Species Data Collection Form

Species name: *Oxytropis campestris* var. *chartacea*
Authority: (Fassett) Barneby.
Common name: Fassett's locoweed
Status:
Fed: Threatened State: Endangered
TNC: Global: G5T1 Ntl: _____ State: S1
Tribal _____FS R9: T

Date: October 9, 1999
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1. HABITAT

1A. Rangewide

1. Area of the historic range (approximately 1600-1800): No records prior to the collection of this variety of *O. campestris* in 1928. After its recognition as a new species in the 1700's by the Swedish botanist Linnaeus (1707-1778), slender locoweed was first scientifically described in 1834 by the Swiss-French botanist Augustin Pyramus deCandolle (1778-1841). At the outset, it was considered one species with one variety. Later, it was subdivided into varieties and other species by Fernald, St. John, Greenm., A.Nels., and others. In 1936 Fassett determined that Wisconsin specimens were a separate species, *O. chartacea*. Barneby reconsidered Fassett's finding and designated the Wisconsin plants a variety, *O. campestris* var. *chartacea*. Some argument was made by Barneby in 1952 and Welsh in 1960 that this variety is the same as *O. campestris* var. *johannensis*. This variety is found in Maine, Quebec, Nova Scotia, New Brunswick, and Newfoundland. (Elisens and Packer, 1980; U.S. Fish and Wildlife Service, 1991; Internet: www.npwrc.usgs.gov, 1999)
It is worth noting that there are numerous varieties of this species throughout the northern hemisphere. Many of the varieties are likewise considered rare. For example, var. *wanapum* is listed as rare in Washington, var. *columbiana* is threatened in Montana, var. *johannensis* is listed as S1 and T in Maine, as SR in New Brunswick, Labrador, Nova Scotia, and Newfoundland, and var. *terrae novae* is listed as SR in Newfoundland. The European species, *O. campestris* is listed as vulnerable in Great Britain and var. *tatrae* is listed as endangered or rare for all of Western and Central Europe. (Gerriets, 1999; Internet: www.wsdot.wa.gov; www.fs.fed.us; moby.nhm.ac.uk/spcdir/detail; botan.ib-pan.krakow.pl; www.heritage.tnc.org)

Geographic location (provide distribution map if available or narrative): No information found.
Size: No information found.

2. Factors that limited the historic range: *Climate:* This species is suspected of being either a glacial relict or a post glacial migrant. In either case, it would require colder climates more resembling arctic or alpine environments. Increasing temperatures since glacial retreat may have negatively impacted the species. Extreme drought might have limited this species by allowing competitors to gain a foothold on lakeshores exposed for abnormally long periods of time. (U.S. Fish and Wildlife Service, 1991)
Competition: Fassett's locoweed does not tolerate shade or dense groundlayer vegetation well. In a location where forest or herbaceous vegetation are allowed to thrive, where there is no disturbance resulting in the decrease of overstory and understory vegetation, this species will decline. (U.S. Fish and Wildlife Service, 1991)
Glaciation: This being a suspected glacial relict or post glacial migrant indicates that this species was dependent upon glacial dynamics for its establishment and upon glacial topography, geology, and post glacial climate for its maintainence. Specifically, it appears to prefer sandy to gravelly, well drained, less acidic, glacial sedimentary deposits over Cambrian sandstone. (U.S. Fish and Wildlife Service, 1991; professional judgement)
Hydrology: This plant prefers exposed shorelines of landlocked, hardwater, seepage lakes. Such lakes are more commonly found where glaciation has occurred. It appears that the lakes of preference are alkaline. And fluctuating water levels appear to be a decisive factor in the persistance of this species. It is suspected that the lakes may have exposure to the regional groundwater table which would produce higher pH and CaCO2. (U.S. Fish and Wildlife Service, 1991; Higgins, 1999; Reineke, 1999) Shoreline plant species are its main competitors. Fluctuating water levels maintain an open habitat favorable for the plant by destroying shoreline competitors during high water. Apparently, the seeds of this species survive inundation well, allowing it to remain competitive under these circumstances. (U.S. Fish and Wildlife Service, 1991; Higgins, 1999; Reineke, 1999)
Fire: It is not known what effect fire may have had upon this species. But it is conceivable that it was one of many factors that created and maintained the open shoreline conditions desired by this species. (Internet: www.fs.fed.us; professional judgement)
Soil: It appears that this species may well be a calciphile, or prefer slightly alkaline soils. The soils and lakes where it

