

Dated: July 10, 1993.
Richard N. Smith,
 Acting Director, Fish and Wildlife Service.
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50 CFR Part 17

RIN 1018-AB52

Endangered and Threatened Wildlife and Plants; The Plant *Eutrema penlandii* (Penland Alpine Fen Mustard) Determined to be a Threatened Species

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The U.S. Fish and Wildlife Service determines that *Eutrema penlandii* (Penland alpine fen mustard) is a threatened species under the Endangered Species Act (Act) of 1973, as amended. Five to fourteen small populations of the plant are distributed in a 40-km (25 mi) stretch of the Continental Divide in central Colorado. Total abundance of the species is estimated at about 10,000 to 16,400 plants that grow on about 200 hectares (about 500 acres) of alpine tundra. The species grows on southerly to easterly facing slopes above 3,703 m (12,150 ft) in elevation. Its habitat is restricted to wetlands that are irrigated by melting snowfields. This wetland habitat is fragile and sensitive to watershed alterations that divert flows of surface water. Direct impacts to plants and habitats occur from mining, off-road vehicles, and other activities of man. Federal land is intermingled with private land (patented mining claims) in areas where *E. penlandii* grows, but the largest populations, about 80 percent of the plants, are on public land. Listing *E. penlandii* as threatened implements the Federal protection and recovery provisions provided by the Act.

EFFECTIVE DATE: August 12, 1993.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Colorado State Office, 730 Simms Street, room 290, Golden, Colorado 80401, or Western Colorado Suboffice, 529-25½ Road, suite B-113, Grand Junction, Colorado 81505-6199.

FOR FURTHER INFORMATION CONTACT: Dr. Lucy A. Jordan, Botanist, at the above Grand Junction address (303/243-2778).

SUPPLEMENTARY INFORMATION: - Background

The Penland alpine fen mustard has been found in 14 different areas (Schwendinger et al. 1991). It was first collected in 1935 at Hoosier Ridge in the Mosquito Range, Park County, Colorado, by the late Colorado College professor C.W.T. Penland. He recollected it in the same area in 1949 (Rollins 1950; Johnson 1981). The plant was described by R. Rollins (1950), an expert on species in the mustard family. The type specimen was found below a snowbank on Hoosier Ridge, near Hoosier Pass (Johnson 1981; Weber and Shushan 1955). This area contains about 2,000 plants, and it is one of three populations with more than 1,000 plants. The other 11 areas identified by Schwendinger et al. (1991) have fewer than 900 plants each (Table 1).

TABLE 1.—NAME AND SIZES OF EXTANT POPULATIONS OF *EUTREMA PENLANDII* (FROM JOHNSTON 1991). () = YEAR DISCOVERED

Population	Population name and year discovered	Number of plants
1	Hoosier Ridge (1935)	2,000
2	Pennsylvania Creek (1985)	200
3	Mount Silverheels (1988)	100
4	Cameron Amphitheater (1988)	700
5	Mosquito Pass-London Mt. (1967)	3,250
6	Mount Buckskin (1988)	850
7	Cooney Lake (1988)	200
8	Hilltop Mine (1967)	750
9	Kite Lake (1991)	200
10	Mount Evans (1991)	6,900
11	Sacramento Creek (1991)	500
12	Dauntless Mine (1991)	200
13	Peerless Mt.-Horseshoe (1991)	610
14	Loveland Mountain (1991)	unknown

Eutrema penlandii is a small, herbaceous perennial plant that grows to 3-8 cm (1.2-3.2 in) in height. It is a shiny-green glabrous (hairless) plant with long-petioled (long-stemmed), heart-shaped basal leaves that grow up to 35 mm (1.4 in) long. It also has clusters of small, white flowers atop the stems that grow 2-3.5 mm (about 0.1 in) in length. The generic name refers to its

small and rounded hollow fruits that are 1.5 mm (0.06 in) wide, and 4-8 mm (0.2-0.3 in) long (Johnston et al. 1981; Rollins 1950).

This taxon is closely related to *Eutrema edwardsii*, a circumboreal (inhabiting northern regions of North America and Eurasia) species in the Arctic whose range also extends into the mountains of central Asia (Weber and Shushan 1955). Rollins (1982) recognized *E. penlandii* at the species level, but Weber (1987) treated it as a subspecies of *E. edwardsii* (*E. edwardsii* ssp. *penlandii*).

The Fish and Wildlife Service (Service) recognizes *E. penlandii* as a species. If it is later recognized as a subspecies of *E. edwardsii*, its designation as a threatened species will remain valid because section 3(15) of the Endangered Species Act (Act) of 1973, as amended, (16 U.S.C. 1531 et seq.) permits the listing of subspecies.

A plant of Colorado alpine tundra, *E. penlandii* grows in a harsh environment. Alpine winters in Colorado may last 5 months or more, and summer temperatures are usually below 16° C (60° F). Growing seasons may only last from 0 to 70 days per year (Colorado Native Plant Society 1989). Thus, in its native habitat, the plant grows at the limits of most plant adaptations due to low temperatures and short growing seasons. Freezing and thawing soil (solifluction), drying winds, and windblown snow and ice crystals also result in low plant productivity on the tundra (Zwinger and Williard 1972).

E. penlandii is habitat-specific, growing only in oligotrophic, rheotrophic alpine marshes (Weber and Shushan 1955). It grows in a macroclimate of long, cold, wet winters and cool, windy summers, and a microclimate of relatively protected, wet, springy bogs (Johnston et al. 1981). Major components of its microenvironment include moss-covered peat fens, perennial subirrigation, and high elevation (above 3,703 m; 12,150 ft). Peat mats on which it grows form on small, flat-to-gently sloping benches in leeward cirques (i.e., steep-walled rounded glacial valleys). Water required for the development and sustenance of these peat mats comes from snowfields which persist through the summer. Conditions for maintaining these persistent snowfields exist along this east-west trending portion of the Continental Divide, where the plant is found on slopes that vary from southerly to easterly (Schwendinger et al. 1991). Most portions of the Continental Divide do not support the plant, presumably due to a north-south

trend which exposes slopes to blowing and snow-melting winds (Weber 1965; Naumann 1988).

