Species Data Collection Form

Species name: *Oxytropis viscida*

Authority: Nuttall
Common name: Sticky locoweed, Stemless locoweed
Status:
Fed: None State: Endangered (MN)
TNC: Global: G5 Ntl: _____ State: S1
Tribal: _____FS R9:

Date: 10/20/99
Preparer: David Schmoller
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1. HABITAT

1A. Rangewide

1. Area of the historic range (approximately 1600-1800): No records prior to Nuttalls description in the 1800's. Seeing that this species inhabits extreme alpine, rocky regions, undesireable for residential or commercial development, it is unlikely that it has declined in range in any large way. What is the present range may well be quite similar to the historic range. (professional judgement)

Geographic location: Unknown, but it might be assumed to be similar to the present geographic range. A distribution map is provided. (Coffen and Pfannmuller, 1988; professional judgement)

Size: Unknown, but it might be assumed to be similar to the present geographic range. (professional judgement)

2. Factors that limited the historic range: *climate:* This species in most locations shows preference for subalpine to alpine to arctic environments. It is a disjunct in three other locations, all in northern latitudes. (Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973; Williams, 1992)
competition: Not a good competitor, it seeks out hostile environments with little competition. (Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973; Williams, 1992)
soil: It prefers thin soil or exposed rock, talus, and alpine crests. Hence, it finds advantage in extreme environments where competition is limited. (Bakowsky, 1999; Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973; Sutherland, 1999; Williams, 1992)

3. Area of the current range: Arctic to alpine to subalpine North America along the Rocky Mountain cordillera and coastal ranges and southern Canada and northern United States. There is no description of it outside of North America, although plants are shown located in far western Alaska. One might expect to find it in neighboring Russia in arctic to alpine to subalpine regions. (Coffin and Pfannmuller, 1988; Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973; Williams, 1992; professional judgement)

Geographic location: Alaska, Yukon, Northwest Territories, Hudson Bay coastal region of Manitoba, Ontario, and Quebec, the Rocky Mountains of British Columbia, Alberta, Montana, Idaho, Wyoming, Colorado, Utah, Nevada, and California. Disjunct populations are along the border of Minnesota and Ontario, the Wallowa Mountains of Oregon, the Olympic Mountains of Washington, and the Gaspe peninsula of Quebec. (Coffin and Pfannmuller, 1988; Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973; Williams, 1992) However, some checklists do not include *O. viscida* for California, Colorado, Idaho, Oregon, Washington, or Wyoming. Instead, with the exception of Wyoming, they have listed *O. borealis* var. *viscida*. (Nutt.)Welsh. (Internet: brrc.unr.edu; Chili.rt66.com; nps.gov; nr.usu.edu; slv2000.qc.ec.gc.ca; sunsite.cut.ac.jp/pub; wcmc.org.uk) A list from Bearing Land Bridge National Preserve in Alaska equates *O. borealis* with *O. viscida* var. *hudsonica.* (Internet: nps.gov) This suggests that *O. borealis* var. *viscida* is the *O. viscida* cited in Gleason, Williams, Hitchcock, and Coffin. So there appears to be some confusion about the identity of the species, and thereby, the location. This is common with the *Oxytropis* genus, as it is highly variable, as are the taxonomists.(Coffin and Pfannmuller, 1988) (provide distribution map if available or narrative)

Size: This species ranges for thousands of square miles. (Coffin and Pfannmuller, 1988; Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973; Internet: brrc.unr.edu; Chili.rt66.com; nps.gov; nr.usu.edu;

slv2000.qc.ec.gc.ca; sunsite.cut.ac.jp/pub; wcmc.org.uk)