is found are generally higher pH. All soils in which it is found are sandy or gravelly. The *Astragalus* and *Oxytropis* genera are found by in large in the western United States where Mollisols, Aridisols, and Alfisols dominate. These are soils with medium to high base supplies and higher pH. Only four species of *Oxytropis* are found in the Northeastern U. S. while there are eleven species in the Great Plains and Northwestern U. S. with many varieties. Similar remarks may be made for this genus in Europe. For example, the species *Oxytropis campestris* on the Swedish island Oland in the Baltic Sea grows on a special type of large meadow, which in Swedish is called "alvar." There the soils are thin and alkaline, overlaying limestone bedrock. (U.S. Department of Agriculture, 1937; Hitchcock and Cronquist, 1973; Johnson and Nichols, 1982; McGregor, 1986; Gleason and Cronquist, 1991; Williams, 1992; Thorsson, 1999)

3. Area of the current range:

Geographic location (provide distribution map if available or narrative): Located exclusively in Wisconsin, in three counties: Bayfield, Waushara, and Portage.

Size: These counties cover approximately 2914 miles or 1,864,960 acres (Bayfield 1509 miles , Waushara 608 miles , Portage 797 miles). The actual suitable range is less than this since lakes occupy a minor portion of the total land base.

4. Area currently occupied within the range: In total, approximately 7.4 acres (3 ha) of land is occupied by this species out of 1,864, 960 acres. That is .0004% of the total county acreage. (U.S. Fish and Wildlife Service, 1991)

5. Current distribution (continuous or metapopulation): It is distributed along ten lakeshores in Wisconsin. Seven of these lakes are concentrated in an eight square mile area in central Wisconsin. Another population is on a lakeshore ten miles to the north-northeast. The last two populations are located approximately 175 miles to the northwest. These last two populations are on two lakes separated by ¼ mile. (U.S. Fish and Wildlife Service, 1991, Westad, 1999)

Habitat requirements (repeat as needed for seasons of the year, describe seasonal habitat briefly if outside ecoregion Province 212):

6. Minimum size of habitat patches: This species exists in patches as small as a few plants up to 1500 plants. The smallest area covered by the plants in one habitat patch is a few square meters. The largest area covered by these plants in one habitat patch has been observed to be 700m , that at Plainfield Lake. From observations it appears that the species can exist on narrow bands of exposed lakeshore, as little as one meter wide. When lakewater rose to the level of the permanent tree line, the plants usually are not in evidence, only to reappear by the hundreds, even thousands when the lake waters receeded. (U.S. Fish and Wildlife Service, 1991)

7. Minimum distance between habitat patches: Considering each lakeshore to be a habitat patch, the minimum distance between these are about ¼ mile. One lakeshore population exists ten miles distant from any other patches. The two patches located in Bayfield county are 175 miles from any other. (U.S. Fish and Wildlife Service, 1991)

8. Composition of habitat

Breeding: Not applicable
Feeding: Not applicable
Resting: Not applicable

9. Habitat patch structure in the landscape, habitat associations (adjacent or in vicinity): Habitat associations common to the ten locations are: Prime habitat of exposed shoreline around seepage lakes with widely fluctuating lake levels. Permanent treeline set back from low water level by as many as eight meters. Surrounding vegetation tends to be dry-mesic forest, generally *Quercus* and *Pinus*, but much of this has been converted into residential or agricultural land. (U.S. Fish and Wildlife Service, 1991)

1B. Planning Area (The planning areas are the National Forest proclamation boundary - see attached map)

1. Area occupied by the species within the planning area (provide map, if available): A strip of land about 3 feet wide by 600 feet long on the shores of Pidgeon Lake and Mountain Lake in Bayfield County. The locations in Portage and Waushara counties appear to be about 10 miles south of the province 212 and 50 miles from the nearest National Forest land. (U.S. Fish and Wildlife Service, 1991; Westad, 1999; professional judgement)

2. Area occupied historically (approximately 1600-1800): No information found.

Habitat requirements:

3. Minimum size of habitat patches if different from rangewide: Same as 1A.

4. Minimum distance between habitat patches if different from rangewide: Same as 1A.

5. Composition of habitat (describe vegetation as it is described in the literature):

Breeding: Not applicable.
Feeding: Not applicable.
Resting: Not applicable.