Eutrema penlandii is found on deep organic soils in moist areas that are usually adjacent to clear, running water from snowmelt. Johnston et al. (1981) noted a relationship between the emergence of *E. penlandii* and snowmelt, i.e., that plant emergence at a site depended on the availability and timing of sufficient water to continuously moisten the mosses in which the plants were rooted, but not so much water as to flood them. Presumably, it is this phenomenon that, in part, affects standing crops during a particular year. Johnston et al. (1981) also stated that flowering was apparently subject to this same control.

The biogeography and phylogenetic history of *E. penlandii* is unusual (Rollins 1982). As the only representative of its genus in the lower 48 States, it is an extremely disjunct species. Its range is separated by more than 1,600 km (1,000 mi) from its nearest relative, *E. edwardsii*, an Arctic circumboreal species. All other species of *Eutrema* occur in Asia. This biogeographic pattern (i.e., disjunct species in central Asia and the interior of western North America) could have been caused by one of several possible historic conditions. *E. penlandii* populations may be glacial relicts from

the Pleistocene epoch that migrated south of the Arctic with glaciation and were left stranded as the glaciers retreated. Alternatively, populations of *E. penlandii* may be relicts of a more widespread Tertiary flora (Weber 1987). These scenarios are supported by the existence of other rare alpine taxa with Arctic affinities that also occur in the Mosquito Range, either as separate species (e.g., *Saussurea weberi*) or disjunct populations of species (e.g., *Armeria scabra* ssp. *sibirica*, *Braya glabella*, and *Braya humilis*; Weber 1987).

As previously indicated, Penland discovered the first stand of *E. penlandii* in 1935. He recollected it in 1949 (Rollins 1950). This population was sampled again by W.A. Weber and others in 1951 and 1959. Weber discovered two new populations in 1967 (Johnston et al. 1981). The two new populations were located south of Hoosier Ridge, one at Mosquito Pass and London Mountain Saddle, and the other above Hilltop Mine on the slopes of Mount Sherman (Naumann 1988) in the Four Mile Creek cirque (between Mount Sheridan and Mount Sherman). Johnston et al. (1981) found and mapped all three populations within 4 km (2.5 mi) of the Continental Divide.

In addition to the three populations above, Johnston et al. (1981) reported nine other collections (in 1977, 1978,

and 1980), which included five new sightings of the plant. Naumann (1988) revised and expanded Johnston et al. (1981) and reported sightings in eight extant populations (in 1985 and 1988). These sightings included five new populations of *E. penlandii*.

Studies by Schwendinger et al. (1991) and Kelso et al. (1991) further clarified the distribution and habitat preferences of *E. penlandii*. Schwendinger et al. (1991) reported six additional populations where *E. penlandii* previously had not been documented. They also reported extensions of four of the eight populations described by Naumann (1988). Schwendinger et al. (1991) reported seven new stands (subpopulations) in areas where the species previously had been known to occur and 16 more at new sites.

Johnston (1991) summarized his earlier findings and those of Naumann (1988) and Schwendinger et al. (1991) to report the total number of *E. penlandii* populations as 14. This total includes 29 distinct stands, with a total number of individuals estimated at about 16,400 (Table 2). All of these discoveries are within the original 40-km (25-mi) range of the species, and Service biologists estimate that the area actually occupied by *E. penlandii* plants is about 200 hectares (about 500 acres).

TABLE 2.—SIZE AND LANDOWNERSHIP STATUS OF KNOWN EUTREMA PENLANDII POPULATIONS AND SUBPOPULATIONS (JOHNSTON 1991; SCHWENDINGER 1991). (NO.=NUMBER; USFS=U.S. FOREST SERVICE; BLM=BUREAU OF LAND MANAGEMENT; PAT=PATENTED MINING CLAIMS; PPAT=PRESUMED PATENTED BUT NOT SURVEYED)

Population	Subpopulation	No. of plants	Federal	State	Private
1		2,000	USFS		
2		200			PAT
3		100	USFS		
4	A	500			PAT
	B	100			PAT
	C	100	USFS		
5	A-D	2,000	BLM		
	E	1,000			PPAT
	F	200	BLM		
	G	50			PPAT
6	A-B	50	USFS		PAT
	C	500			PAT
	D	300	USFS		
7		200	USFS	CO	
8	A-C	750			PAT
9		200	USFS		
10	A-G	5,000	BLM		
	H	1,800	BLM		
	I	100	BLM		
11		500	BLM ¹		
12		200			PAT
13	A	10			PAT
	B	100			PPAT
	C	500	USFS		
14		<100	USFS		

¹ Landownership uncertain.

Federal and private land is intermingled in the alpine areas where *E. penlandii* is found, and exact boundaries often have not been determined on the ground. Most of the private land was once Federal land that was converted to patented mining claims under provisions of the General Mining Law of 1872.

The known elevational zone occupied by *E. penlandii* has been extended by Schwendinger et al. (1991), who reported *E. penlandii* populations at 2,793 m (9,165 ft) in elevation. This lowered its known growth zone about 199 m (653 ft). However, all *E. penlandii* plants are restricted to the Mosquito Range and recent reconnaissance of potential habitat in Summit, Gunnison, Chaffee, and Clear Creek Counties in Colorado, and in the Wind River Range in Wyoming failed to find *E. penlandii* (Schwendinger et al. 1991; Walter Fertig, Rocky Mountain Herbarium, pers. comm., 1991). Previous searches by other botanists also failed to locate *E. penlandii* outside of the Mosquito Range.

