

5-YEAR REVIEW

Short Form Summary

Species Reviewed: Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii* [syns. *Lupinus oreganus* var. *kincaidii*, *Lupinus oreganus*])

Current Classification: Threatened

FR Notice announcing initiation of this review: Federal Register: July 6, 2005, Volume 70, Number 128, Pages 38972-38975.

Lead Region/Field Office:

Region 1/Oregon Fish and Wildlife Office, Portland, Oregon

Name of Reviewer(s):

Kate Norman, Oregon Fish and Wildlife Office, Botanist

Jeffrey Dillon, Oregon Fish and Wildlife Office, Supervisory Biologist

Methodology used to complete this 5-year review:

The review was conducted by staff of the Oregon Fish and Wildlife Office of the U.S. Fish and Wildlife Service (Service) beginning on January 1, 2010. The review was based on the final critical habitat designation for *Lupinus sulphureus* ssp. *kincaidii* and two other species found predominantly in the Willamette Valley, Oregon (Service 2006), the final Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington (Service 2010a), and review of current, available information. The evaluation of the status of the species was prepared by our lead *Lupinus sulphureus* ssp. *kincaidii* biologist and reviewed by the Recovery Coordinator for the Oregon Fish and Wildlife Office. The document was then reviewed by the acting assistant project leader before submission to the acting State Supervisor for approval.

Background:

Kincaid's lupine was listed as threatened under the Endangered Species Act (Act) of 1973, as amended (16 U.S. C. 1531 et seq.) in 2000. For more information regarding the species' listing history and other facts, refer to the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database for threatened and endangered species (http://ecos.fws.gov/tess_public).

Application of the 1996 Distinct Population Segment (DPS) Policy:

This policy does not apply to plants.

Review Analysis:

Refer to the final critical habitat designation for *Lupinus sulphureus* ssp. *kincaidii* published in the Federal Register on October 31, 2006, and the Final Recovery Plan for Prairie Species of Western Oregon and Southwestern Washington (recovery plan) completed on June 29, 2010, for a complete discussion of the

species status (including biology and habitat), threats, and management efforts. A summary of this information is provided below.

Kincaid's lupine is primarily a prairie plant, although, in Douglas County, it also grows in forests and along forest edges; it is endemic to Western Oregon and Southwestern Washington. Kincaid's lupine is known to occur in eight counties in Oregon and one county in Washington, with the majority of populations located in the Willamette Valley, Oregon. At the time of listing, the Service recognized 54 sites (Service 2000). The number of sites is difficult to estimate as there are no standard naming conventions and sites occurring on different properties, although close in proximity, are often given separate names due to historic naming conventions, landownership, or management practices. The Service currently uses names that are associated with monitoring reports and management agreements. This convention does not reflect "population" as a functional unit, but "site" as a management unit. In order to compare the changes in sites between the time of listing and present conditions, we have analyzed the data using current, Service site naming conventions.

This analysis of historic data resulted in 60 site names that were known at time of listing (Service 2010b). Of these 60 sites, 48 are believed extant at this time. The remaining 12 sites are extirpated, have not been found during recent surveys, or their status is unknown. Since 2000, when Kincaid's lupine was listed, an additional 106 sites have been located; a total of 154 sites are currently believed extant. All recovery zones have shown increases in the number of extant Kincaid's lupine sites. Overall, the estimates of populations indicate an increase from conservative estimate of 14,070 square meters (m²) (3.5 acres) of cover range wide at the time of listing to 15,502 m² (3.8 acres) of cover at present. However, the data is incomplete and statistics relating to increases or decreases in mapped area and low or high population estimates should be interpreted with caution. All site population estimates used in this analysis are presented in Tables 1 and 2 in the appendix.