6. Habitat patch structure in the landscape and proportion, habitat associations (adjacent or in vicinity) that may be needed for different parts of daily activity or life cycle: The patch structure is somewhat obscure. The eight southern locations are slightly east of the eastern edge of glacial lake Wisconsin. The two northern locations are also east of glacial lake Grantsburg. It has been observed that seven of the locations of

Fassett's locoweed lay in a shallow valley called a "tunnel channel" formed by a glacial meltwater stream. Within this valley ice blocks were deposited which became the lakes by which the species resides. The other three locations, while not in tunnel channels, are also on the shores of ice block lakes. (U.S. Fish and Wildlife Service, 1991)
It is clear that the species relys on its propinquity to shallow seepage lakes. There it finds fluctuating water levels that periodically destroy shoreline vegetation creating the open habitat it so desires. Other habitat associations are unertain, but this species may well depend upon the dry-mesic forest of *Quercus* and *Pinus* on the perimeter for pollinators and dispersal agents such as mammals and birds. (U.S. Fish and Wildlife Service, 1991; professional judgement)

7. Habitats or features that are actively avoided (e.g. humans, highways, wetlands...): This species will not appear in times of high water. It is relatively shade intolerant. It is not tolerant of dense ground level vegetation. It might not tolerate acidic soil or water conditions. It may be threatened by competition from invasive non-natives such as *Heiracium aurantiacum* and *Melilotus alba*. It may be threatened from pesticide and herbicide residue from agricultural operations in the vicinity. It has shown some adverse reaction to shoreline development, particularly brush piles. It is suspected that this species does poorly under the influence vehicular traffic, manipulation of natural lake fluctuations (as in aquifer drawdown, storm sewer drainage, shoreline development), trampling by hikers, grazing by stock animals, and removal of the surrounding woodlands. (U.S. Fish and Wildlife Service, 1991; Reineke, 1999; Higgins, 1999; professional judgement)

8. Habitat conditions that may not be required but contribute to greater productivity: Possibly the presence of surrounding woodlands. This may not be required, as the species requires open light, which would be maintained at the overstory level by woodland removal. However, pollinators and dispersal agents beneficial to the species may lurk in those woodlands. The role of fire in the establishment and maintainance of this species is unknown. Perhaps fire was one of several factors that produced or maintained the open shoreline conditions. (U.S. Fish and Wildlife Service, 1991; Internet: www.fs.fed.us; professional judgement)

1C. Site, stand, or project level

Habitat requirements

1. Composition of the overstory: The absence of overstory is required. (U.S. Fish and Wildlife Service, 1991)

2. Composition of the shrub/understory: The absence of shrub/understory is required. (U.S. Fish and Wildlife Service, 1991)

3. Composition of ground flora: Minimal ground flora is required. In the southern sites, what ground flora is observed is commonly *Typha latifolia, Scirpus acutus*, and *Polygonum* spp.)U.S. Fish and Wildlife Service, 1991)

4. Vertical structure of the vegetation: Ground layer only. No shrub, understory, overstory. (U.S. Fish and Wildlife Service, 1991)

5. Age class(es) of forest vegetation: Pioneer species, early seral stage. (U.S. Fish and Wildlife Service, 1991)

6. Required or preferred microhabitat features, if any (e.g. vernal pools, large woody debris, exposed sandy banks, nest trees, rock outcrops....) and their use (e.g. perching, sunning, nesting, denning, etc.): *Soil:*
It appears that this species may well be a calciphile, or prefer slightly alkaline soils. The soils and lakes where it is found are generally higher pH. All soils in which it is found are sandy or gravelly. The *Astragalus* and *Oxytropis* genera are found by in large in the western United States where Mollisols, Aridisols, and Alfisols dominate. These are soils with medium to high base supplies and higher pH. Only four species of *Oxytropis* are found in the Northeastern U. S. while there are eleven species in the Great Plains and Northwestern U. S. with many varieties. Similar remarks may be made for this genus in Europe. For example, the species *Oxytropis campestris* on the Swedish island Oland in the Baltic Sea grows on a special type of large meadow, which in Swedish is called "alvar." There the soils are thin and alkaline, overlaying limestone bedrock. (U.S. Department of Agriculture, 1937; Hitchcock and Cronquist, 1973; Johnson and Nichols, 1982; McGregor, 1986; Gleason and Cronquist, 1991; Williams, 1992; Thorsson, 1999)
Light: This species grows well in open light conditions. These are present on the shallow, seepage lakes at which it resides. Fluctuating water levels create open shoreline and restrain the colonization of the shoreline by trees and shrubs. (U.S. Fish and Wildlife Service, 1991)
Groundcover: This species in all varieties shows a propensity toward open ground, being seen on rocky cliffs, gravelly shores, rocky and gravelly slopes throughout its range. Again, fluctuating water levels create open shoreline and restrain the colonization of the shoreline by forbs, grasses, sedges and other ground flora. (Britton and Brown, 1913; Hitchcock and Cronquist, 1973; Stubbendieck and others, 1981; McGregor, 1986; U.S. Fish and Wildlife Service, 1991; Gleason and Cronquist, 1991; Williams, 1992)
Lakeshore: This species finds itself on lakeshores in all of its locations. These lakes are invariably hardwater, shallow, seepage lakes with periodic water level fluctuations. It is likely that these lakes are somewhat higher in pH. This is anomalous in the northern part of the state where lakes are more commonly acidic. (U.S. Fish and Wildlife Service, 1991; Higgins, 1999; Reineke, 1999)