Federal action involving *E. penlandii* began in 1973 with section 12 of the Act, which directed the Secretary of the Smithsonian Institution to prepare a report on those plants considered to be endangered, threatened, or extinct. This report, designated as House Document No. 94-51, was presented to Congress on January 9, 1975. On July 1, 1975, the Service published a notice (40 FR 27847) of its acceptance of this report as a petition within the context of section 4(c)(2) of the Act, now section 4(b)(3)(A), and of its intention thereby to review the status of those plants. *E. penlandii* was included for review as endangered in the July 1, 1975 petition.

In 1976, the Service proposed *E. penlandii* for endangered status, along with 1,700 other plant species (41 FR 24535), but this proposal was withdrawn in 1979 because a final rule had not been prepared within the time limits required under the 1978 amendments to the Act. On December 15, 1980 (45 FR 62485), the Service included the plant as a category 2 species in an updated notice reviewing native plants under consideration for classification as threatened or endangered. Category 2 consists of taxa for which there is some evidence of vulnerability, but for which there was not enough data to support listing proposals at that time.

Section 4(b)(3)(B) of the Act, as amended in 1982, required the Secretary of the Interior to make findings on certain petitions within 1 year of their receipt. Section 2(b)(1) of the 1982 amendments further required that all

petitions pending on October 13, 1982, be treated as having been newly submitted on that date. Because the 1975 Smithsonian report was accepted as a petition, all the taxa contained in the notice, including *E. penlandii*, were treated as being newly petitioned on October 13, 1982.

On November 28, 1983 (48 FR 53665), the Service changed *E. penlandii* from Category 2 to Category 3C based on recommendations from Johnston et al. (1981). Category 3C consists of taxa that are no longer being considered for listing because they are more abundant and/or widespread than previously thought. In a notice published on January 24, 1984 (49 FR 2485), the Service announced a "not warranted" finding for listing *E. penlandii* due to its reclassification to Category 3C. This finding terminated the need for 1-year petition findings on the species. *E. penlandii* remained as a Category 3C species in the September 27, 1985, Notice of Review (50 FR 39552).

In a 1985-1986 reconnaissance survey, O'Kane (1988) found one new, small population of *E. penlandii* consisting of 200 plants on a 0.4 hectare (1-acre) plot at Pennsylvania Creek. However, he searched six sites that were previously occupied by the plant and was able to locate the plant on only two of these (O'Kane 1988). He observed ditching associated with gold mining operations and expressed concern that these operations could disrupt the hydrologic regime of peat fens and threaten the plant by desiccating its habitat.

In 1988, the Service funded a new status survey and report under a Section 6 Cooperative Agreement with the Colorado Natural Areas Program. Only four new populations were found during the 1988 status survey. Each consisted of about 0.4-0.8 hectares (1-2 acres) and all were within the previously documented range. Total numbers estimated for eight populations of the Penland alpine fen mustard in 1988 were 5,200 individuals from 25 hectares (62 acres; Naumann 1988). No plants were found in two previously known locations, one at London Mountain Saddle below Mosquito Pass and the other at the Dauntless Mine site below Mount Sherman. Desiccating effects of ditching from off-road vehicle ruts and mining activities were observed at several of the populations. For these reasons, Naumann (1988) recommended that *E. penlandii* be returned to the candidate list. On February 21, 1990, it was added to the 1990 Notice of Review (55 FR 6205) as a Category 1 candidate species, a species for which the Service has substantial information to support a

proposal to list as threatened or endangered.

Eutrema penlandii was proposed for listing as a threatened species on October 15, 1990 (55 FR 41725). All interested parties were requested to submit factual reports or information that might contribute to the development of a final rule.

During the public comment period associated with the listing proposal, the Alma London Joint Venture, a mining company which has done geological mapping in the Mosquito Range, disagreed with the Service's summary of habitat requirements for *E. penlandii*, particularly with respect to reports that it required calcareous substrate for growth. The Service had based its determination that the plant needed calcareous substrates on its co-occurrence with calciphiles (plants that require calcareous substrates), and it had stratified its search for potential *E. penlandii* habitat by looking for calcareous substrates.

The mining company, based on their geologic mapping, stated that several sites occupied by the plant did not occur in areas with significant amounts of carbonate rock fragments. They suggested that new plants might be found if searches were broadened to include noncalcareous substrates. If so, they believed that a broadened search might show the species to be too common to qualify for listing. They requested a 6-month extension before a final decision was made on the listing to allow them to look for *E. penlandii* in additional areas. The company developed a 1991 study plan to search about 50 additional areas in the Mosquito and Sawatch (the next mountains to the west) ranges where other rare alpine plants occur. Alma London Joint Venture also believed the proposed rule overstated acid mine drainage as a threat to the plant.

The Service, the Colorado Natural Areas Program, and the mining company agreed that the plant's substrate preferences should be further evaluated. The Service then decided that substantial disagreement existed among scientists regarding interpretation of available data and that a 6-month extension would be appropriate to resolve habitat preference and distributional questions. The Service also worked with Colorado College in a study to:

- (1) Determine pH (acidity) of *E. penlandii* habitat and
 - (2) Examine exchangeable calcium in soils where *E. penlandii* grows.
- To allow time to resolve various issues, the Service published a notice of a 6-month extension on October 28,

1991 (56 FR 55487), extending the listing deadline to April 15, 1992. A 30-day comment period was granted from October 28, 1991, to November 27, 1991.

Alma American Mining Corporation (Schwendinger et al. 1991) and Colorado College (Kelso et al. 1991) prepared and submitted reports to the Service for use in the final listing decision. These reports were of interest to others, and numerous requests were received to extend the comment period to allow review and comment on them. The Service extended the comment period until February 7, 1992, an additional 45 days. Notice of reopening the comment period was published December 24, 1991 (56 FR 66614). Results from the two reports are presented and discussed in this rule.

