5-YEAR REVIEW
Yreka phlox (*Phlox hirsuta*)

GENERAL INFORMATION:

Species: Yreka phlox, Phlox hirsuta
Date listed: 2/3/00
FR citation: 65 FR 5268
Classification: endangered

BACKGROUND:

Most recent status review: 73 FR 11945; Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Reviews of 58 Species in California and Nevada; Availability of Completed 5-Year Reviews in California, Nevada and Southern Oregon; 3/5/08

FR Notice citation announcing this status review: 83 FR 28251; Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 50 Species in California, Nevada, and the Klamath Basin of Oregon; 6/18/18.

ASSESSMENT:

Information acquired since the last status review:

This 5-year review was conducted by the U.S. Fish and Wildlife Service's (Service) Yreka Fish and Wildlife Office (YFWO). Information was solicited from interested parties through a Federal Register notice announcing this review on June 18, 2018. We did not receive any substantive comments from this solicitation. We also directly contacted scientists who are conducting, or recently have conducted, research on Yreka phlox to request any new scientific information on the species. And finally, we conducted a review of the information in our files.

New information available:

Population monitoring

The YFWO has completed 11 years of population monitoring at the 4 (Cracker Gulch, Soap Creek Ridge, Greenhorn Creek, and China Hill) primary Yreka phlox populations. The Recovery Plan for *Phlox hirsuta* (Yreka phlox) (Recovery Plan) outlines two alternate pathways to delist the species once the downlisting (to threatened) criteria have been met. One of these pathways includes 10 years of demographic research and/or quantitative monitoring at 4 protected populations that has demonstrated that plant population size has not declined more than 10 percent in any population (total change between year 0 and year 10). Figure 1 depicts that the total number of plants at each population has not declined by more than 10 percent. Therefore, when these four primary populations have secure, permanent protection, the third recovery criterion for delisting will have been met.