2. POPULATION

2A. Rangewide

1. Historic (approximately 1600-1800) No information found.

a. Numbers of individuals:

b. Breeding/reproducing individuals:

c. Numbers of populations:

d. Relationship/distance among populations:

e. Reasons for fluctuations in population size:

2. Current

a. Numbers of individuals: In low water seasons a fair estimate would be 10,000 total, or about 1000 per site. In high water seasons there may be no plants to be seen. (U.S. Fish and Wildlife Service, 1991)

b. Breeding/reproducing individuals: From observations at Mountain Lake in Bayfield county and Pickerel Lake in Portage county, about 10% of the plants are seen in flower. (U.S. Fish and Wildlife Service, 1991)

c. Numbers of populations: 10 (U.S. Fish and Wildlife Service, 1991; Westad, 1999)

d. Relationship/distance among populations: Separated by as little as ¼ mile and as much as 175 miles. Seven of the populations are likely able to interbreed as they are all along a four mile line. The two northern populations are likely able to interbreed as they are within ¼ mile of one another. (U.S. Fish and Wildlife Service, 1991)

2B. Planning Area (see attached map)

1. Historic (approximately 1600-1800) No information found.

a. Numbers of individuals:

b. Breeding/reproducing individuals:

c. Numbers of populations:

d. Relationship/distance among populations:

e. Reasons for fluctuations in population size:

2. Current

a. Numbers of individuals: At Pigeon Lake in Bayfield county, at last count, one specimen on the XX side of the lake. At Mountain Lake in Bayfield county a few hundred specimens on the XX shore of the lake. Total plants at last count perhaps 300. (U.S. Fish and Wildlife Service, 1991; Westad, 1999)

b. Breeding/reproducing individuals: About ¼ or 75 plants. (U.S. Fish and Wildlife Service, 1991; Westad, 1999)

c. Numbers of populations: Two. One at each lake. (U.S. Fish and Wildlife Service, 1991; Westad, 1999)

d. Relationship/distance among populations: About ¼ mile separates the two lakes. (U.S. Fish and Wildlife Service, 1991)

3. LIFE HISTORY (Describe life history by geographic area within the range where variations occur)

3A. Reproductive method (seeds, sprouts, stolons, rhizomes, spores, eggs, live birth, etc.): By seeds. No evidence of vegetative reproduction. (Stubbendieck and others, 1981; U.S. Fish and Wildlife Service, 1991)

3B. Dispersal of progeny or propagules

1. Methods: In recent history, dispersal methods are, for the most part, gravity. Some dispersal is by wind, lake waters, or rain. Animals or birds may carry the seeds to other locations. Were the dispersal in late glacial or early post glacial times, as the theory contends, the waters of glacial lakes dispersed the seeds. Were it not glacial lakes, it is likely that glacial meltwaters in some form carried the seeds. Were Pigeon and Mountain Lakes connected in the distant past, or were the seven neighboring lakes in Waushara county connected in the distant past, dispersal could have occurred by lake waters. Were it in more recent times, likely animals or birds carried the seeds that distance. (U.S. Fish and Wildlife Service, 1991)

2. Distance: In recent times, it appears not much more than the lake basin on which they reside. It is likely that the populations in Bayfield county are related, so dispersal in that county was about ¼ mile. Similar observations could be made for the concentration of seven sites in Waushara county. These lakes are not much more than ¼ mile from another population of Fassett's locoweed. The introduction of plants into the isolated site in Portage county could be from the lakes in Waushara county, or vice versa. If so, then the distance of dispersal would be 10 miles. If the plants of Bayfield county originated in or dispersed to the southern counties, then the distance of dispersal would be 175 miles. (U.S. Fish and Wildlife Service, 1991)

