COMMITTEE ON THE
STATUS OF ENDANGERED
WILDLIFE IN CANADA

OTTAWA, ONT. K1A 0H3
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COMITÉ SUR LE STATUT
DES ESPÈCES MENACÉES
DE DISPARITION AU
CANADA

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STATUS REPORT ON THE HARE-FOOTED LOCOWEED *OXYTROPIS LAGOPUS* NUTT. IN CANADA

BY

BONNIE SMITH

STATUS ASSIGNED IN 1995
VULNERABLE

REASON: HIGHLY RESTRICTED RANGE AND COMMON WHERE FOUND, WITH EVIDENCE OF HABITAT DISRUPTION.

OCCURRENCE: ALBERTA

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Hare-footed Locoweed

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JUNE 1994

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STATUS REPORT ON THE HARE-FOOTED LOCOWEED *OXYTROPIS LAGOPUS* NUTT.

IN CANADA

BY

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STATUS ASSIGNED IN 1995
VULNERABLE

EXECUTIVE SUMMARY

Description

Oxytropis lagopus Nutt. var. *conjugans* Barneby, or Hare-footed Locoweed, is a member of the Fabaceae or Pea Family. It is a caespitose plant (scapes to 13 cm height) with totally silky-pilose herbage. Leaves are 3-11 cm long with 5-17 leaflets. Racemes are 5-18 flowered. Flowers are blue-purple, 13-16 mm long. The pod is erect, 6-15 mm long and somewhat inflated upon maturing. The flower colour and silky, silvery herbage are distinctive. The keel petal of species of *Oxytropis* have a sharp point or beak at the tip which distinguishes the genus from the similar *Astragalus* (Milk Vetch).

Distribution

Hare-footed Locoweed is native and endemic to the Rocky Mountains extending from Wyoming to western Montana and Idaho in the United States. The species is considered rare in Montana. In Alberta, the species is restricted to an area between Whiskey Gap (in the west) to the vicinity of Lake Shanks (in the east) and north to the Ross Lake area (approximately 112o44' to 113o01' N and 49o00' to 49o05'W). Oxytropis lagopus is known from only 8 closely distributed locations in Alberta. The Cardston site (collected 1966, 1967) has not been relocated. Populations are concentrated around Lake Shanks and decline as the plant approaches its western and northern range limits. The species is fairly common within its restricted range.

Population Size and Trends

An estimated total of 10 to 20 thousand specimens are located within the restricted Alberta range. Specimens have been found in the low to mid-thousands on sites west, south and southeast of Lake Shanks. Specimens decrease to the low to mid-hundreds along the western and northern fringes of the species range (from Whiskey Gap to Ross Lake along a ridge system). It is too early to recognize population trends. Population data has only been collected in 1986 (4 of 8 sites) and 1993 (5 of 8 sites).

Habitat

Oxytropis lagopus is found only on the unglaciated, gravelly soils of the Milk River Ridge, particularly, the areas surrounding the North Milk River. The Milk River drains south to the Gulf of Mexico unlike the majority of the Foothills Grassland sub-region. The Milk River is a major area of peripherality for rare and unusual species. Brown chernozem soils characterize the sites. *Oxytropis lagopus* mostly grows within a 10 m wide strip along the upper slopes or plateau rims of steep ridges. The species grows

commonly with the following species: *Artemisia frigida* Willd., *Poa cusickii* Vasey, *Phlox hoodii* Richards., *Oxytropis sericea* Nutt., *Selaginella densa* Rydb. and *Eriogonum flavum* Nutt. *Oxytropis viscida* Nutt. usually occurs within the immediate vicinity. Hare-footed Locoweed is commonly associated with other rare or uncommon species, especially *Phlox alyssifolia* Greene.

General Biology

Oxytropis lagopus is a perennial species. It reproduces sexually by pollen production. The species is actively producing fruit and setting seed at the Alberta sites. Little is known about the role the species plays in the ecosystem. The species is considered hazardous by stockmen as a inducer of locoism, a chronic poisoning which may eventually lead to the death of livestock.

Limiting Factors

Gravel extraction operations pose the primary threat to the continued success of the species in Alberta because of the abundance of gravel on the preferred sites. At present, no sites are in immediate danger, although the loss of the Cardston site may be attributed to the active gravel pit operating at that site. Gravel removal was halted in 1986 at the Ross Lake Community Pasture site. Grazing may produce a change in species association thereby limiting the use of available habitat, restricting the species to the more inaccessible upper slopes. Cultivation of natural habitats has eliminated many sites but the steepness of most remaining areas makes further cultivation difficult. Any change in management of grazing leases, gravel operations or development of any kind on the sites should be closely monitored.