At the time of listing, Kincaid's lupine was described with the scientific name *Lupinus sulphureus* ssp. *kincaidii*. Historically, it has also been described as a variety, *Lupinus sulphureus* var. *kincaidii* (Stephen Meyers, Oregon Flora Project, pers. comm., 2010). Currently the Service still uses *Lupinus sulphureus* ssp. *kincaidii*. However, several recognized plant authorities in Oregon use different scientific names to describe this species. For example, the Natural Resource Conservation Service in the Plant Database lists Kincaid's lupine as *Lupinus oreganus* var. *kincaidii* (NRCS 2010); the Oregon Flora Project refers to it as *Lupinus sulphureus* ssp. *kincaidii* (Stephen Meyers, Oregon Flora Project, pers. comm., 2010). Dr. Paul Severns, an authority on the species, uses the name *Lupinus oreganus* (Severns 2009). Kincaid's lupine is also listed as *Lupinus oreganus* in Plants of Western Oregon, Washington, and British Columbia (Kozloff 2005). The Service will continue to use *Lupinus sulphureus* ssp.

kincaidii for the present, but is aware that upcoming publications may elevate Kincaid's lupine to full species (*L. oreganus*) status.

Threats to this plant include development, encroachment by woody species, and invasion by aggressive, non-native plants. These threats to habitat have not changed since Kincaid's lupine was listed. Other potential threats include over-use for scientific or educational purposes. Kincaid's lupine has been collected for scientific study under permits from the Service; therefore the threat associated with this activity has been substantially minimized. Kincaid's lupine is currently not used for recreation or commercial purposes; therefore no threats are associated with this type of activity.

Fender's blue butterfly (*Icaricia icariodes fenderii*) uses Kincaid's lupine as its primary larval host plant but occasionally uses *Lupinus arbustus* (spur lupine) and *L. albicaulis* (sicklekeel lupine) when available (Schultz et al. 2003). This relationship was well documented at the time of listing and has not changed. No additional disease or predation issues have been reported. Regulatory mechanisms for Kincaid's lupine are limited to Federal lands and actions (under the Act) or state lands (under state laws). Kincaid's lupine serves as host plant for Fender's blue butterfly and may benefit from the regulations associated with this species when the two are found together. However, the plant itself, when it occurs alone on private lands where no federal agency is involved, is not protected. Voluntary conservation by private landowners has been of great assistance, but no regulatory mechanism exists to protect Kincaid's lupine on private property.

One concern that was not addressed at the time this species was listed was the possibility for Kincaid's lupine to hybridize with co-occurring lupine species. Hybridization, the result of cross breeding between two species, can be detrimental if the offspring that result are maladapted, but compete for the same resources as the co-occurring lupine plants that are capable of sexual reproduction. Hybridization may also be detrimental if continued intermixing results in back crossing to the more common parent plant and, ultimately, swamping of the rare parent genes (Tom Kaye, Institute for Applied Ecology, pers. comm., 2010; Rebecca Currin, Oregon Department of Agriculture, pers. comm., 2010). Kincaid's lupine and spur lupine (*Lupinus arbustus*) are known to hybridize at Baskett Slough National Wildlife Refuge (Liston et al., 1995). In order to determine the role of hybridization and any risk it may pose to this species, additional genetic information is needed for Kincaid's lupine populations throughout its range.

Hybrids, first generation crosses between two species, are generally not regulated by the Act. However, the tendency for plants to share some traits and characteristics based on historic interbreeding is a subject which has not been fully addressed by a Service Policy and is open to interpretation. Because broadly sympatric occurring lupine species (including Kincaid's lupine) appear to

frequently interbreed (Hitchcock and Cronquist 1961), we recommend that plants showing the dominant traits of Kincaid's lupine be regarded as Kincaid's lupine until such time as they are conclusively shown to be the result of direct hybridization, not historic introgression, through genetic studies. This topic will be reviewed as additional information becomes available.

The recovery criteria as described in the recovery plan for this species (Service 2010a) call for a minimum of 20 populations totaling at least 50,000 m² of foliar cover distributed across eight recovery zones. At present, there are 166 named sites distributed between the recovery zones and 154 are believed to be extant at this time (Table 1). Of the extant named sites, only six have a reported foliar cover of at least 500 m² and the majority of sites with data support less than 50 m² of foliar cover. A large number of sites, 68 of the 154 extant sites, do not have reliable population data associated with the location information. Based on the currently available data, none of the recovery zones have met the abundance goals outlined in the recovery plan (Service 2010a, 2010b). In addition to abundance goals, the recovery plan also stipulates that populations should show evidence of reproduction and stable or increasing populations (an attribute that cannot be determined with current foliar cover estimates) and the habitat should be managed to maintain or improve prairie quality and control threats. The recovery plan also recommends that a substantial portion of the populations be secured either by a government agency or a private conservation organization (Service 2010a).