3. Habitat requirement for dispersal: Currently, fluctuating water levels that create periodically exposed lakeshores. Wave action. Animal and/or bird traffic across the exposed lakebed. (U.S. Fish and Wildlife Service, 1991)

4. Barriers: Uplands between lakes. Distances greater than ¼ mile between lakes. Revegetating shorelines. (U.S. Fish and Wildlife Service, 1991)

3C. Reproductive Age

1. Minimum: It appears that plants will produce flowers in their second season of growth. (U.S. Fish and Wildlife Service, 1991)

2. Maximum: Not known. (U.S. Fish and Wildlife Service, 1991)

3D. Fecundity

1. Cycles per year: One, occasionally remontant flowers. (U.S. Fish and Wildlife Service, 1991)

2. Years per cycle: One. (U.S. Fish and Wildlife Service, 1991)

3. Seeds per mature plant per cycle: "Numerous" (U.S. Fish and Wildlife Service, 1991)

4. Progeny per mature female per cycle: Not applicable.

5. Total progeny per life time: Not known. (U.S. Fish and Wildlife Service, 1991)

3E. Survival (what proportion of progeny survive to reproductive age): Not known. Legumes are noted for extraordinarily long term viability of seeds in the seed bank. (U.S. Fish and Wildlife Service, 1991)

3F. Sex ratio of populations: Not applicable

3F. Lifespan (average and longest known): Not known. Suspected of being a short-lived perennial on shorelines and longer-lived above the high water line. (U.S. Fish and Wildlife Service, 1991)

3G. Migration

1. Where does the species go when it migrates: Not applicable.

2. What time of year does the species leave and return to ecoregion Province 212: Not applicable.

3H. Obligate associations (e.g. plants, insects, mammals, microbes, and which part of the life cycle is obligate): There has been little research on pollinators, consumers, symbiotics. It is suspected that this species depends upon rhizobial bacteria for survival. (U.S. Fish and Wildlife Service, 1991)

3I. Miscellaneous

Monoecious vs. dioecious: Monoecious (Gleason and Cronquist, 1973)

Sexual vs. asexual: Sexual (U.S. Fish and Wildlife Service, 1991)

Monogamous vs. polygamous:

Herds: Not applicable.

Packs: Not applicable.

Other: Scarification of seeds might be important for germination. This species is a polyploid complex. (U.S. Fish and Wildlife Service, 1991)

4. TRENDS (Percent increase or decrease if known; approximate time when population began increasing or decreasing.)

4A. Rangewide

Habitat: Increasing____ Decreasing__X__ Stable____ Do not know_____

Cause: The species is no longer found at two of the southern sites, Mud Lake and Shumway Lake. These two sites have heavily grazed lakeshores. Plainfield Lake sees diminished populations in the vicinity of a heavily used boat landing where vehicle traffic has rutted the shoreline. The Pigeon Lake site, in the north, might find its apparent decline in the shoreline development since its discovery in 1928. (U.S. Fish and Wildlife Service, 1991)

Population: Increasing____ Decreasing__X__ Stable____ Do not know_____

Cause: In 1980, 1988, and 1990 searches for the species were unsuccessful on two of the historic sites, Mud Lake and Shumway Lake. The site at Pigeon Lake is also in decline. It was not found there from 1934 until 1990. It was rediscovered in 1993, but only one plant. Plainfield Lake sees diminished populations in the vicinity of a heavily used boat landing. The other six sites maintain populations of the species resembling historic levels. (U.S. Fish and Wildlife Service, 1991; Westad, 1999)

4B. Regional (Province 212 (see attached map) (Boundaries dependent on species)

1. Habitat: Increasing____ Decreasing__X__ Stable____ Do not know_____

Cause: Both sites have a significant percentage of undeveloped shoreline. However, it is likely that the character of the shoreline has changed drastically since the observations at Pigeon Lake in 1928. On the private holdings, many residences have been constructed and much shoreline has been cleared for viewing, docks, and beaches. (U.S. Fish and Wildlife Service, 1991)

2. Population: Increasing____ Decreasing__X__ Stable____ Do not know_____

Cause: Both sites in Province 212 have specimens of *O. campestris var. chartacea* on the shoreline according to most recent observations. Mountain Lake has maintained its populations. But the the number of specimens on the shore of Pigeon Lake has decreased dramatically since observations in 1928 and 1934. Cause is

the same as above: on the private holdings, many residences have been constructed and much shoreline has been cleared for viewing, docks, and beaches. (U.S. Fish and Wildlife Service, 1991; Westad, 1999)

3. Adaptation to human pressures (any evidence that the species' or population's behavior is changing to adapt in a way that would cause populations to increase?): No.