Protection

There are no regulatory or other measures to protect this species. The populations are apparently sufficiently numerous and unthreatened by immediate dangers to be considered stable at this time. The only active measure taken to ensure survival of the species has been the decision to cease gravel extraction at the Ross Lake Community Pasture site.

Conclusions

Oxytropis lagopus is recommended for listing as a vulnerable species in Canada in consideration of not only the species restricted range in Canada and the United States but also its substantial population base and relative freedom from threats to its continued existence. The prognosis for the species survival is very good if the existing habitat is not compromised. Development should be restricted, especially in the area surrounding Lake Shanks, northeast of Del Bonita. Gravel extraction should be prohibited or very closely monitored along the ridges of the North Milk River. Studies should be undertaken to determine the affects of grazing on population distribution patterns.

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I. Species Information

1. Classification and Nomenclature

The scientific name for Hare-footed Locoweed is *Oxytropis lagopus* Nutt. var. *conjugans* Barneby. It is a member of the family Fabaceae in the order Fabales. The Fabaceae is a very large family composed of 440 genera. Many genera occur in Canada and the United States. The Fabaceae contains some 12,000 species worldwide. *Oxytropis* contains more than 200 species. (Cronquist 1981, Moss 1983)

The genus *Oxytropis* has numerous species worldwide with 14 species occuring in Canada. The species *Oxytropis lagopus* was first described by Nuttall, a renowned botanist, in 1834 in Acad. Phila. 7:1. The var. *conjugens* was first described by Barneby in 1952 in Proc. Calif. Acad. Sci. IV, 27:227. The type location of this variety is listed as follows: Near Helena, Montana, collected by E.O. Wooton, June 1921. Gray's Herbarium Index (1968) lists *Oxytropis lagopus* Nutt. as follows: *Oxytropis Lagopus* Nutt. (*Spiesia Lagopus* (Nutt.) O. Ktze, *Aragallus Lagopus* (Nutt.) Greene, *Astragalus Lagopus* (Nutt.) Tidestrom) and *Oxytropis Lagopus*, var. *conjugans* Barneby (Proc. Calif. Acad. Sci. 4th ser. 27:227. 1952. -- Montana.). Hitchcock et al. (1961) recognizes three varieties; namely, var. *conjugens* Barneby, var. *lagopus* and var. *atropurpurea* (Rydb.) Barneby. Only the var. *conjugens* occurs within Canada.

Hitchcock et al. (1961) lists the following synonyms for *Oxytropis lagopus* Nutt.: *Aragallus lagopus* Greene (Pitt. 3:212. 1897), *Astragalus lagopus* Tidestr. (Proc. Biol. Soc. Wash. 50:19. 1937), *Aragallus blankinshipii* A. Nels. (Erythea 7:58), *Astragalus blankinshipii* Tidestr. (Proc. Biol. Soc. Wash. 50:18. 1937), *Oxytropis blankinshipii* K. Schum (Just Bot. Jahresb. 271:496. 1901), *Aragallus atropurpureus* Rydb. (Bull. Torrey Club 34:424. 1907), *Oxytropis lagopus* var. *atropurpurea* Barneby (Leafl. West. Bot. 6:611. 1951), and *Oxytropis lagopus* var. *conjugens* Barneby (Proc. Calif. Acad. Sci. IV, 27:227. 1952).

Of the fourteen species of *Oxytropis* in Canada, nine species occur within Alberta. Hare-footed Locoweed is restricted in the wild to Alberta within Canada. (Moss 1983, Scoggan 1978)

2. Description

Oxytropis lagopus var. *conjugans* Barneby is a caespitose plant with a branching caudex. The herbage is totally silky-pilose with long silvery hairs. The stipules are membraneous and densely silky-pilose dorsally, sometimes glabrate with age. Leaves are 3-11 cm long with 5-17 (usually 5-9) ovate to oblong-elliptic leaflets. Each leaflet is about the same length as the leaf

rachis rather than much shorter. Scapes are erect, arcuate ascending or subprostrate. Scapes are 2-13 cm long. The racemes are 5-18 flowered, subcapitate to oblong. Bracts are shaggy-pilose dorsally, often with dark hairs. The calyx is 8-11 mm long, heavily silky-hirsute concealing the surface of the tube which is turgid to inflated at anthesis. The corolla is pink-purple, 13-16 mm long. The keel is 11-14 mm long. The pod is erect, silky-pilose, shortly stipitate, exserted from the calyx, 6-15 mm long, chartaceous to submembraneous. The calyx is usually persistent until after the pod dehisces rather than usually deciduous with the enclosed pod before seed dispersal. (Moss 1983, Hitchcock *et al.* 1961, Looman and Best 1979, Scoggan 1978) (Figures 1, 3, 6)