Summary of Comments and Recommendations

Seven comments were received during the initial comment period. Five of these were in support of the proposed listing. These comments were provided by one State agency, one Federal agency, and three professional botanists (from a botanical garden, a plant conservation center, and a university, respectively). The other two comments were received from a mining company and opposed listing. One comment from the company requested a public hearing, but indicated that this request would be withdrawn if further studies were agreed to. The other comment from the company questioned some of the information used to determine the status of the species and suggested that further listing action be delayed so that additional studies could be conducted.

Subsequent to the initial comment period, several letters were exchanged between the Service, the mining company, and a private conservation organization. These letters discussed the purpose and objectives of proposed studies, and consequences that this delay in the listing process might have on the species.

Notice of the availability of the two 1991 study reports and a solicitation for comments were sent to appropriate State and Federal agencies, scientific organizations, and other interested parties. Fifteen written and three oral comments were received (one individual responded both in writing and orally, and one group responded twice in writing). Comments were received from Federal and State agencies (7), local government (1), botanical gardens (1), universities (3), and private firms (6). Fifteen comments were in support of listing *E. penlandii* as threatened, one was neutral, and two

comments from one group opposed the listing.

Written comments and oral statements received during the comment period are addressed in the following summary. Comments of a similar nature or point are grouped into general issues. These issues and the Service's response to each are discussed below.

Issue 1: Is *Eutrema penlandii* rare enough to warrant listing as threatened?

a. Comments claiming *Eutrema penlandii* is not rare

The sponsors (Alma Mining Company) and authors (Schwendinger et al. 1991) of a 1991 study of the distribution and habitat preferences of *E. penlandii* pointed out that they found its habitat specificity was broader than originally thought, i.e., that *E. penlandii* does not appear to require calcareous substrates as suggested by others. They stated that more potential habitat may exist than previously estimated and that prior searches had been inappropriately designed. They also noted that brief but intense searches by trained amateurs during the 1991 survey succeeded in expanding population sizes and numbers, leading them to conclude that the species is not uncommon in appropriate habitats. They speculated that similar efforts in other mountain ranges may well result in the same success. They concluded that the species is not as rare as previously thought and not sufficiently rare to qualify as a threatened species.

b. Comments claiming *Eutrema penlandii* is rare

Regarding the 1991 survey (Schwendinger et al. 1991) and comments provided by its proponents, several botanists noted that *E. penlandii* is diminutive, difficult to identify in the field, and that it can often be confused with similar-looking species that grow with it. They expressed concern that voucher specimens were collected at only two locations and that photographs were taken as documentation in the study in lieu of taking voucher specimens, particularly because most of the survey workers were amateurs and the principal investigators did not visit every site.

Several commenters disagreed with the estimates given by Schwendinger et al. (1991). One biologist commented that the number of *E. penlandii* at one location was overestimated by 1991 survey workers, and he estimated the total number of plants to be about 10,000 rather than the 16,400 reported by Schwendinger et al. (1991). Another group of biologists found significant discrepancies between numbers in

populations that they counted in the same year that counts were made by Schwendinger et al. (1991). They suggested caution when using estimated numbers and that numbers provided by Schwendinger et al. (1991) be taken as possible overestimations. Another commenter stated that the delineation of discrete populations was arbitrary and not based on sufficient examination of biogeographical conditions and ecological parameters. This commenter stated that just as defensible a case could be made for 5 populations, or 2 major populations using existing data rather than the 14 populations described by the mining company and its contractors.

Some reviewers were concerned that the procedure used to estimate population sizes was not described in the study report. All professional botanists were pleased that additional plants were found. However, they pointed out that even if the estimate of 16,400 individuals were accurate, this should not be construed as a large population or sufficient for long-term viability of this species. Furthermore, populations were generally quite small in numbers (most numbering less than 900 individuals) and small areas of habitat were occupied. Thus, they were considered vulnerable to extirpation from any number of potential natural or human-caused threats.

Reviewers stated that *E. penlandii* requires special habitat conditions, including clear, running water from melting, persistent snowfields. These habitat conditions are restricted in the Mosquito Range (and elsewhere), and they serve to limit the number and size of the plant populations and their potential distribution. Furthermore, these habitat conditions would be virtually impossible to artificially produce should the species require propagation to bolster the declining populations. Whether or not the plant is limited by calcareous substrates, reviewers maintained that the species is highly specialized and restricted to sensitive and vulnerable habitats. Therefore, it was judged important to protect *E. penlandii* populations by listing the plant.

Some reviewers considered it significant that, even though additional plants and populations were discovered, 1991 surveys did not extend the range of *E. penlandii*. Small stands of the plant were found scattered in sensitive habitats in high elevations of the east-west trending portion of the Mosquito Range. Reviewers believed that this relict plant, a rare and disjunct species, should be considered an important evolutionary resource and that its

distribution pattern mandates preserving the full genetic complement of the species (i.e., all the populations). Those supporting listing indicated that loss of even a single population could compromise the ability of the species to adapt to changing conditions or threats.

Reviewers repeated that several trained botanists had searched suitable habitats in many mountain ranges over many years without discovering additional *E. penlandii* populations. Therefore, despite the apparent success of the 1991 study in locating additional plants and expanding the number of populations within the Mosquito Range, it is unlikely that other populations will be found outside this range. Searches by botanists were not limited to known calcareous substrates, and thus their surveys were not biased.

Service Response

The Service finds that *E. penlandii* is a rare species occupying small areas of specialized habitat within a limited range. Despite years of search, its documented distribution remains restricted to the Mosquito Range. Computations by Service biologists and others from survey maps indicate that most subpopulations identified in Table 2 occur in tracts of a few hectares (2.47 acres) or less in size, and the total area of all documented, occupied habitat is about 200 hectares (500 acres).