4C. Planning Area (see attached map)

1. Habitat: Increasing____ Decreasing_X__ Stable____ Do not know_____

Cause: Same as above: Both sites have a significant percentage of undeveloped shoreline. However, it is likely that the character of the shoreline has changed drastically since the observations at Pigeon Lake in 1928. On the private holding, many residences have been constructed and much shoreline has been cleared for viewing, docks, and beaches. (U.S. Fish and Wildlife Service, 1991; Westad, 1999)

2. Food: Increasing____ Decreasing____ Stable____ Do not know_____

Cause: Not applicable.

3. Population: Increasing____ Decreasing____ Stable__X__ Do not know_____

Cause: Same as above: Both sites in the Planning Area have specimens of *O. campestris var. chartacea* on the shoreline according to most recent observations. Mountain Lake has maintained its populations. But the number of specimens on the shore of Pigeon Lake has decreased significantly since observations in 1928 and 1934. (U.S. Fish and Wildlife Service, 1991; Westad, 1999)

4. Adaptation to human pressures (any evidence that the species' or population's behavior is changing to adapt in a way that would cause populations to increase?): No.

5. THREATS TO POPULATION VIABILITY (On next page)

5.1: Part 1 Identify potential threats to species population viability.

Evaluate those threats that impact, or could potentially impact, populations in northern forested areas of Wisconsin and Minnesota.

Instructions:

Note: Provide a source citation for each piece of species information.

Table 1. Threats to population viability. Identify threats to viability that apply to this species. High, Medium, and Low categories refer to the likelihood of the threat occurring during the time period specified (short term: 10 years and long term: approximately 100 years).

Species: ***Oxytropis campestris* var. *chartacea***

THREAT	TERM	YES: Potential threat to pop. viability exists: further eval of threat in Part 5.2			NO: Generally "not applicable"	REMARKS
		High	Med	Low		
Loss of habitat	10yr		X			Some land in DNR, USFS. Private in development.
	100yr	X				Same plus population expansion a problem.
Decline in habitat quality	10yr		X			Private land prime for development. Agriculture changes water table, runoff.
	100yr	X				Same plus population expansion a problem.
Habitat fragmentation (include los of connectivity)	10yr	X				Most connections in private land, highly developable. Shore fragmented by houses, docks.
	100yr	X				Same
Changes in vegetation composition	10yr	X				Development brings landscaping, livestock, aliens
	100yr	X				Same
Changes in vegetation structure	10yr	X				Development brings lot clearing for homes, livestock
	100yr	X				Same
Competition from non-native species	10yr	X				Big problem in developed, accessible wetlands in state
	100yr	X				Same
Competition from native species whose range *or* pop. trend has changed	10yr			X		Uncertain. No known.
	100yr			X		Same
Predation	10yr		X			Livestock grazing
	100yr		X			Same
Disease	10yr			X		No known.
	100yr			X		Same
Climate change	10yr			X		Uncertain. If an arctic species, global warming is a problem.
	100yr		X			Global warming may increase.
Loss of obligate associate	10yr			X		No known obligates.
	100yr			X		Same.
Natural catastrophes	10yr			X		Unlikely. Fire might be beneficial. Windstorms might benefit by opening.
	100yr			X		Same.
Threats during migration	10yr				X	
	100yr				X	
Genetic drift	10yr			X		Species is very isolated.
	100yr			X		Same
Genetic homogeneity	10yr	X				Isolation maintains homogeneity.
	100yr	X				Same.
Hunting/Trapping	10yr				X	
	100yr				X	
Collection	10yr			X		Not in demand.
	100yr			X		Same.
Poisoning	10yr				X	
	100yr				X	
Criminal Acts	10yr	X				Shoreline development notoriously illegal.
	100yr	X				Same.
Pollution/toxics	10yr	X				Agriculture on edge of habitat, lawns on lakefront
	100yr	X				Same.
Interactions among threats	10yr			X		No known.
	100yr			X		Same.
Other:						

5.2 Part 2 Evaluate and document potential threats to species population viability (from Table 1)
Include source citation for all information.

Species: *Oxytropis campestris* var. *chartacea* **Preparer:** David Schmoller **Date:** 10/19/99

5.2A. Description of threat: (discuss both short term: next 10 years and long term: approximately next 100 years), including how it affects the species (e.g. the threat is grazing and the effect is removal of seeds with fewer resulting progeny; or, the threat is grazing and the effect is exposure of bare soil which allows non-native weeds to establish and compete)

Habitat changes: This is the single greatest threat to this species.