Although the number of populations and the rough population estimate of foliar cover have increased since the time of listing, many of the populations are still unsecured and/or unmanaged. The recovery goals for Kincaid's lupine have not been reached as none of the recovery zones have met the abundance criteria established for this species and the threats of habitat degradation and habitat loss identified at the time of listing have not been removed. Therefore, Kincaid's lupine meets the definition of threatened as it is likely to become endangered within the foreseeable future throughout its range.

Recommendations for Future Actions:

Site naming conventions remain inconsistent and do not reflect "populations" as functional units. We recommend that a standard procedure for aggregating sites into populations be developed so that the Service and our partners can describe the number of populations in a more meaningful way.

We recommend that the taxonomy of this species be reviewed as multiple names are currently being used for the same species. Naming conventions and genetics issues surrounding Kincaid's lupine remain unresolved.

Management is imperative for prairie species to survive. Removal of woody species, control of invasive weeds and, in some cases, reintroduction of the once common native prairie matrix species may be necessary to maintain suitable habitat for Kincaid's lupine.

Recovery of Kincaid's lupine will require voluntary conservation by private landowners. The majority of this species' habitat is privately owned and, due to the regulatory limitations, the Service is not able to prevent privately owned populations from being destroyed. Working with private landowners, conservation organizations, and local governments to conserve and protect Kincaid's lupine is essential to achieving recovery.

We recommend that the issue of hybridization be addressed through genetic analysis or crossing studies of Kincaid's lupine. Current publications are limited to one known instance of hybridization between Kincaid's lupine and spur lupine at Baskett Slough National Wildlife Refuge (Liston et al. 1995). In order to determine the role of hybridization and the risk it poses to this species, additional genetic information is needed for Kincaid's lupine populations throughout its range.

The gaps in data evident in this analysis also indicate the need for accurate and up-to-date population (foliar cover) estimates for a number of sites. We recommend a complete survey effort to assess the status of all presumed extant populations of Kincaid's lupine throughout its range.

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U.S. Fish and Wildlife Service. 2010a. Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington. U.S. Fish and Wildlife Service, Portland, Oregon. xi + 241 pp.

U.S. Fish and Wildlife Service. 2010b. Kincaid's lupine GIS data and corresponding notes to file detailing processes and analyses used for the Kincaid's lupine 5-Year Review. Unpublished data on file at the Oregon Fish and Wildlife Office, Portland, Oregon.

Personal Communications:

Rebecca Currin. 2010. Oregon Department of Agriculture. Email to Kate Norman, U.S. Fish and Wildlife Service, Portland, Oregon on 11 August 2010. Peer Review comments.

Tom Kaye. 2010. Institute for Applied Ecology. Email to Kate Norman, U.S. Fish and Wildlife Service, Portland, Oregon on 3 August 2010. Peer Review comments

Stephen Meyers. 2010. The Oregon Flora Project. Email to Kate Norman, U.S. Fish and Wildlife Service, Portland, Oregon on 6 July 2010. Kincaid's lupine nomenclature.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW on *Lupinus sulphureus* ssp. *kincaidii*

Pre-1996 DPS listing still considered a listable entity? NA

Recommendation resulting from the 5-year review:

- Delisting
- Reclassify from Endangered to Threatened status
- Reclassify from Threatened to Endangered status
- No Change in listing status


Field Supervisor, Oregon Fish and Wildlife Office

Neil W. Corbett

Date 9/29/10

Appendix

Table 1: Kincaid's lupine current and historic population estimates by site number. For the privacy of our partners, site names have been replaced with unique numeric codes.