It is essential to carefully separate the Alberta species of *Oxytropis* as several can and do occur on exactly the same site, growing closely together. The Hare-footed Locoweed is readily distinguishable, though, with its blue-purple flowers and very silky, silvery herbage. A combination of the following characteristics serve to distinguish Hare-footed Locoweed from all other species of *Oxytropis* in Alberta: acaulescent; leaflets not fascicled, opposite or subopposite; flowers purplish or blue; bracts, scapes and pods densely silky-pilose; calyx somewhat turgid or inflated at anthesis. (Moss 1983)

Members of the genus *Oxytropis* might be confused with members of the genus *Astragalus* (Milk Vetch), which contains 25 species in Alberta. Several species of the two genera may appear similar but are readily distinguished by characteristics of the keel petal. In *Astragalus* the keel is rounded or obtuse at the tip while in *Oxytropis* the keel has a sharp point or beak at the tip. (Moss 1983) Indeed, the scientific name *Oxytropis* is latinized from the Greek words *oxus* (sharp) and *tropis* (keel).

3. Biological and Economic Significance

Hare-footed Locoweed is considered hazardous by stockmen as an inducer of locoism. Extensive grazing of locoweeds induces a chronic poisoning called locoism. Such plants are habit-formers, their poisonous effects being cumulative, fatalities ensuing only after prolonged use. Addicted animals should be shifted immediately to ranges where the plants are not available, as otherwise the habit will eventuate in their ruination and death. Furthermore, a loco eater is liable to teach other animals the habit. Other species of *Oxytropis* which induce locoism are *Oxytropis lambertii* Pursh, *O. sericea* Nutt., *O. saximontana*, *O. richardsonii*, and *O. splendens* Dougl. ex Hook.

Among the earliest symptoms of locoism comes loss of weight, followed by gait irregularities, general depression, and such extreme weakness that it is sometimes mistaken for paralysis. Lack of muscular coordination and defects of vision develop, due to the reactions of the plant poison on the central nervous system. Emaciation and weakness increase as the disease progresses, with death often resulting from starvation. Among domesticated animals horses are the most seriously affected followed in order of severity by cattle and then sheep. The best treatment is to remove cattle to good pasture, preferably alfalfa.

No practical method of eradicating locoweeds from large areas has been devised. Grubbing may prove effective in small, heavily infested patches if the roots are cut 2 or 3 inches below the bud crowns -- a practice which prevents subsequent spreading from those parts. Conservative grazing which facilitates the reestablishment of perennial grasses and other desirable forage species is probably the only economic method of reclaiming large areas of range. Seeding to other species may hasten reclamation.

The palatability of *Oxytropis* is poor for cattle and horses and fair for sheep, although sometimes, especially in scarcity of desirable forage, the plants are eaten freely. Although the genus contains harmless species and is widely distributed and plentiful on many western ranges, its relatively low palatability is not disadvantageous considering the livestock losses caused by locoweeds. From the range standpoint the locoweeds are more important than the species which do not cause locoism. (Forest Service, Department of Agriculture 1937)

Members of the genus *Oxytropis* have a minor horticultural value, mostly as species for rock or alpine gardens. Bailey (1952) notes that a dozen species are cultivated in Europe mostly as rock plants. Hitchcock *et al.* (1961) states that for gardeners east of the Cascades several species of *Oxytropis* have considerable potential, such as *O. besseyi*, *O. lagopus*, and *O. splendens* (Barr, Bull. Am. Rock Gard. Soc. 18:65-67. 1960).

4. Distribution

The Fabaceae is of cosmopolitan distribution and is widespread in temperate and cold as well as tropical regions (Cronquist 1981). *Oxytropis* are known chiefly from the northern and mountain regions of North America, Europe and Asia (Everett 1981). The majority of *Oxytropis* occur in the Old World, with Asia and Siberia to the Caucasus Mountains and Turkestan as the centre of distribution. A few species reach the mountains of Central Europe. There are no species in Africa. (Bailey 1952) In North America, locoweeds extend from sea level in Alaska to elevations of about 11,000 ft. in Colorado. In the United States the genus is best represented in the Rocky Mountain States particularly Montana, Wyoming and Colorado.(Forest Service 1937).

Hare-footed Locoweed is native and endemic to the Rocky Mountains from Wyoming to western Montana and Idaho. (Map reference: Barneby 1952 from Proc. Calif. Acad. Sci. 27:221) In Canada the species is known only from southwestern Alberta in the area near the Montana border south of Cardston. (Hitchcock et al. 1961, Scoggan 1978, Booth and Wright 1959, Argus and White 1978) (Map 1)

Precise locality data and land ownership, if known, is on file with COSEWIC and the appropriate provincial/territorial jurisdictions. This information is generally available unless the localities are considered to be publicity-sensitive.