4. Area currently occupied within the range (proportion of the area in #3 above): No reference to this in the literature at hand, but judging from the populations in Utah and Minnesota, only a small fraction of the entire range of the plant is occupied. In Utah, for example, the atlas for this species shows nine locations in the entire state. (Internet: brrc.unr.edu). In Minnesota, there are two locations. In Ontario there are two locations, on the Canadian side of the lakes where the plant is found in Minnesota. (Bakowsky, 1999; Coffin and Pfannmuller, 1988; Sutherland, 1999; Internet: mnr.gov.on.ca) Judging from the abundance of rock outcrops in Minnesota and Ontario and the abundance of subalpine terrain in Utah, this seems to represent a very small occupation of the available patches. (professional judgement)

5. Current distribution (continuous or metapopulation): Metapopulation. It exists in patches throughout the Rocky Mountains and Arctic North America with several outlying patches. (Coffin and Pfannmuller, 1988; Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973)

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: No records available.

7. Minimum distance between habitat patches: No records available. The four sites in Minnesota are all within the same river valley, along two lakes formed by the river. The greatest distance between the sites is approximately three miles. (Bakowsky, 1999; Coffin and Pfannmuller, 1988; MNNHP, 1999; Sutherland, 1999) Judging from the map of the Utah sites, the nine plant locations are separated by anywhere from 5 to 60 miles. (Internet: brrc.unr.edu)

8. Composition of habitat

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

9. Habitat patch structure in the landscape, habitat associations (adjacenct or in vicinity): Patches are apparently random, small (at one site it covers a fraction of a hectare), long lived, and rare. Habitat associations are unstated. (Coffin and Pfannmuller, 1988; Internet: brrc.unr.edu).

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): It is found at two sites near South Fowl Lake in far northeastern Minnesota, on the Canadian border. Interestingly, the two Ontario sites are found near South and North Fowl Lakes. (MNNHP, 1999; Internet: mnr.gov.on.ca)

2. Area occupied historically (approximately 1600-1800): No records. The species was first observed here in 1938 by Butters and Abbe. (Butters and Abbe, 1943).

Habitat requirements:

3. Minimum size of habitat patches if different from rangewide: Presumably the same, less than a hectare. (Coffin and Pfannmuller, 1988)

4. Minimum distance between habitat patches if different from rangewide: In this location there are four sites, two in Minnesota, two in Ontario. The two Minnesota sites are separated by about ¼ mile. (see maps) On the continental scale, these are probably considered one single patch. They are 950km from the nearest population. (Coffin and Pfannmuller, 1988)

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: Similar to the range scale: random, small, long-lived, and rare. They are distributed along rock outcrops, in this area that being slate cliffs and their associated talus. It appears that this distribution occurred in a random way because the species is not recorded at any of the other slate cliffs that are common in the area. Habitat associations are unclear. (Bakowsky, 1999; Coffin and Pfannmuller, 1988 Sutherland, 1999; Internet: brrc.unr.edu)

7. Habitats or features that are actively avoided (e.g. humans, highways, wetlands...): Warmer climates, vegetation overstory, full ground cover. There is a suggestion that disturbance by rockclimbing might be adversely affecting one population. (Coffin and Pfannmuller, 1988; Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973) The effects of grazing is unclear. Early season grazing by musk ox on the species alters the morphology of the plants, and the plants are less likely to be grazed in the following year. (Crowley, 1986)

8. Habitat conditions that may not be required but contribute to greater productivity: Soil acidity might be a factor. It is located in Spodosols in the eastern and northern portions of its range. Spodosols are very acid throughout and have a low cation-exchange capacity. In the mountainous and arctic part of its range it likely occurs in Inceptisols, also characterized by slight to strong acidity. (Foth, 1978). The presence of this species on acidic soils is somewhat unusual. While not unheard of, the genus *Oxytropis* is more commonly a range plant occurring on Mollisols and Aridisols, soils with higher base saturation, a calcium accumulation layer, and thus, a higher pH. (Foth, 1978; Stubbendeick, Hatch, and Butterfield, 1981; USDA, 1937) Bare rock may be a desired but not required condition because it is found on thin red soil overlaying diabase bedrock on one of the Ontario sites. Combining all site data indicates that at the least, the preferred soil is thin to absent. (Bakowsky, 1999, Coffin and Pfannmuller, 1988)