Recovery Zone and Numeric Site ID	CURRENT			HISTORIC		
	Lower Foliar Cover Estimate (m2)	Upper Foliar Cover Estimate (m2)	Mapped Polygon Extent (m2)	Lower Foliar Cover Estimate (m2), historic	Upper Foliar Cover Estimate (m2), historic	Mapped Polygon Extent (m2), historic
Corvallis West	1236.4	1236.4	404708.0	4330.0	6330.0	372961.1
1	52.0	52.0	816.2			
2	0.0	0.0	614.5			
3	3.5	3.5	132.5			
4	2.0	2.0	74.5			
5	271.0	271.0	2670.4	1.0	1.0	15159.9
6	0.3	0.3	97.8	100.0	100.0	7811.7
7	0.0	0.0	89573.7	0.0	0.0	192549.9
8	4.5	4.5	114401.9	21.0	21.0	10304.0
9	0.0	0.0	44.9	0.0	0.0	7811.5
10	1.5	1.5	14.1			
11	0.3	0.3	4.4	5.0	5.0	7811.7
12	0.0	0.0	44889.9			
13	32.1	32.1	347.0			
14	0.0	0.0	59556.2			
15	4.0	4.0	37.0			
16	0.0	0.0	13045.8			
17	30.0	30.0	205.4			
18	0.0	0.0	87.5			
19	5.0	5.0	721.4			
20	0.0	0.0	2327.8	200.0	200.0	16827.0
21	15.5	15.5	125.5			
22	4.8	4.8	56.0			
23	0.0	0.0	106.2			

Recovery Zone and Numeric Site ID	CURRENT			HISTORIC		
	Lower Foliar Cover Estimate (m2)	Upper Foliar Cover Estimate (m2)	Mapped Polygon Extent (m2)	Lower Foliar Cover Estimate (m2), historic	Upper Foliar Cover Estimate (m2), historic	Mapped Polygon Extent (m2), historic
24	52.8	52.8	1414.7	0.0	0.0	7811.7
25	4.0	4.0	98.0			
26	22.8	22.8	904.5			
27	0.0	0.0	91.0			
28	2.0	2.0	98.8			
29	0.8	0.8	14.3			
30	5.0	5.0	268.1			
31	5.0	5.0	141.8			
32	0.0	0.0	12038.9	0.0	0.0	7811.4
33	0.0	0.0	7.1	0.0	0.0	7811.5
34	5.0	5.0	151.5			
35	3.0	3.0	184.7			
36	12.0	12.0	49.9			
37	6.0	6.0	268.4			
38	0.3	0.3	42.3			
39	281.0	281.0	21522.5	4000.0	6000.0	21825.9
40	2.8	2.8	71.6			
41	2.0	2.0	23.6			
42	0.0	0.0	187.0			
43	0.0	0.0	13.4			
44	5.0	5.0	162.6			
45	50.0	50.0	1314.2			
46	12.5	12.5	508.2	1.0	1.0	8503.9
47	10.5	10.5	189.2			
48	7.0	7.0	18.1			
49	0.0	0.0	279.8			
50	0.0	0.0	164.4			
51	4.5	4.5	34.5			
52	2.0	2.0	7.8			
53	296.3	296.3	6781.7			

Recovery Zone and Numeric Site ID	CURRENT			HISTORIC		
	Lower Foliar Cover Estimate (m2)	Upper Foliar Cover Estimate (m2)	Mapped Polygon Extent (m2)	Lower Foliar Cover Estimate (m2), historic	Upper Foliar Cover Estimate (m2), historic	Mapped Polygon Extent (m2), historic
54	1.3	1.3	1.3			
55	4.0	4.0	139.9			
56	10.0	10.0	261.3	1.0	1.0	60921.0
57	0.8	0.8	11.0			
58	1.0	1.0	88.3			
59	0.0	0.0	17302.0			
60	0.0	0.0	2089.6			
2009	1.0	1.0	7811.4	1.0	1.0	
Douglas County¹	4734.2	4865.3	76851.8	1226.0	2274.0	47799.9
61	50.0	50.0	1718.7	360.0	360.0	8255.0
62	573.1	573.1	573.1	100.0	200.0	7807.3
63	0.0	0.0	20886.5			
64	0.0	0.0	3747.1			
65	30.0	30.0	714.0			
66	0.0	0.0	250.7			
67	60.0	60.0	501.4			
68	70.0	175.1	3115.0	3.0	3.0	7807.8
69			27.7	0.0	0.0	55.4
70	0.0	0.0	643.5			
71	30.0	40.0	1643.7	500.0	500.0	8756.4
72	30.0	40.0	1643.7			
73	12.0	18.0	1534.6			
74	0.0	0.0	54.3	101.0	1000.0	6360.7
75	2377.7	2377.7	2377.7			
76	1.5	1.5	1531.2			
77	100.0	100.0	11357.5	51.0	100.0	7807.5

