
Assessing the status of *Lupinus lepidus* var. *cusickii* in Denny Flat, Baker County, Oregon

2010 Progress Report

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PREFACE

This report is the result of a cooperative Challenge Cost Share project between the Institute for Applied Ecology (IAE) and the Bureau of Land Management. IAE is a non-profit organization dedicated to natural resource conservation, research, and education. Our aim is to provide a service to public and private agencies and individuals by developing and communicating information on ecosystems, species, and effective management strategies and by conducting research, monitoring, and experiments. IAE offers educational opportunities through internships. Our current activities are concentrated on rare and endangered plants and invasive species.

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Cover photograph: *Lupinus lepidus* var. *cusickii* habitat (above) and plant (below). Photos by Rachel Newton.

REFERENCE

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INTRODUCTION

Lupinus lepidus var. *cusickii* (cover photo, Figure 1), Cusick's lupine, is a narrow endemic inhabiting volcanic ash deposits found in Baker County, Oregon. It is a BLM Special Status Species, Oregon Department of Agriculture endangered species, and a U.S. Fish and Wildlife Service Species of Concern. Because of its extremely limited range, the Oregon Biodiversity Information Center (ORBIC) considers it a List 1 species (taxa which are threatened with extinction or presumed to be extinct throughout their entire range) with G1T1 global and S1 state rankings (critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with five or fewer occurrences; ORBIC 2010). This report documents the methods and results of the first year of a long term project to survey potential habitat for *L. lepidus* var. *cusickii* on land managed by the Bureau of Land Management and develop restoration protocols for the species. In 2010, the focus of our activities was to survey populations in Denny Flat.

L. lepidus var. *cusickii* is a member of the Fabaceae, the legume or pea family. These plants are perennial with a caespitose habit, and are less than 15 cm tall. The *cusickii* variety is distinguished from others in the *L. lepidus* complex by its inflorescence characters, branching patterns and specificity of habitat. Its flower peduncles are generally shorter than the leaf petioles, resulting in inflorescences that are surpassed by the foliage. Upper stem nodes are often branched, and individual flower pedicels are 4-5 mm in length, longer than other *L. lepidus* varieties (Broich 1990).

Known *L. lepidus* var. *cusickii* populations are found on eroding, tuffaceous hillsides at elevations around 4000 feet. *L. lepidus* var. *cusickii* occurs in areas of sparse vegetation, but is generally associated with occasional junipers and low-growing perennials such as *Eriogonum* spp., *Allium* spp., and *Lomatium* spp. Associated annual species include *Mimulus nanus*, *Phacelia lutea*, *Spraguea umbellata*, and *Camissonia* sp. (Meinke et al. 1990). Other species sometimes observed with *L. lepidus* var. *cusickii* include *Artemisia tridentata*, *Astragalus* sp., *Phlox* sp., and *Silene* sp. (Broich 1989). The average annual precipitation in the area is 30-40 cm. All populations of the species fall within the Blue Mountains physiographic province (Franklin and Dyrness 1984).

Although *L. lepidus* var. *cusickii* was first located in Oregon in 1886, relatively little is known about the species (Meinke et al. 1990). The purpose of this project is to document all extant populations of *L. lepidus* var. *cusickii* on BLM managed land and develop restoration protocols (including seed collection, grow-out, and out-planting). In 2010, our activities focused on determining the distribution of *L. lepidus* var. *cusickii* populations in the Denny Flat region of Baker County, estimating the size of populations, and determining potential threats to these populations. This information will provide the BLM with important information to assess management plans for the conservation of this sensitive species.

METHODS

Field surveys were conducted July 6-7, 2010. Potential habitat was identified using aerial photos and topographic maps. Areas likely to have *L. lepidus* var. *cusickii* were identified through a combination of topography and soil color. Tuffaceous soil, the primary component of *L. lepidus* var. *cusickii* habitat, is very light in color and found mainly on eroding hillsides.

With these characteristics in mind, additional areas were identified over the course of the surveys. At each site, the Intuitive Controlled survey method (Whiteaker et al. 1998) was employed to determine the extent of the *Lupinus lepidus* var. *cusickii* population. A complete census of *L. lepidus* var. *cusickii* was conducted along the survey route; plant density, habitat, threats, and associated species were also documented. Locations were documented using a navigation grade GPS unit. Additional GPS coordinates were periodically taken to document survey routes. These routes were delineated on USGS 7.5' topographic quadrangles (Appendix A). All survey results will be shared with ORBIC.