1C. Site, stand, or project level

Habitat requirements

1. Composition of the overstory: No overstory demands described.

2. Composition of the shrub/understory: No understory demands described.

3. Composition of ground flora: The ground flora associates described at the Minnesota locations are two other rare species, *Saxifraga aizoon* var. *neogaea,* and *Moehringia macrophylla* (*Arenaria machrophylla* Hooker). (Coffin and Pfannmuller, 1988, MNNHP, 1999) The Ontario sites have many rare plants on North and South Fowl Lakes, in the vicinity of *O. viscida*. These are *Arnica lonchophylla, Calamagrostis purpurascens, Carex supina* ssp. *spaniocarpa*, *Carex xerantica, Carex practicola*, *Carex rossii, Moehringia macrophylla, Muhlenburgia racemosa, and Poa canbyi.* Other species on the Ontario sites are *Draba cana, Agrostis scabra, Heuchera richardsonii*. (Bakowsky, 1999; Sutherland, 1999; Internet: mnr.gov.on.ca)

4. Vertical structure of the vegetation: The rock outcrops limit the vegetation to a sparse ground layer with relatively open light conditions.(Coffin and Pfannmuller, 1988)

5. Age class(es) of forest vegetation: Although the plants occupying these sites are not long-lived woody species, the extreme environment prevents any siginificant facilitation, inhibition, or tolerance. As a result, the impression is one of mid-stage early succession where herbaceous perennials dominate. No succession by fast-growing, short-lived trees is successful under these conditions. (Coffin and Pfannmuller, 1988; Crawley, 1986)

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.): While the following might be better described as macrohabitat features, and were considered in section 1.2, Rangewide habitat limiting factors, they will be repeated here:

Soil: Again, soil acidity might be a factor. It is located in Spodosols in the eastern and northern portions of its range. Spodosols are very acid throughout and have a low cation-exchange capacity. In the mountainous and arctic part of its range it likely occurs in Inceptisols, also characterized by slight to strong acidity. (Foth, 1978). The presence of this species on acidic soils is somewhat unusual. While not unheard of, the genus *Oxytropis* is more commonly a range plant occurring on Mollisols and Aridisols, soils with higher base saturation, a calcium accumulation layer, and thus, a higher pH. (Foth, 1978; Stubbendeick, Hatch, and Butterfield, 1981; USDA, 1937) Soil is thin to absent on all site records reviewed and is likely a requirement. (Ontario, Coffin and Pfannmuller, 1988; Gleason and Cronquist, 1991; Williams, 1992)

Substrate: This grows on exposed rock or talus in much of its range. In Minnesota and Ontario it grows on slate cliffs, talus, or thin red soil over smooth diabase. (Bakowsky, 1999; Coffin and Pfannmuller, 1988; Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973; Sutherland, 1999; Internet: mnr.gov.on.ca)

Light: In higher elevations it grows in alpine or subalpine environments. In lower elevations it grows on rock outcrops. Thus, in general, it grows in open light conditions. (Bakowsky, 1999; Coffin and Pfannmuller, 1988; Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973; Williams, 1992; Internet: brrc.unr.edu; mnr.gov.on.ca; nr.usu.edu).

Temperature: In most of its range, this is decidedly an arctic to subalpine species. In the outlying locations in Minnesota, Ontario, and Quebec the environment may approach the extreme cold and wind of the arctic to subalpine environments that this species occupies elsewhere. Northeast Minnesota and Northwest Canada are the target of arctic fronts throughout the winter. In all three eastern outliers the species occupies generally north-facing rock outcrops, shaded in the summer and exposed to the cold arctic winds in the winter. In fact, at one of the Minnesota locations the plant was found in abundance on the steep north-facing cliffs but it stopped abruptly where the cliffs made a westward turn. (Bakowsky, 1999; Butters and Abbe, 1943; Coffin and Pfannmuller, 1988; Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973; Sutherland, 1999; Internet: mnr.gov.on.ca; slv2000.qc.ec.gc.ca) This might be expected because other genera in the family *Fabacea* have features that protect them from dessication and freezing. *Oxytropis* and *Astragalus* are both considered cold-resistive genera. Many of the species are found in