¹ Discrepancies were found during peer review of Douglas County data. Service estimates are represented here, however, additional information from the Institute for Applied Ecology reports population estimates as follows: #61= 9.43 m², #63 = 23.53 m², #67 = 20.65 m², 71 and #72 (combined) = 3.94 m², #74 and #77 (combined) = 19.11 m², #78 = 11 m².

Recovery Zone and Numeric Site ID	CURRENT			HISTORIC		
	Lower Foliar Cover Estimate (m2)	Upper Foliar Cover Estimate (m2)	Mapped Polygon Extent (m2)	Lower Foliar Cover Estimate (m2), historic	Upper Foliar Cover Estimate (m2), historic	Mapped Polygon Extent (m2), historic
78	400.0	400.0	16592.4			
79	0.0	0.0	131.0	10.0	10.0	949.8
2022	1000.0	1000.0	7808.2	101.0	101.0	
Eugene East	446.7	446.7	33374.9	11.0	11.0	7811.6
81	0.0	0.0	463.1			
82	0.0	0.0	9978.1			
83	0.0	0.0	932.5			
84	0.0	0.0	3059.6			
111	444.7	444.7	444.7			
112	0.0	0.0	2873.8			
113	1.0	1.0	7811.6	10.0	10.0	7811.6
2034	1.0	1.0	7811.6	1.0	1.0	
Eugene West	4026.7	5948.2	139493.4	7898.0	9898.0	283346.0
80	0.0	0.0	836.6			
85	0.0	0.0	204.3	3.0	3.0	3442.1
86	0.0	0.0	153.6			
87	300.0	300.0	31769.1	300.0	300.0	68461.4
88	27.4	52.9	235.6	3120.0	3120.0	35784.8
89	0.0	0.0	51.1			
90	0.0	0.0	234.5			
91	166.6	166.6	166.6			
92	0.0	0.0	1194.9	6.0	6.0	9035.0
93	0.0	0.0	65.8			
94	0.0	0.0	4326.7	2.0	2.0	30185.0
95	0.0	0.0	154.2			
96	0.0	0.0	349.6			
97	3160.1	5056.1	12640.3	3000.0	5000.0	30220.0
98	0.0	0.0	233.2			
99	0.0	0.0	4799.9			
100	0.0	0.0	8470.7			

Recovery Zone and Numeric Site ID	CURRENT			HISTORIC		
	Lower Foliar Cover Estimate (m2)	Upper Foliar Cover Estimate (m2)	Mapped Polygon Extent (m2)	Lower Foliar Cover Estimate (m2), historic	Upper Foliar Cover Estimate (m2), historic	Mapped Polygon Extent (m2), historic
101	0.0	0.0	737.7	6.0	6.0	9158.0
102	0.0	0.0	787.4	2.0	2.0	21504.5
103	0.0	0.0	723.0	200.0	200.0	4551.3
104	319.7	319.7	1065.6			
105	0.0	0.0	465.8	3.0	3.0	3583.7
106	0.0	0.0	3465.6	3.0	3.0	3954.2
107	0.0	0.0	8836.0	600.0	600.0	19950.6
108	0.0	0.0	5425.3	200.0	200.0	4166.4
109	0.0	0.0	24214.4	200.0	200.0	33795.6
110	0.0	0.0	73.7	200.0	200.0	5553.3
2027	3.0	3.0	4208.8	3.0	3.0	
2029	12.0	12.0	8090.0	12.0	12.0	
2031	4.0	4.0	7702.1	4.0	4.0	
2032	34.0	34.0	7811.6	34.0	34.0	
Salem West	3586.7	3995.3	912452.1	605.0	605.0	612283.6
114	0.0	0.0	251944.5			
115	6.0	9.0	79.3			
116	28.8	72.1	288.4	1.0	1.0	499884.0
117	0.0	0.0	1814.4	0.0	0.0	7810.9
118	0.0	0.0	12.5	1.0	1.0	7810.8
119	200.0	200.0	3140.8			
120	1.0	3.0	10.5			
121	0.0	0.0	964.0			
122	106.5	133.1	266.3			
123	0.0	0.0	28826.3			
124	0.0	0.0	404.8			
125	0.0	0.0	65.3			
126	0.0	0.0	1247.7			
127	154.4	154.4	474.5			
128	7.8	15.5	118.4	0.0	0.0	13515.5