Figure 1. *Lupinus lepidus* ssp. *cusickii* reproductive adult from Denny Flat.

RESULTS

During the 2010 field season, approximately 3900 acres in the Denny Flat area of Baker County were surveyed for *L. lepidus* var. *cusickii*, excluding the areas where permanent monitoring transects are located. Five populations were observed, including extensions of previously known populations (Table 1, Appendix A). Four of the observed populations appeared to be larger than previously documented. Although this may be due to increased population size, it is more likely that this stems from using different methodology and

Table 1. Partial summary of *L. lepidus* var. *cusickii* populations at Denny Flat, excluding plants that occur within the vicinity of permanent monitoring transects. The population size is for 2010 surveys only. See Appendix A for more information regarding previously known populations.

Population	Status	Complete census	Population size	Proportion seedlings to total	ORBIC EO
Elms Reservoir 1 & 2	known, expansion ¹	no	4924	81%	
ORV Hill 1 & 2	known, expansion ¹	no	1592	30%	
Denny Flat West	known, expansion ¹	yes	1634	48%	
Denny Flat East 1 & 2	known, expansion ¹ (#2), new (#1)	yes	1330	40%	PDFAB2B193.6 (#2)
Amphitheater 1 & 2	known, expansion ¹	no	2806	51%	

¹“Expansion” refers to instances where the populations of *L. lepidus* var. *cusickii* that we observed were larger or covered more area than previously documented. Although this could indicate increased population size, it may also stem from the use of different methodology or technology to survey and document the populations.

technology to survey and document the populations. *Lupinus lepidus* var. *cusickii* was somewhat uncommon throughout the entire area, but when encountered, formed dense populations. Although there was a noticeable amount of dead reproductive adults, this was counterbalanced by a high rate of recruitment (Figure 2). The proportion of seedlings to the rest of the population varied from 30% for the ORV Hills population to 81% for the Elms Reservoir population. Populations ranged in size from 1330 to 4924 individuals (Table 1). No solid set of habitat characteristics, aside from the presence of tuffaceous soil, could be developed throughout these surveys; *L. lepidus* var. *cusickii* was conspicuously absent from several areas that appeared appropriate. The largest populations were found on steep, eroding hillsides with little other vegetation (Figure 3). Plants also inhabited flatter areas with greater soil stability and higher shrub cover.

Lupinus lepidus var. *cusickii* was most commonly associated with open spaces with very low competition on highly erodible tuffaceous soil. The plant community was dominated by desert shrubs, and included the natives *Chrysothamnus viscidiflorus*, *Artemisia tridentata*, *Atriplex canescens*, and *Ericameria nauseosa*. Groves of *Juniperus occidentalis* dotted the landscape, along with the occasional *Pinus ponderosa*. Other natives included *Eriogonum* spp., *Elymus elymoides*, *Silene* sp., and *Mimulus nanus*. Invasive community members included *Bromus tectorum*, *Sisymbrium altissimum*, *Lepidium perfoliatum* and *Cardaria* sp.

Disturbances and potential threats were observed at each occurrence and were mainly limited to invasive species and potential human disturbance. Several areas in Denny Flat show evidence of off-road vehicle (ORV) use and illegal dumping of household appliances and car

parts. While none of the populations we saw are in immediate danger, continued use of the area by humans could easily expand into *L. lepidus* var. *cusickii* populations. Evidence of cattle use was found at the ORV Hill 1 site, but appeared to be several years old.



Figure 2. *Lupinus lepidus* var. *cusickii* seedlings and dead adult.

FUTURE ACTIVITIES

In the 2011 and 2012 field seasons, additional surveys will be conducted in eastern Oregon. Areas of interest have been identified by the presence of tuffaceous soil, the main habitat indicator of *Lupinus lepidus* var. *cusickii*. Locations within Baker County include Windlass Gulch, Cottonwood Creek, Happy Camp, and areas north of Unity. Potential habitat has been identified to the southeast in Malheur County, and includes areas north of North Willow and northwest of Ironside. These surveys will provide accurate information about the true extent of this species' range and aid in the prioritization of management actions.



Figure 3. Amphitheater population at Denny Flat.

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APPENDIX A. POPULATION SUMMARIES FOR *LUPINUS LEPIDUS* VAR. *CUSICKII* SURVEYS

This information has been removed from the public draft.