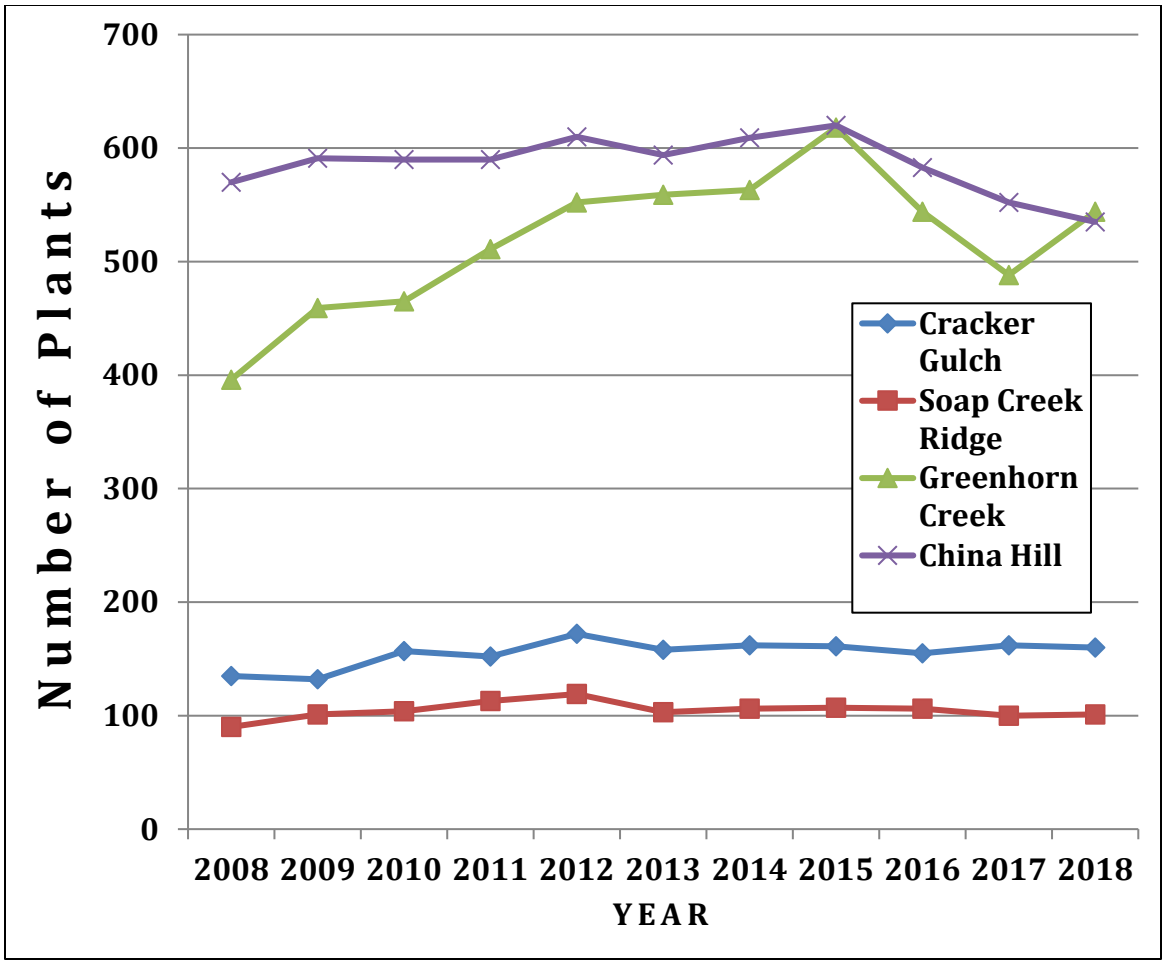

Figure 1. Results of permanent sampling transect (50 meters x 2 meters) monitoring at four Yreka phlox populations (China Hill, Greenhorn Creek, Soap Creek Ridge, and Cracker Gulch). Except for Greenhorn Creek, transects were placed using a simple random design. Only three transects were monitored at Greenhorn Creek because of the limited habitat available. The total number of plants at each population has not declined by more than 10 percent at any of these populations since 2009 (2008 was a pilot year).

Threat Assessment

The YFWO has also conducted threat monitoring at the four primary populations since 2010. Based on this monitoring, the most significant threats at the present time are alteration or destruction of habitat resulting from residential development, off-road vehicle use, and competition with invasive non-native plants.

The City of Yreka, Siskiyou County Department of Agriculture, volunteers, and the YFWO have been working together to ameliorate the lesser threats of off-road vehicle use and competition with invasive non-native plants. We expect these efforts to continue into the future and that these efforts will be effective at controlling these threats.

The threat of development is still imminent and of high magnitude. Significant efforts have been made to minimize this threat, primarily through existing and ongoing acquisition efforts (see "Recovery" below). A 503-acre piece of property located on Soap Creek Ridge is currently on the market. This property encompasses roughly 36 percent of the area of the entire species and

85 percent of the Soap Creek Ridge population. The CDFW has submitted a request for nontraditional Section 6 Recovery Land Acquisition funds to purchase this property (see Recommendations for Future Actions below).

In contrast to what we know today, the 2007 5-Year Review listed alteration or destruction of habitat resulting from logging, fire suppression activities, ongoing highway maintenance, or construction activities; illegal collection and vandalism; herbicide application; grazing by domestic animals; inadequate existing regulatory mechanisms; and potential extirpation as a result of random events; in addition to those YFWO staff have observed as the main current threats. While all of these threats, except for domestic animal grazing could still be affecting individual Yreka phlox plants, they are not the main threats acting on the species at the present time, with the exception of alteration or destruction of habitat from construction activities (which we summarize above as the threat of development). During the past eight years, there is no evidence of domestic animal grazing on Yreka phlox plants, although researchers have observed herbivory by native mammals and beetles.

Research

Research conducted since the 2007 5-Year Review has been funded by several traditional Section 6 grants from the Service. Below we summarize research on Yreka phlox not included in our 2007 5-year review.