Alaska. (Crawley, 1986; USDA 1937)

2. POPULATION

2A. Rangewide

1. Historic (approximately 1600-1800): No records from these centuries.

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: Not numbered, but millions might be a fair estimate in view of its wide distribution. (professional judgement)

b. Breeding/reproducing individuals: Unknown, but it might be assumed to be similar to the proportions found in the Minnesota and Ontario sites. (professional judgement)

c. Numbers of populations: Unnumbered.

d. Relationship/distance among populations: Not stated, but minimum distances between populations in Utah and Minnesota are anywhere from ¼ mile to a few miles. Genetic exchange through pollen and seeds may be possible at such a distance. (Bakowsky, 1999; Coffin and Pfannmuller, 1988; MNNHP, 1999; Sutherland, 1999)

2B. Planning Area (see attached map)

1. Historic (approximately 1600-1800): No records from these centuries.

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: On the two Minnesota sites, 1000 at site #25198 and 35 to 50 to 100 plants at site #5176. The two Ontario sites have several hundred plants at each site. (Bakowsky, 1999; MNNHP, 1999; Sutherland, 1999)

b. Breeding/reproducing individuals: On one of the Minnesota sites it was observed that "about 20%" were in flower and '10% were setting seed.' At one of the Ontario sites it was observed that "many" plants were in fruit. (Bakowsky, 1999; MNNHP, 1999; Sutherland, 1999)

c. Numbers of populations: Two in Minnesota. Two in Ontario. (Bakowsky, 1999; MNNHP, 1999; Sutherland, 1999)

d. Relationship/distance among populations: Speaking for all four sites at the Fowl Lakes, at a minimum they are ¼ mile apart, at the most, three miles apart. (Bakowsky, 1999; MNNHP, 1999; Sutherland, 1999)

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.): Seeds. (Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973)

3B. Dispersal of progeny or propagules

1. Methods: No records. But, this species is similar in growth form and range *as Oxytropis campestris* var. *chartacea.* Dispersal methods of *O. campestris* var. *chartacea* might be similar. These dispersal methods are: Gravity plays the biggest role. Some dispersal is by wind or rain. Animals or birds may carry the seeds to other locations. Its locations are generally in regions visited by Pleistocene glaciation. It is likely ice movement or movement of glacial meltwaters were a factor in dispersal of the seeds. (U.S. Fish and Wildlife Service, 1991)

2. Distance: No records. But distance of dispersion of *O. campestris* var. *chartacea* is in a clumped pattern around the plant. (U.S. Fish and Wildlife Service, 1991)

3. Habitat requirement for dispersal: No records. But this species is on bare rock or thin, acidic soils in exposed locations subject to wind and cold. (Bakowsky, 1999; Coffin and Pfannmuller, 1988; Gleason and Cronquist, 1991; Hitchcock and Cronquist, 1973; Sutherland, 1999; Williams, 1992; Internet: Internet: brrc.unr.edu;

mnr.gov.on.ca; nr.usu.edu).

4. Barriers: Judging from preferred habitat, barriers might be shade, well developed soil, higher pH, shelter from wind, climate warmer than arctic, alpine, or subalpine. (professional judgement)

3C. Reproductive Age

1. Minimum: No record.

2. Maximum: No record.

3D. Fecundity

1. Cycles per year: No record, but other *Oxytropis* have been seen to have remontant flowers. (Fassett, 1976; US Fish and Wildlife, 1991)

2. Years per cycle: *Oxytropis* are perennial herbs. One species has been observed to have flowered the year after germination. (Gleason and Cronquist, 1991; U.S. Fish and Wildlife Service, 1991)

3. Seeds per mature plant per cycle: No records, but other Oxytropis have been observed to have "numerous" seeds. (U.S. Fish and Wildlife Service, 1991)

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

5. Total progeny per life time: No records.

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): No record.