There is disagreement regarding the total population size for *E. penlandii*. Three field botanists have estimated the numbers at 5,200, 10,000, and 16,400, respectively. The most recent estimates are 10,000 and 16,400 plants, and the Service believes that the actual number of plants is likely to be somewhere between these two estimates. The Service points out that no statistically based estimate exists for the number of *E. penlandii* plants, and thus the significance or absolute statistical validity of either "estimate" remains open to question. However, even though the exact number is not known, it is apparent from the estimates that the total population size of this species is relatively small.

The Service also acknowledges that the number of *E. penlandii* populations or subpopulations is open to question. The 14 populations that have been identified may not warrant population status based on valid principles of biogeography and genetics. It has been suggested that there is no valid scientific reason why the number of populations is 14, and the number may be 2 or 5. The close proximity of some of the populations and many of the subpopulations warrants further investigation. It is likely that the extent

of many of the stands of the plant is a function of the amount of annual precipitation, and thus some overlap may be expected in years of favorable hydrologic conditions. Thus, the reliance on one year of survey work to delineate populations and subpopulations is considered scientifically inadequate.

The Service has mapped and examined the locations of various stands of *E. penlandii* and finds that designation of subpopulations and populations is somewhat arbitrary. Only a few feet or less separate some of the subpopulations delineated by Schwendinger et al. (1991). As an example, subpopulations 10 a, c, d, e, f, and g (Table 2) all occur in an area less than about 16 hectares (40 acres), and it is arguable whether these should be construed as six or only one subpopulation. As an example of questionable population designations, it is debatable whether populations 5 and 10 characterized by Schwendinger are 2 populations or only 1 population. The Service believes that the present number of populations is between 5 and 14, and that this does not constitute a diverse and common species.

Eutrema penlandii primarily grows in soils that overlay the Leadville limestone formation. Its requirements for or relationship with these calcareous substrates are unknown, but the role of substrate has been debated (Kelso, et al. 1991; Schwendinger et al. 1991). The Service finds that regardless of whether *E. penlandii* is associated with calcareous substrates, the plant is otherwise highly restricted in its habitat use. Many questions about the life history and habitat requirements of the plant remain unresolved, but its habitats are uncommon and the amount of available habitat is highly dependent upon hydrology.

Issue 2: Are *Eutrema penlandii* populations or its habitat sufficiently threatened to warrant designation as a threatened species?

a. Comments Indicating Minimal Threats to Populations or Habitat

The sponsors and authors of the Schwendinger et al. report (1991) reiterated that there were no visible signs of ongoing mining activities where *E. penlandii* was found and, except for one instance, off-road vehicle travel appeared to be restricted to existing roads. Also, they found *E. penlandii* in areas that recently had been disturbed (within the past few years), indicating the plant had some tolerance for habitat disturbance. They concluded that the magnitude of threats to *E. penlandii*

populations has been exaggerated (Schwendinger et al. 1991).

b. Comments Indicating Significant Threats to Populations or Habitat

The reviewers supporting listing *E. penlandii* emphasized that the habitat required by the species is created by specific hydrologic conditions that can easily be altered. Any activity that diverts water flow or changes the quality of water flowing to *E. penlandii* habitats could place an entire population at risk. Although reviewers acknowledged that *E. penlandii* can be found where there is some habitat disturbance, it would not tolerate disturbance that is frequent, repeated, or of large magnitude.

Although there is little current mining activity in areas where *E. penlandii* is established, much of the area occupied by the plant is staked for mining claims, and reviewers were concerned that mining activity could become a serious problem for the species if market conditions change. Even though *E. penlandii* may be somewhat tolerant of acidic soil and water conditions, this does not diminish threats due to actual destruction of populations and changes in the watershed and its hydrology.

Half of the *E. penlandii* populations occur, at least partially, on private land (patented mining claims). Reviewers suggested that listing would increase the incentives to create cooperative protection agreements with landowners.

Reviewers observed that recreation is growing in popularity in alpine areas along the Continental Divide and that many *E. penlandii* sites are accessible and near existing or proposed trails. They stated that listing the species as threatened would encourage Federal land managers to more adequately take into account the requirements of the species in their recreational and land-use planning.

Service Response

The Service finds that *E. penlandii* and its restricted habitat are under sufficient threat that the species is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. *E. penlandii* populations exist in alpine habitats in which plant growing seasons may vary from 0 to 70 days depending on annual climatic changes. Plant growth is already reduced in some years by naturally extreme conditions characteristic of the alpine tundra, and human-induced changes can easily and quickly affect this sensitive ecosystem.

Threats from mining activities and recreation can destroy populations by modifying habitat through surface

disturbance or changes in hydrology, such that the habitat no longer supports the species. The Service notes that most of the populations and subpopulations of the plant are very small, and some are only a few square meters (yards) in size. These small plant stands are highly vulnerable to human-induced changes in surface topography, especially in upslope areas. Specific threats posed by anthropogenic impacts are discussed in detail later in this document under the five listing factors.

Summary of Factors Affecting the Species

Section 4(a)(1) of the Act and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act set forth the procedures for adding species to the Federal lists. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to *Eutrema penlandii* Rollins (Penland alpine fen mustard) are as follows:

A. *The present or threatened destruction, modification, or curtailment of its habitat or range.* The Service finds that *E. penlandii* is a rare species occupying a small area. Despite years of search, its documented distribution remains limited to a restricted range in specialized and uncommon habitat. Most subpopulations occur in small tracts and the total area of all documented, occupied habitat is about 200 hectares (500 acres). Only a few meters (yards) or less separate some of the *E. penlandii* subpopulations, and some populations do not appear to be biogeographically distinct. However, regardless of the number of populations and subpopulations, the Service believes that the areas occupied by *E. penlandii* are too small to provide a high degree of genetic diversity or to reduce the threats of endangerment to the species.