Pollination and Reproductive Biology

Yreka phlox is predominantly an out-crossing species, butterflies are the primary pollinators, and pollinator-visit frequency is low (Ferguson *et al.* 2006). Although there are three carpels in the ovary, only one seed is produced, and fruit and seed set are low. In the field, only 13-31 percent of flowers produce seed-containing fruits (Ruane *et al.* 2014). Florivorous (flower eating) beetle density or large floral display size decreases fruit set, except where Yreka phlox populations are dense. Seed predation by mammals has a significant negative effect on seed set at one population (Ruane *et al*. 2014). Average fruit set across all populations is 8.5 percent, larger plants produce more seeds, and deer consumed 20 percent of unripe fruit in one population (Ruane *et al.* 2016, Wood *et al.* 2017). Poor reproductive success in Yreka phlox may be caused by a combination of pollen inviability as flowers age, genetic incompatibility between the pollen and the pistil, and self-pollen interference with outcrossing pollen (Ruane *et al.* 2013).

Pollination dispersal distance among and between populations does not affect the number of seeds produced (Ruane *et al.* 2015). Therefore, poor reproductive success can't be attributed to the distance pollen travelled. However, moving pollen between populations does negatively affect germination and early seedling development, though seeds are approximately nine times more likely to abort if they are sired by pollen grains from the same population.

Propagation and Genetics

Successful propagation techniques have been identified (Ferguson *et al.* 2006; Filipski 2005). Yreka phlox is divided into three major population groups (Cohen and Ruane 2018). The China Hill and Greenhorn Creek populations are two genetically separate and distinct populations and in turn, are separate from the Cracker Gulch and Soap Creek Ridge group, which are not distinct from each other.

Summary of Research

Management strategies that maximize genetic variability within populations, without transporting genes between populations are recommended (Ruane *et al.* 2015). Ongoing and future research funded by a 2015 Section 6 grant, is further quantifying the degree of genetic variation within and among populations, and is conducting a long-term demographic study to determine the degree to which each life history stage hinders or promotes population growth.

The 2007 5-Year Review stated that Yreka phlox had received little scientific study and its biology was poorly known. Since then, and as discussed above, a significant amount of scientific research has been conducted to guide recovery and conservation efforts.

Protection of Populations and Land Management

On April 27, 2018 the Yreka Phlox at China Hill Recovery Section 6 Land Acquisition grant was awarded to the California Department of Fish and Wildlife (CDFW). The California Wildlife Conservation Board (WCB) is approaching landowners about their interest in selling four parcels on China Hill. If successful, this grant will result in protection of 95 percent of occupied *Phlox hirsuta* habitat on China Hill. In addition, CDFW has submitted a request for a nontraditional Section 6 Recovery Land Acquisition grant to fund the purchase of properties that would result in protection of 70 percent of the Soap Creek Ridge population and 100 percent of the Cracker Gulch population. Alternatively, a conservation agreement or easement are being considered to protect part of the Cracker Gulch population.

A Service Partners for Fish and Wildlife grant as well as other grants with the Siskiyou County Department of Agriculture, have resulted in annual invasive weed treatment in areas surrounding the primary four Yreka phlox populations since 2010. The YFWO and volunteers also manually remove weeds at the China Hill and Cracker Gulch populations each year.

Through a Section 6 grant and volunteer assistance, CDFW and Service staff collected seeds on China Hill in 2008 and 2009. Four hundred forty-four seeds have been accessioned (stored) at Rancho Santa Ana Botanic Garden. YFWO staff have been awarded a Recovery Challenge Grant to work with the Rae Selling Berry Seed Bank and Conservation Program to develop a plan for seed storage.

Surveys

A map showing where surveys have been conducted, has been completed, but could be revised to show where additional negative surveys have been done. Since 2007, more than 460 hectares (1137 acres) of suitable habitat have been surveyed for Yreka phlox.

Outreach

YFWO staff and volunteers from the Siskiyou Arboretum, lead an annual interpretive walk on China Hill. To celebrate Earth Day in 2018, the Siskiyou Gardens, Parks, and Greenway Association, in partnership with the City of Yreka, California Conservation Corps, and Fish and Wildlife Service, organized 50 volunteers in an effort to clean up garbage on China Hill. These types of volunteer and outreach efforts led the City of Yreka to adopt Yreka phlox as its official flower on September 8, 2009.