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. Other Leguminacea have been suspected of dependence upon rhizobial bacteria for survival. (U.S. Fish and Wildlife Service, 1991)

3I. Miscellaneous

1. Monoecious vs. dioecious: Monecious. (Gleason and Cronquist, 1991)

2. Sexual vs. asexual: Sexual. (Gleason and Cronquist, 1991)

3. Monogamous vs. polygamous: Not polygamous. (Gleason and Cronquist, 1991)

4. Herds: Not applicable.

5. Packs: Not applicable.

6. Other: Other species of *Oxytropis* suggest that scarification of seeds might be important for germination. This species is a polyploid complex. (Gleason and Cronquist, 1991; 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

1. Habitat: Increasing____ Decreasing____ Stable__X___ Do not know_____

Cause: Hostile, inaccessible environments are favored, thus less likely to be developed, managed, or trampled by humans or their livestock. Many sites are in public ownership. (professional opinion)

2. Population: Increasing____ Decreasing____ Stable__X___ Do not know_____

Cause? Hostile, inaccessible environments are favored, thus less likely to be developed, managed, or trampled by humans or their livestock. Many sites are in public ownership. (professional opinion)

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

1. Habitat: Increasing____ Decreasing____ Stable__X___ Do not know_____

Cause: Hostile, inaccessible environments are favored, thus less likely to be developed, managed, or trampled by humans or their livestock. All sites are in public ownership. (Coffin and Pfannmuller, 1988; Minnesota

State Register, 1996)

2. Population: Increasing____ Decreasing_X___ Stable_____ Do not know_____

Cause: Despite the hostile, inaccessible environments and that all sites are in public ownership, the population is in decline. Surveys in 1938 described plants that 'luxuriated over several acres of cliffs and talus.' In 1983 only 50 to 100 plants on a fraction of a hectare were seen. The theory was advanced that the species suffered natural fluctuations due to the weathering and erosion that occurs on the cliff faces. Human disturbance was ruled out. (Coffin and Pfannmuller, 1988; Minnesota State Register, 1996)

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____ Stable__X___ Do not know_____

Cause: Hostile, inaccessible environments are favored, thus less likely to be developed, managed, or trampled by humans or their livestock. All sites are in public ownership. (Coffin and Pfannmuller, 1988; Minnesota State Register, 1996)

2. Food: Increasing____ Decreasing____ Stable_____ Do not know_____

Cause: Not applicable.

3. Population: Increasing____ Decreasing_X___ Stable_____ Do not know_____

Cause: Despite the hostile, inaccessible environments and that all sites are in public ownership, the population is in decline. Surveys in 1938 described plants that 'luxuriated over several acres of cliffs and talus.' In 1983 only 50 to 100 plants on a fraction of a hectare were seen. The theory was advanced that the species suffered natural fluctuations due to the weathering and erosion that occurs on the cliff faces. Human disturbance was ruled out. (Coffin and Pfannmuller, 1988; Minnesota State Register, 1996)