Evidently, because of its high degree of habitat specificity, which requires the combination of several microenvironmental factors as described earlier, the Penland alpine fen mustard is found only in the Mosquito Range in Colorado, where this combination of conditions occurs. Suitable habitat for the plant is rare, and most areas in Colorado and elsewhere that have a high potential as habitat have been surveyed by botanists. *E. penlandii* never has been collected outside the Mosquito Range in Colorado, and it appears unlikely that the plant exists outside of this area.

The most fragile aspect of the Penland alpine fen mustard's habitat is the continuous supply of water needed to maintain peat fens in which the species grows. *E. penlandii* grows in peat mounds along saturated stream margins and small hummocks within streams, and it rarely occurs more than 0.5 m (0.55 yd) away from flowing meltwater. Populations of *E. penlandii* are small, and some are found on areas of less than about 0.4 hectares (1 acre). Some subpopulations occupy only a few square meters (yards). Because stands of the plant are so small, they are vulnerable to surface disturbances that reroute the needed water supply. This can occur from ditching, diking, or other watershed perturbations that alter surface water flow (e.g., roads, trails, ruts of vehicle tracks, footpaths, or mining construction) to a peat fen in which the Penland alpine fen mustard grows. Desiccation and loss of a peat fen can cause a loss of *E. penlandii* plants, and reduction in the amount of its highly specialized habitat.

Old mines occur near every *E. penlandii* population, but the plant is not found in habitats that have been significantly altered by mining. Records show that most mining claims on public land are active (i.e., claims have not been allowed to lapse). Virtually all of the public land in the area, including *E. penlandii* habitat, is staked for mining claims under the Mining Act of 1872. For example, there are 2,500 mining claims on the South Park Ranger District of the U.S. Forest Service (Steve Currey, Clint Kyhl; U.S. Forest Service, pers. comm., 1992).

Mining activity includes such activities as prospecting, annual assessment work to validate a claim, and actual mineral extraction. Prospecting and assessment work are currently occurring in and near areas occupied by *E. penlandii*, and mineral extraction may resume whenever market and other conditions are favorable. The Hoosier Ridge area, the type location and largest population of *E. penlandii*, is under intense scrutiny for mining. If mining occurs there as planned, extirpation of that population appears imminent.

In a recent appeal to the establishment of a Hoosier Ridge Research Natural Area (HRRNA), St. Mary Minerals, Incorporated, stated:

The proposed boundary of the HRRNA overlaps seven active lode mining claims * * * staked between 1980 and 1987 * * * we have both gold anomalies and high trace metal concentrations, which together indicate the possible presence of a mineral deposit in the area where the three watersheds originate (the HRRNA) * * *

Sampling and analyses of rocks along the ridge which constitutes the eastern boundary of the proposed HRRNA * * * reveal zones of mineralized rock with elevated gold values, some of which are of ore-grade (economic concentrations).

The Hoosier Ridge area is one of the largest populations of *E. penlandii* and the type locality. Active prospecting and establishment of new claims has continued in this area through 1992. Threats to this population are imminent at this locality and at others as well. Thus, the Service believes that mining activities, including prospecting and annual assessments, threaten *E. penlandii* populations.

Full-scale mineral extraction is not necessary for mining to constitute a threat to *E. penlandii*. One trip by a drilling rig on the way to drilling a prospect hole could alter the hydrology of sensitive areas sufficiently to decimate a subpopulation or even a population of *E. penlandii*. In addition, Service biologists find that several *E. penlandii* subpopulations are in such close proximity that more than one could be severely impacted and perhaps lost due to a single upslope disturbance, such as a road, trail, or mine that would alter surface drainage patterns. Extensive mining activity will likely increase if economic conditions become more propitious. In that case, it is likely that several subpopulations would be impacted and perhaps extirpated.

Half of the *E. penlandii* populations occur on private land (patented mining claims) that was once Federal land. Although mineral extraction is not currently occurring on these claims, it could resume if market conditions become favorable. If public opinion favors reform of the 1872 mining law, many claimants may expedite patenting mining claims and thus convert even more Federal land and *E. penlandii* populations to private land. Under current law, only a few stipulations need be met to transfer public lands to private ownership at costs as low as \$2.50 to \$5 per 0.4 hectares (1 acre). *E. penlandii* plants on private land are not protected by Federal or State law, nor will they be after the species is listed as threatened.

Recreational activities are increasing in alpine areas of the Mosquito Range. Although many forms of outdoor recreation, such as hiking, appear benign, participation by enough people can lead to braided trail formation, soil compaction, and disruption of water flow from snowfields and in wetlands as people hike around or through them. Hiking has increased in the Mosquito Range and up to 4,000 people are now hiking during the short wildflower

season in some locations near *E. penlandii* populations (Sharon Kyhl, U.S. Forest Service, pers. comm., 1992). The plant occurs on gentle terrain below steep slopes, and these areas attract hikers because they appear as lush wildflower gardens that are adjacent to water.

Motorcycles, 4-wheel drive vehicles, and other off-road vehicles are adversely impacting alpine areas of the Mosquito Range. Numerous roads associated with tracts of privately owned mining claims provide vehicular access to most alpine areas. The Service finds that 8 of the 14 areas occupied by *E. penlandii* have roads or off-road vehicle trails that lead to them. The primary author of this rule observed direct impacts to *E. penlandii* plants at Mosquito Pass due to off-road vehicle use, indicating that motorized vehicles can, and in many instances do, go anywhere. Surface disturbances by vehicles can crush plants and directly impact *E. penlandii* populations, and rutting and other disturbance can degrade and destroy the alpine wetlands in which the plant grows.

