastic events on small populations. While some actions by the U.S. Forest Service have reduced impacts associated with off-road vehicle activities and recreational use, and programmatic strategies have been developed to conserve Cushenbury oxytheca, mining continues to threaten to impact about 79 percent of the species' habitat, and stochastic events may affect the species throughout its range. Additionally, other threats have been identified since listing, including fire suppression activities and the effects associated with global climate change. Therefore, Cushenbury oxytheca should remain listed as endangered. Upon successful implementation of the programmatic strategies to establish a permanent reserve system for Cushenbury oxytheca, this conclusion should be reconsidered.

V. RESULTS

Recommended Listing Action:

- Downlist to Threatened
- Uplist to Endangered
- Delist (indicate reason for delisting according to 50 CFR 424.11):
 - Extinction*
 - Recovery*
 - Original data for classification in error*
- No Change

New Recovery Priority Number and Brief Rationale:

Despite being in danger of extinction throughout all or a significant portion of its range, protections for Cushenbury oxytheca have increased on Federal lands since listing. The degree of threat faced by the species, though of concern, is better categorized as “moderate” under our guidance. We also conclude that recovery potential for the species is “high” because of potential protections associated with Carbonate Habitat Management Strategy and other carbonate species recovery efforts. Additionally, conflict with construction or other development projects or other forms of economic activity still exists. Therefore, as per our guidance, we are changing the Recovery Priority Number to 9C, indicating that this plant variety has a moderate degree of threat, a high potential for recovery, and is the subject of conflict.

VI. RECOMMENDATIONS FOR ACTIONS OVER THE NEXT 5 YEARS

Finalize Recovery Plan

Prepare a new threats-based recovery plan specific to Cushenbury oxytheca that identifies a recovery strategy, objectives, and criteria for reclassification to threatened, objectives and specific criteria for removal from the list of endangered and threatened species, and prioritizes recovery actions.

In the interim, seek implementation of elements of the Carbonate Habitat Conservation Strategy that have direct benefit to the conservation of Cushenbury oxytheca.

Monitor Existing Populations

Work with the San Bernardino National Forest to conduct systematic monitoring of Cushenbury oxytheca throughout known and potentially occupied sites as necessary to track the status of the species and identify management priorities. There is a need to continue to obtain quantitative information regarding the status of this species to evaluate the effectiveness of conservation efforts over time, especially in light of potential effects associated with global climate change.

Management of Occupied Cushenbury Oxytheca Habitat

Work with partners, such as the San Bernardino National Forest, to help conserve Cushenbury oxytheca by identifying opportunities to:

- a) Continue monitoring programs for the effectiveness of measures to protect Cushenbury oxytheca from recreational activities and make adjustments to signs, barriers, and roads as necessary.
- b) Avoid new developments in or near Cushenbury oxytheca habitat.

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**U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW**

Acanthoscyphus (Oxytheca) parishii var. *goodmaniana*
(Cushenbury oxytheca)

Current Classification: Endangered

Recommendation Resulting from the 5-Year Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Review Conducted By: Carlsbad Fish and Wildlife Office

FIELD OFFICE APPROVAL:

ACTING

Lead Field Supervisor, U.S. Fish and Wildlife Service

AUG 13 2009

Approve _____ Date _____

Scott A. Sobiech