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 viscida***

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		Large inaccessible tracts in public ownership.
	100yr			X		Large inaccessible tracts in public ownership.
Decline in habitat quality	10yr			X		Large inaccessible tracts in public ownership.
	100yr		X			Expanding resource and recreation demands and climate changes may impact.
Habitat fragmentation (include loss of connectivity)	10yr	X				These species are isolated from their kin by thousands of km. In between lays much development
	100yr	X				These species are isolated from their kin by thousands of km. Development will increase.
Changes in vegetation composition	10yr			X		Largely unvegitated rock.
	100yr		X			Largely unvegitated rock but climatic changes would likely impact this species.
Changes in vegetation structure	10yr			X		Limited public access and resource extraction at present.
	100yr		X			Increased resource and recreation demands and global warming might change surrounding vegetation.
Competition from non-native species	10yr			X		None mentioned in literature.
	100yr		X			Pure speculation. As population expands, so do nonnatives.
Competition from native species whose range *or* pop. trend has changed	10yr			X		None mentioned in literature.
	100yr		X			Global warming could accomplish this.
Predation	10yr					None mentioned in literature.
	100yr					None mentioned in literature.
Disease	10yr					None mentioned in literature.
	100yr					None mentioned in literature.
Climate change	10yr			X		Perhaps this is why the plant is in apparent decline.
	100yr	X				Global warming will likely get worse. This plant is likely sensitive to warming.
Loss of obligate associate	10yr			X		No obligates noted in literature.
	100yr			X		No obligates noted in literature.
Natural catastrophes	10yr			X		None envisioned.
	100yr		X			Rock weathering and slides might be a concern.
Threats during migration	10yr				X	Not applicable.
	100yr				X	Not applicable.
Genetic drift	10yr			X		Very isolated species.
	100yr			X		Very isolated species.
Genetic homogeneity	10yr	X				Isolation breeds homogeneity.
	100yr	X				Isolation will be maintained.
Hunting/Trapping	10yr				X	Not applicable.
	100yr				X	Not applicable.
Collection	10yr			X		Quite remote and inaccessible.
	100yr			X		Quite remote and inaccessible.
Poisoning	10yr			X		Agriculture not in watershed.
	100yr			X		Agriculture not in watershed.
Criminal Acts	10yr			X		Quite remote and inaccessible.
	100yr			X		Quite remote and inaccessible.
Pollution/toxics	10yr			X		Agriculture not in watershed, but CO2, SO2, acid rain an unknown quantity.
	100yr		X			Agriculture not in watershed, but CO2, SO2, acid rain will likely increase.
Interactions among threats	10yr			X		Global warming might inhibit plant as well as decline habitat quality, change vegetation.
	100yr		X			Global warming might inhibit plant as well as decline habitat quality, change vegetation, to an increasing degree.
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 viscida*** **Preparer:** David Schmoller **Date:** 10/20/99

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)
The three biggest threats to this species appear to be the following:
Habitat: The concern here is not the loss of habitat, because the sites are in public ownership, remote, relatively inaccessible, and in a climatically undesireable location for a massive migration of human population. The concern is loss of habitat quality. While in the *short term* this does not appear to be a problem for this particular rare plant environ, in the *long term* there will be increased demands upon natural resources and recreational opportunities as well increased demands for privacy. This will put isolated locales such as this in the spotlight. Indeed, this is already occurring nationwide, with great demands being placed upon National Parks and Wildernesses. It would be expected that the press of civilization would eventually make its presence known in this region. This would mean increased off water traffic, increased demand for timber, increased demand for recreational sports like rock-climbing. At that point, the decline in habitat quality might become apparent.
This decline would be evident in increased defoliation, increased timber poaching, increased erosion. This could spell the demise of these outlying populations of *O. viscida.* (professional judgement)
Isolation: The genetic isolation of this species is extreme. It is hundreds, even thousands of kilometers from the nearest populations of the species. Observed populations are very small, perhaps as few as 50 plants in a population. (Coffin and Pfannmuller, 1988) This approaches a dangerous level of isolation and smallness. At this level there is a likelihood of inbreeding depression. This would be exhibited in reduced seed set, reduced numbers of seeds per fruit, reduced individual seed weights, poor germination, reduced seedling growth rates, and reduced longevity. (Crawley, 1986) Similar results of isolation would be expected in the *short* and *long terms*. There is the possibility that the decline of the specimens seen at the sites is a result of isolation and its attendants reproduction disorders. (professional judgement)
Climate: One other factor which affect the species directly and indirectly is climate change. Its effect upon habitat quality cannot be ignored. It is said that global warming would be most evident in increased intensity of precipitation. This would increase erosion, diminishing the persistence of the species. (Begley, 1996) Global warming may alter the vegetation structure and component as well. Were this to be limited to the area outside of the rock outcrops, it might not have an impact upon the species. But should this make for increased vegetation on the cliff faces and talus slopes, then the species may become shaded into oblivion. And the effect that this might have on the plants themselves must be considered. Other genera in the family *Fabacea* have features that protect them from dessication and freezing. *Oxytropis* and *Astragalus* are both considered cold-resistive genera. Many of the species are found in Alaska. (Crawley, 1986 USDA, 1937) To increase the average temperatures in this location, one of the most temperate that this species occupies, may be enough to eliminate it altogether. While it is largely conjecture at this stage in meteorology, global warming might be having an impact in the *short term* should it be accountable for any general increase in storm severity or precipitation intensities in the region. In the *long term*, if the science is reliable, this will only increase the danger to the species.