B. Overutilization for commercial, recreational, scientific, or educational purposes. No overutilization of *E. penlandii* has been documented. However, the existence of a threatened plant on Federal lands could be perceived by claim holders and others as a potential obstruction that could cause curtailment of the assessment work needed to retain a mining claim and convert Federal land to private ownership. Listing the plant also could place further environmental requirements on mining extraction. Thus, claim holders and others may destroy plants.

This species is a relict plant whose closest relative occurs in the Arctic. Listing the species could increase its value to plant collectors and lead to more taking. To help minimize these threats, the Service has not proposed critical habitat as this action requires delineation of the species' specific habitats (see "Critical Habitat" section of this rule).

C. Disease or predation. No serious threats are known. There is evidence that pika and microtine rodents feed on the plants, but these interactions are considered part of the natural history of *E. penlandii* (Naumann 1991). The significance of such herbivory is unknown; however, pikas may assist in seed dispersal by moving them to storage areas (Naumann 1991).

D. The inadequacy of existing regulatory mechanisms. No Federal or State laws protect *E. penlandii*. A Research Natural Area was proposed for the Hoosier Ridge population on U.S.

Forest Service land. However, several mining companies appealed this proposal because of their intent to conduct future mining operations in the area. The U.S. Forest Service then withdrew its proposal. Since that time, these mining companies have filed claims and are prospecting for minerals over the entire proposed area.

The research area proposal for Hoosier Ridge was developed over a 10-year period by several cooperating agencies, including the U.S. Forest Service and the Colorado Natural Areas Program. The proposed Hoosier Ridge area represented one of the most floristically complete and pristine alpine areas remaining in the Nation. Abandonment of this proposed research area concept in response to the appeal by mining companies leaves the type locality, one of the largest populations of *E. penlandii*, without protection and under imminent threat. Because Region 2 of the Forest Service does not include the plant as a sensitive species, *E. penlandii* habitat does not have any regulatory, planning, or policy protection.

The Bureau of Land Management treats *E. penlandii* as a sensitive species for management planning purposes. However, the species and its habitat are not necessarily given priority in multiple-use considerations. The area around Mosquito Pass has been nominated as an Area of Critical Environmental Concern (ACEC). Designation as an ACEC flags an area and the values for which the ACEC was established so that managers can take those values into consideration when developing resource management plans. However, a manager has the prerogative of disregarding or not giving high priority to those values if other values appear to have more importance. It is questionable whether the nominated area will become an ACEC. Even if it does, designation of *E. penlandii* habitat as an ACEC will not necessarily confer the level of protection the Service deems necessary, because not all *E. penlandii* populations are included in the nominated area. The Act would provide additional protection and encourage active management through the **Available Conservation Measures** discussed below.

E. Other natural or manmade factors affecting its continued existence. *E. penlandii* has a pattern of rarity (i.e., a few small populations on small areas of specialized habitat) that makes it particularly vulnerable to the threats described above, as well as to localized environmental catastrophes such as fungal blight, drought, or insect infestations. Alpine tundra is a harsh

environment for plant growth. If climatic changes (local or global) reduce the amount of persistent snowfields, *E. penlandii* habitat might be further reduced, and the plant may become more rare than it is at present. In addition, the Service finds that several of the subpopulations and populations are located in such a small area that they are vulnerable to perhaps a single upslope surface disturbance.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to this species in determining to make this final rule. Based on this evaluation, and cognizant of the debate about the imminence and magnitude of threats to *E. penlandii* populations and habitat posed by activities in alpine areas, the Service believes *Eutrema penlandii* warrants listing as threatened.

Eutrema penlandii is a restricted endemic species, a relict of past glaciation whose fragile wetland habitat is being threatened by anthropogenic development. Threats include mining and recreational activities. Mining is presently at a low level, but the area supporting the plant is being extensively prospected, converted to mining claims, and patented to private mining lands. Miners are continuing assessment work on public lands, and they are not allowing their mining claims to lapse. Mining companies have indicated that economically viable deposits of various minerals occur and that these can be mined. As mining becomes more profitable, more public land will be patented and transferred to private ownership. Because *E. penlandii* populations are predominantly associated with areas under consideration for mining, it appears only a matter of time before extensive areas of its habitat are altered.

Recreational activities that are potentially disruptive to alpine wetland hydrology, such as backpacking, hiking, mountain biking, trail riding with horse and burro, and off-road vehicle use are gaining in popularity and increasing in the alpine areas where *E. penlandii* occurs. Roads now provide access to most *E. penlandii* populations. Many of these populations are very small and vulnerable to changes in local topography that would affect their water supply.

At present levels, these identified threats to *E. penlandii* and its habitat are not likely to result in the species' extinction in the foreseeable future. However, threats are acting on *E. penlandii*'s small populations and limited range, and this species is likely to become endangered within the

foreseeable future in all or a significant portion of its range. Thus, *E. penlandii* is a threatened species as defined by the Act. For reasons given below, it is not considered prudent to designate critical habitat.

Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time the species is determined to be endangered or threatened. The Service finds that designation of critical habitat is not presently prudent for *E. penlandii* because possible adverse consequences from vandalism would likely outweigh the minimal benefits accruing from critical habitat designation.

As noted under Factor B, *E. penlandii* is vulnerable to taking. Publication of precise maps and descriptions of critical habitat in the Federal Register would make this plant more vulnerable to incidents of vandalism and could contribute to the decline of the species. This has been documented with other listed species (e.g., *Hudsonia montana*; N. Murdock, U.S. Fish and Wildlife Service, pers. comm., 1991). Lacking mobility, plants are more vulnerable to vandalism than animals. A listing of *E. penlandii* as threatened would also publicize the rarity of this plant and encourage taking by researchers or collectors of rare plants. *E. penlandii* is a relict plant, and it is the only representative of its genus in the lower 48 States. Its rarity and biogeographic status would likely stimulate greater interest for collectors than most other species. Theft of an entire small population of another listed plant, *Asclepias meadii* (Mead's milkweed), in Illinois exemplifies the problem (U.S. Fish and Wildlife Service 1991).