Throughout Wisconsin lakefront property is in great demand. Most of this property is being acquired with an eye for residential construction. In Vilas county, for example, sixty percent of the developable lakefront property has been developed. Furthermore, common practice in lakefront development has been to dramatically alter the shoreline vegetation and structure. Trees will be cut between the house and the lake to provide unobstructed views of the lake, shorelines will be cleared of fallen trees, emergent and submergent vegetation will be pulled, beaches will be created, docks will be installed. To combat these trends, state, county, and town governments have created regulations for the development of shorelines. Nevertheless, much alteration has occurred, and many developments violate the regulations. (professional judgement)

What this lakefront development means for this species in the near term is a reduction of habitat. The removal of shoreline vegetation, the maintainance of beaches, the human traffic, and the obstruction of the shoreline by docks, boats, retaining walls, and the likes all functions to eliminate both plants and seeds and to allow the introduction of highly competitive alien wetland plants. (U.S. Fish and Wildlife Service, 1991)

This threat is expected to increase over the years as the general population grows, as the retirement class expands beyond general population growth and, as it is assumed, personal wealth increases and more people esteem the allure and asset of lakefront property. What this means for the species is that its habitat is expected to decrease over the years, roughly in proportion to the advance of the population, retirees, personal wealth, and lakefront value. (professional judgement)

In addition to residential development, agricultural activities threaten the habitat of this species. Already two of the historic sites have no confirmed populations of *O. campestris* var. *chartacea*, and both of these sites are heavily grazed. Grazing animals trample the shoreline of wetlands in their thirst, crushing this species in the process. A taste and a craving for locoweeds can be acquired despite their toxicity. Runoff from cultivated fields may increase siltation which could bury plants and allow entry by the feared *Lythrum salicaria*. Irrigation systems may draw down the water table, affecting the natural fluctuations of the seepage lakes. (U.S. Fish and Wildlife Service, 1991)

Should such agricultural activities continue unabated, or should they expand around the lakes this species inhabits, it can be expected that the habitat will continue to decline.

Habitat fragmentation is another consideration. The viability of this species may be dependent upon its ability to exchange genes and with populations on nearby lakes, or even upon the germination of plants on entirely new shoreline. With shoreline development and off-water development on a record-setting pace, corridors from one population to another or from one population to another lakeshore may be obstructed. (U.S. Fish and Wildlife Service, 1991; professional judgement)

Vegetation changes: These can amount to habitat changes. As mentioned above, the shoreline development and the agricultural influence both can result in the abnormal exposure of the shoreline and the introduction of noxious weeds. Many of these, such as *Lythrum salicaria,* are highly competitive and a source of vexation. (U.S. Fish and Wildlife Service, 1991)

Vegetation structure changes can occur where natural fluctuations of the water table are impacted, resulting in a stable or a lower water table than previously. Agricultural activity such as water table drawdown by irrigation wells could accomplish this. Dredging, channeling, or damming of the wetlands might accomplish this. And increased runoff from irrigation might as well. Any of these could eliminate the operation that produces the open shoreline that this species demands. Encroachment by woody perennials would likely occur, decreasing bare ground, increasing shade, and likely eliminating the species. (U.S. Fish and Wildlife Service, 1991; professional judgement)

Predation/Disease: Predation appears to be more of a threat than disease. Livestock continue to heavily graze two of the historic sites. Recent surveys for *O. campestris* var. *chartacea* at those sites have been unsuccessful. (U.S. Fish and Wildlife Service, 1991)

While locoweeds are generally unpalatable, they are habit forming, addiction developing despite the poisonous qualities of the species. Grazing of locoweeds including varieties of *O. campestris* incurs a chronic poisoning called locoism. Once addicted, an animal may teach other animals the habit. While it can result in harm to the animal, it can also result in the depletion of the species from the range. (U.S. Department of Agriculture, 1937; Stubbendieck and others, 1981; Johnson and Nichols, 1982)

Criminal Acts: Lakefront property, while protected by Federal, State, County, and Municipal regulations, is the subject of frequent abuse. Much of the development that occurs in the state is outside of the law. It would not be expected that the criminal activity would be directly against the species, for it is not exceptionally desireable or despised, as might be the Grey wolf, but it would be against the habitat it demands. (professional judgement)