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: Low, Outcome 2. In the short term it is expected that with the protection of the sites by public ownership, but with continued isolation, the species will decline slightly, but not drastically. It remains stable in the majority of its range, especially in the north and the Rocky Mountains. (professional judgement)
Long term: Medium, Outcome 3. If it is true that the population at one of the sites was in the thousands over several acres in the late 1930's, but had declined to 50 to 100 plants on a fraction of a hectare, then given that rate of decline, the species would be essentially eliminated from that site in 100 years. In the long term, with exploding population and resource demands, increasing global temperatures, increasing precipitation intensity, and increasing inbreeding depression this species is not expected to exist at this edge of its range. It would likely continue to thrive in its northern range, in the Rocky Mountains, the boreal forest, and the arctic. (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: The quality of the habitat is fairly stable at present. The intense clearcutting of the late 1800's and early 1900's has diminished. The land is in public ownership, restricted from development. The region is isolated and lacks overwhelming human traffic. The threats are not at a threshold level. Maintainance of the current land use practices, or reduction of forestry practices would keep the habitat in the presently favorable condition.

However, in 100 years it will be a different story, should the trends continue as they are. The expected increase in land use, human traffic, and climate change could could easily devastate this small population. The levels at which the threats would surpass a threshold are difficult to quantify, but it is safe to say that an increase in harvest rotations, rock climbing, clear cutting, and other land use practices in the vicinity of the rare plant sites cannot be afforded by this species with such a tenuous hold on life. One way of measuring it: To reduce the populations to below 50 plants per site would certainly set them up for serious inbreeding depression. They would most likely disappear. Continued monitoring is essential. Consideration should be given to other rock outcrops where the species might be introduced. Aerial photographs show many rock outcrops in the area. (professional judgement)

Isolation: As mentioned, a threshold level is at hand. If populations are actually about 50 individuals at a site, then that site is at the threshold level and may very well have crossed the level. Inspections of the populations should be made to see if there is any evidence of deleterious recessives. Isolation of these small populations only exacerbates the problem, diminishing the likelihood of a pollen parent coming from another population. (Crawley, 1986; professional judgement)

Climate: This is also difficult to measure. It seems that one scientist presents data proving global warming at one conference while across the continent another presents data proving global cooling. And in the heartland, another scientist shows data proving that there is no change in climate at all. Meanwhile, the human race continues its global experiment with massive carbon dioxide emissions. It could be anyones guess where this all ends up. But if this carbon dumping continues for another 100 years, it is difficult to argue that there won't be any dramatic alteration of the earth's climate. Should it result in global warming, this species will likely decline. In fact, if global warming has been occurring in the past few decades as some profess, it may well explain the decline in this cold-adapted species. No matter what the species, and no matter what the impact upon the species, any man-induced climate change is too much. Reduction of "greenhouse" gas emissions is a must. (professional judgement)

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

The largest interaction appears to be between climate changes and habitat alteration. This species gives much evidence that it is a cold tolerant, even a cold dependent species, as it weakens competition from other plants. To warm the climate, to increase the precipitation intensity would have impacts upon the species itself and the habitat it enjoys. (professional judgement)

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