Recovery Zone and Numeric Site ID	CURRENT			HISTORIC		
	Lower Foliar Cover Estimate (m2)	Upper Foliar Cover Estimate (m2)	Mapped Polygon Extent (m2)	Lower Foliar Cover Estimate (m2), historic	Upper Foliar Cover Estimate (m2), historic	Mapped Polygon Extent (m2), historic
129	0.9	0.9	344.4			
130	83.5	170.9	1847.9	300.0	300.0	11285.1
131	7.0	15.0	102.3	2.0	2.0	7809.7
132	0.9	0.9	164.3			
133	15.3	40.0	1335.7			
134	47.3	47.3	315.0			
135	0.0	0.0	155.5			
136	0.0	0.0	1726.2	0.0	0.0	7809.7
137	875.0	950.0	5939.0			
138	25.0	30.0	1514.9			
139	30.0	30.0	721.8			
140	0.0	0.0	409.7	0.0	0.0	24252.4
141	0.0	0.0	2.9			
142	0.2	0.2	292.1			
143	2.0	5.0	144.4			
144	24.8	24.8	51.7			
145	966.2	966.2	3476.8			
146	0.0	0.0	151.7			
147	0.0	0.0	11968.4	0.0	0.0	32105.4
148	608.2	731.1	2851.3			
154	65.0	65.0	65.0			
155	30.0	30.0	65.0			
2051	1.0	1.0	528710.6	1.0	1.0	
2055	0.0	0.0	24250.8	0.0	0.0	
2058	0.0	0.0	7808.6	0.0	0.0	
2062	300.0	300.0	20569.3	300.0	300.0	
2065	0.0	0.0	7809.0	0.0	0.0	
SW Washington	1471.6	1801.3	24974.5	0.0	0.0	1084481.3
149	0.0	0.0	684.6	0.0	0.0	542240.6
150	1456.6	1779.3	2373.4			

Recovery Zone and Numeric Site ID	CURRENT			HISTORIC		
	Lower Foliar Cover Estimate (m2)	Upper Foliar Cover Estimate (m2)	Mapped Polygon Extent (m2)	Lower Foliar Cover Estimate (m2), historic	Upper Foliar Cover Estimate (m2), historic	Mapped Polygon Extent (m2), historic
151	0.0	0.0	3.0			
152	0.0	0.0	21592.7	0.0	0.0	542240.7
153	15.0	22.0	320.8			
Grand Total	15502.4	18293.4	1591854.5	14070.0	19118.0	2408683.4

Table 2: Current and historic population estimates for Kincaid's lupine by Recovery Zone.

Recovery Zone and Numeric Site ID	CURRENT			HISTORIC		
	Lower Foliar Cover Estimate (m2)	Upper Foliar Cover Estimate (m2)	Mapped Polygon Extent (m2)	Lower Foliar Cover Estimate (m2), historic	Upper Foliar Cover Estimate (m2), historic	Mapped Polygon Extent (m2), historic
Corvallis West	1236.4	1236.4	404708.0	4330.0	6330.0	372961.1
Douglas County	4734.2	4865.3	76851.8	1226.0	2274.0	47799.9
Eugene East	446.7	446.7	33374.9	11.0	11.0	7811.6
Eugene West	4026.7	5948.2	139493.4	7898.0	9898.0	283346.0
Salem West	3586.7	3995.3	912452.1	605.0	605.0	612283.6
SW Washington	1471.6	1801.3	24974.5	0.0	0.0	1084481.3
Grand Total	15502.4	18293.4	1591854.5	14070.0	19118.0	2408683.4