Recovery

Since the 2007 5-Year Review was completed, significant progress has been made to understand, recover, and conserve Yreka phlox. However, recovery criteria specified in the Recovery Plan have only partially been completed.

To reclassify Yreka phlox from endangered to threatened status (*i.e.*, to downlist), the following criteria must have been met: (a) the China Hill, Soap Creek Ridge, Jackson Street, and Cracker Gulch populations have secure permanent protection, or alternatively the China Hill and Soap Creek Ridge populations are protected and substitutes representing the Jackson Street and/or Cracker Gulch populations are protected, and a Yreka phlox seed bank and effective propagation techniques have been established.

To delist (recover) Yreka phlox, the reclassification criteria listed above must be met and either two additional populations have been located and permanently protected, **or** 10 years of demographic research and/or quantitative monitoring at 4 protected populations has demonstrated that plant population size has not declined more than 10 percent at any population (total change between year 0 and year 10). As demonstrated in Figure 1, the delisting criteria of 10 years of demographic monitoring with stable populations trends has already been met.

At this point in time, approximately 75 percent of the China Hill population by acreage, 5 percent of the Greenhorn Creek population, and 25 percent of the Soap Creek Ridge population has been protected. If successful, currently awarded and proposed Section 6 Recovery Land Acquisition grants may increase the protected acreage to approximately 95 percent at China Hill, 70 percent at Soap Creek Ridge, and 100 percent at Cracker Gulch. Additionally, effective propagation techniques have been published and funding for a seed bank storage plan has been awarded. If we can secure protection at more of the Greenhorn Creek population, and when we implement the seed bank storage plan, all recovery criteria for Yreka phlox will be met and delisting will be possible.

Because the recovery criteria for both downlisting and delisting have not yet been fully met and habitat destruction or alteration remains a current and ongoing threat, Yreka phlox remains an endangered species. With our partners, we continue to diligently pursue protections for Yreka phlox and ameliorate threats from off-road vehicle use, and competition with invasive non-native weeds (see RECOMMENDATIONS FOR FUTURE ACTIONS below). We expect, with continued effort, delisting of Yreka phlox is possible in the near future.

Conclusion:

After reviewing the best available scientific information, we conclude that Yreka phlox remains an endangered species. The evaluation of threats affecting the species under the factors in 4(a)(1) of the Endangered Species Act and analysis of the status of the species in our 2007 5-Year Review remains an accurate reflection of the species' current status.

RECOMMENDATIONS FOR FUTURE ACTIONS:

Future actions will focus on securing and permanently protecting four (up to six) Yreka phlox populations.

- Funding is needed to purchase the Soap Creek Ridge property and part of the Cracker Gulch property that is currently for sale. The CDFW has submitted a request for a nontraditional Section 6 Recovery Land Acquisition grant to fund the purchase of properties that would result in protection of 70 percent of the Soap Creek Ridge population and part or all of the Cracker Gulch population.
- Funding is needed to purchase part of the Cracker Gulch population from another private landowner. Alternatively, a conservation agreement or easement is being considered to protect this second half of the Cracker Gulch population.
- Approach Greenhorn Creek property owners to establish conservation agreements or easements on several additional scattered properties that have Yreka phlox.
- Continue ongoing cooperation with the City of Yreka and Siskiyou County Department of Agriculture should be continued to protect populations from off-road vehicle trespass and invasive non-native weed infestation.
- Continue to coordinate with CDFW and the WCB, on the Recovery Land Acquisition grant that was awarded to purchase the last four remaining private land parcels on the China Hill population.
- Work with Rae Selling Seed Bank and Conservation Program to complete the seed storage plan for Yreka phlox.
- Collection and accession of more seeds from each population as described in and after the propagation plan has been completed.
- After Yreka phlox has been delisted, continue to monitor the populations for five years, as required under the Endangered Species Act.

Completion of these future actions will allow the Fish and Wildlife Service to delist Yreka phlox (see "Recovery" above).

Lead Field Supervisor, Fish and Wildlife Service

Approve JENNY ERICSON Digitally signed by JENNY ERICSON Date: 2019.06.14 13:01:29 -07'00' Date _____

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