Few additional benefits would be provided to the species by designating critical habitat that would not already be provided by listing the species as threatened. Any Federal action (e.g., approving a new road, etc.) that would impact the plant's habitat would also affect rooted plants; therefore, this impact would be addressed through Section 7 consultation. In addition, Section 9(a)(2)(B) of the Act makes it unlawful to remove and reduce to possession any threatened species of plant from areas under Federal jurisdiction. The Forest Service and the Bureau of Land Management are aware of the occurrence of *E. penlandii* on their lands and of their obligations under the Act.

The adverse modification standard for critical habitat under Section 7(a)(2) of the Act does not apply to private land

if there is no Federal involvement. Thus, if Federal Agencies have no jurisdiction over activities on private land, designation of critical habitat on private land does not afford additional protection to listed species.

For the reasons discussed above, it would not be prudent to designate critical habitat for *E. penlandii*.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain activities. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required of Federal Agencies and the prohibitions against certain activities involving listed plants are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal Agencies to evaluate their actions with respect to proposed or listed species and with respect to critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) requires Federal Agencies to confer informally with the Service on any action likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) requires Federal Agencies to insure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal Agency must enter into formal consultation with the Service.

The largest populations of *Eutrema penlandii* occur on Federal land administered by the Forest Service and Bureau of Land Management. Their involvement could include section 7 consultation on mining activities and land exchanges. A recreational plan is needed to manage off-road vehicle and other recreational use. On both Federal and private land, the Service expects that listing would elevate the awareness of this plant's status and foster efforts for its conservation.

The Act and its implementing regulations found at 50 CFR 17.71 and 17.72 set forth a series of general prohibitions and exceptions that apply to all threatened plants. All taking and trade prohibitions of section 9(a)(2) of the Act, implemented by 50 CFR 17.71, apply. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to import or export, transport in interstate or foreign commerce in the course of a commercial activity, sell or offer for sale listed species in interstate or foreign commerce, or to remove and reduce it to possession from areas under Federal jurisdiction. Seeds from cultivated specimens are exempt from these prohibitions provided that a statement of "cultivated origin" appears on their containers. In addition, for endangered plants, the 1988 amendments (Pub. L. 100-478) to the Act prohibit the malicious damage or destruction on Federal lands and the removal, cutting up, digging up, or damaging or destroying of endangered plants in knowing violation of any State law or regulation, including State criminal trespass law. Section 4(d) of the Act allows for the provision of such protection to threatened species through regulations. This protection may apply to Penland alpine fen mustard once revised regulations are promulgated. Certain exceptions to the prohibitions apply to agents of the Service and State conservation agencies.

The Act and 50 CFR 17.72 also provide for the issuance of permits to carry out otherwise prohibited activities involving threatened plants under certain circumstances. With regard to *E. penlandii*, it is anticipated that few, if any, trade permits would ever be sought or issued because this species is not in cultivation or common in the wild. Requests for copies of the regulations on listed plants and inquiries regarding prohibitions and permits may be addressed to the Office of Management Authority, U.S. Fish and Wildlife Service, room 432, 4401 North Fairfax Drive, Arlington, Virginia 22203 (703/358-2104).

National Environmental Policy Act

The Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the Federal Register on October 25, 1983 (48 FR 49244).

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and Wildlife Service (see ADDRESSES above), and Dr. Harold M. Tyus, U.S. Fish and Wildlife Service, Denver Regional Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species. Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations is amended, as set forth below:

PART 17—[AMENDED]

1. The authority citation for Part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1544; 16 U.S.C. 4201-4245; Pub. L. 94-625, 100 Stat. 3500, unless otherwise noted.

2. Amend § 17.12(b) by adding the following in alphabetical order under the family Brassicaceae to the List of Endangered and Threatened Plants:

§ 17.12 Endangered and threatened plants.
 * * * * *
 (i) * * *

Author

The principal authors of this final rule are Dr. Lucy A. Jordan, U.S. Fish and Wildlife Service, John L. Anderson, Botanist, formerly with the U.S. Fish

Species		Historic range	Status	When listed	Critical habitat	Special rules
Scientific name	Common name					
Brassicaceae—Mustard family:						
<i>Eutrema penlandii</i>	Penland alpine fen mustard.	U.S.A (CO)	T	509	NA	NA

Dated: June 24, 1993.
 Richard N. Smith,
 Acting Director, Fish and Wildlife Service.
 (FR Doc. 93-17933 Filed 7-27-93; 8:45 am)
 BILLING CODE 4310-55-P

50 CFR Part 17
 RIN 1018-AB56

Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Plant *Astragalus applegatei* (Applegate's Milk-vetch)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) determines the plant *Astragalus applegatei* (Applegate's milk-vetch) to be an endangered species under the authority contained in the Endangered Species Act of 1973, as amended (Act). This species has two extant populations in Klamath County, Oregon. The largest population is found on 6 acres of private land estimated to contain up to 30,000 individuals. The Nature Conservancy has leased this land on a year-by-year basis for *Astragalus applegatei* management. However, it is zoned for commercial development. The second site, on State of Oregon land,

supports approximately 30 to 80 plants in three patches scattered over 1 acre (J. Kagan, Oregon Heritage Program, pers. comm., 1992). Survival of this species is threatened primarily by the loss of habitat from past and potential development and road construction. The increased number of plants observed in recent surveys is believed to be a result of studies more quantitative in nature, not an expansion or improvement of the species habitat. Wildlife grazing has been determined to be another serious threat to the two remaining populations. This plant's palatability to cattle is an additional factor contributing to its current status. This rule implements the protection and