Pollution/Toxics: Runoff from agricultural operations and residential lawns on the lakefronts may contain herbicides or fertilizers that could damage the plants or the chemistry of the soil. (U.S. Fish and Wildlife Service, 1991)

5.2B. Consequence to species persistence, rated as High, Medium, or Low. High consequence would result in Outcome 5 (diagram and descriptions attached), Medium would result in Outcomes 3 or 4, and Low would result in Outcome 2. (short term: 10 yrs and long term: 100yrs)

Short term: Outcome 2. In the short term it is expected that with the protection of a percentage of the sites by public ownership and agreements with landowners the species will decline some, but not drastically. (professional judgement)

Long term: Outcome 4. In the long term, with population, retiree, lakefront demands in full swing, it is expected that the private holdings would be rendered largely unfit for the species. Public lands would become the last sanctuary of the species. These same forces that degrade the private holdings would be expected to play on the public lands. These same forces would degrade the corridors between populations. Add to that the small size of the lakes and the species may very well disappear. (professional judgement)

5.2C. Threshold levels of the threat that could cause a sudden decline in populations (short term: 10 yrs and long term: 100yrs)

Habitat: It really appears that the habitat is at that threshold at this very moment. No further loss can be tolerated.

It is imperative that lakefront property owners cooperate with all jurisdictions in protection of the habitat. Shoreline regulations must be enforced. Shoreline vehicle traffic must be stopped. It is imperative that more habitat be acquired by public or private conservation organizations. The habitat acquired should not be restricted to the lakefronts alone, but an effort be made to identify any corridors over which the species may travel to other populations or suitable habitat. And it would be well to identify any other likely seepage, alkaline lakes that may harbor or could be seeded with the species with an eye to establishing and preserving habitat there. (U.S. Fish and Wildlife Service, 1991; professional judgement)

Vegetation: Again, it appears that no further alteration of vegetation can be tolerated. Threshold levels have been attained.

Agriculture has made an impact. It appears that grazing animals have already done heavy damage to the viability of the species. Indeed, they may have resulted in the loss of 20% of the known populations. Siltation and overgrazing may someday open the door for noxious weed invasion.

Residential development has had an impact. The clearing of shoreline might have accounted for the loss of populations on Pigeon Lake. That represents 10% of all known populations. (U.S. Fish and Wildlife Service, 1991)

Predation/Disease: It appears that predation threshold levels have not only been attained but have been exceeded. The populations at Mud and Shumway Lakes appear to have been extirpated by grazing animals. That is 20% of all known populations.

Grazing should be restricted from the shores of all remaining sites. If possible, grazing should be eliminated from Mud and Shumway Lakes and an effort made to recolonize the lakeshores with *O. campestris* var. *chartacea*. (U.S. Fish and Wildlife Service, 1991)

Criminal Acts: This does not at present impact this species directly. It does indirectly in the violation of shoreline zoning and regulation. At present, legal shoreline development is a far greater threat to this species than illegal. Nevertheless, illegal development continues apace. It is a difficult thing to assign a level for criminal acts beyond which the species would suddenly decline. Perhaps it could be said that in the short term or the long term, if public sentiments for protection of wetlands and rare species is maintained at present levels, this would not have an adverse impact upon the species. More specifically, such sentiment must be maintained among lakefront property owners at the 10 lakes and amongst the visitors to those lakes. Any decline in these values bodes ill for the species. (professional judgement)

Pollution/Toxics: This threshold has been attained. No further herbicide or fertilizer runoff can be tolerated.

Can it be said with a certainty that the extirpation of the species from Mud and Shumway Lakes was from grazing alone? Is it possible it was aided by the runoff of pesticides and fertilizers? And what of the alteration of the water chemistry by animal wastes? All of these toxins could have contributed to the loss of the plants at these two lakes. To allow like agricultural activity on the shores of the remaining eight lakes would radically reduce the populations there as well. To be consistent, this means lakefront lawn fertilizers and herbicides should be prohibited. It would be best to eliminate not only the grazing animals from Mud and Shumway Lakes but also the agricultural runoffs. Then a program of species reintroduction could follow. (U.S. Fish and Wildlife Service, 1991; professional judgement)

5.2D. Describe any interactions among threats and summarize any other key points:

The U.S. Fish and Wildlife Service in its 1991 report on Fassett's locoweed presented an excellent recovery plan for the species. It includes land acquisition goals, landowner education and agreements, management activities, monitoring, and surveys. It is a must read.

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ATTACHMENTS

Website materials, email correspondence, phone conversations, scanned texts. **[not included in this webversion]**