4.1 Alberta

The very restricted range, on the ridges and hills around the western section of the North Milk River, in southwestern Alberta is bounded by Whiskey Gap to the west, Lake Shanks to the east, Ross Lake to the north, and the U.S. border to the south; approximately 112°44'to 113°01' N and 49o00' to 49o05' W. (Smith 1993, Wallis *et al.* 1986) (Map 2)

Various sites within the range of the species in southwestern Alberta were examined and rated as potential habitat for Hare-footed Locoweed. Three ridges and one hill system were noted to contain all of the recognized sites for the species in Alberta. Other sites were examined but either the elevation was too low, the elevation gain was insufficient or the species composition was unsuitable for Hare-footed Locoweed. A few areas not visited were examined by sight and assigned a potential rating for finding the species. *Oxytropis lagopus* apparently requires a combination of elevational and biological site characteristics for creation of suitable habitat. (Map 3)

5. General Environment and Habitat Characteristics

The Grassland Natural Region contains three sub-regions - the Mixed, Northern Fescue and Foothills Grassland. Populations of Hare-footed Locoweed occur in the Foothills Grassland which occupies a narrow belt along the western margins of the Mixed Grassland between the Mixed Grassland and the Foothills Parkland. Some areas of the Foothills Grassland merge directly into the Rocky Mountain Montane. The southern Foothills Grassland is restricted to areas surrounding Ross Lake and west to Waterton National Park and to two small areas in the Cypress Hills of Alberta and Saskatchewan. (PCAP 1989-1994, Alberta Recreation and Parks 1989)

The southernmost Foothills Grassland have an abundance of plants that are either rare or at the periphery of their range, including Hare-footed Locoweed. The prime area of significance of Foothills Grassland is the Ross Lake area on the Milk River Ridge, exactly where Hare-footed Locoweed occurs. The region consists of broad, flat to gently rolling plains with few major hill systems. (Cottonwood Consultants 1983, Alberta Recreation and Parks 1989) Hare-footed Locoweed is found on rolling steppe or dry grassland on gravelly soil almost exclusively on unglaciated terrain on the Milk River Ridge. (Figures 4, 10-12) (Wallis *et al.* 1986, Argus and White 1978, Packer and Bradley 1984)

5.1 Climate

The Prairies Climatic Region, encompassing the Alberta site, is characterized by low winter precipitation. The Foothills Grassland is an uncommon grassland type in North America, found in the foothills area where greater rainfall and cooler temperatures provide more available moisture. The Alberta site lies in the northern cool-temperate zone characterized by low annual precipitation, high evaporation rates and fast runoff. Rainfall occurs mainly in early summer causing a late searson moisture deficit. Precipitation is approximately 30 mm less during the growing season than in the mixed prairie ecoregion. (Prairie Conservation Action Plan 1989-1994, Stamp 1988)

5.2 Physiography, Hydrology, and Edaphic Factors

The Alberta site occurs in the Great Plains physiographic region. The Great Plains region slopes chiefly to the east. The majority of the Foothills Grassland Sub-Region drains into the Saskatchewan River system, however a small portion drains into the Milk River system. The southern slopes of the Cypress Hills, the Wood Mountain and Missouri coteau, and the slopes of the Sweet Grass Hills, are drained by the Frenchman and Milk Rivers and numerous smaller streams, the waters of which eventaually flow into the Gulf of Mexico. The areas surrounding the North Milk River are drained into the Milk River. Very little of the precipitation within the area is lost through exterior drainage. (Coupland 1950, Wershler and Wallis 1986, Alberta Recreation and Parks 1989)

Much of the strongly rolling and hilly land is excessively drained due to loss of precipitation through runoff. Low lying flats and depressions are characterized by varying degrees of restricted drainage. (Coupland 1950)

The bedrock, which is best exposed along the Milk and Lost rivers, is composed of four formations: the Milk River, Pakowki, Foremost, and Oldman. Because the bedrock is of both marine and terrestrial types, there is a wide variety of fossils, ranging from marine molluscs to dinosaurs and other reptiles. Rare outcrops of igneous rock are found in the areas which are associated with the intrusive rocks of the Sweetgrass Hills. (Spalding 1980)

The surface geological deposits and parent materials of the soil are chiefly of glacial origin. There are areas of preglacial gravels along the North Milk River which have remained as surface features since before the Wisconsin glacial period. Such gravels are uncommon in southern Alberta, being confined to the Del Bonita uplands in the south with a few smaller outliers to the north and west (Whiskey Gap, Ross Lake areas). The driest areas composed of preglacial gravels, right at the edge of the hillcrests, support several rare species including the Hare-footed Locoweed. Brown chernozem soils characterize the Milk River sites. The clay loam solonetzic soils developed on thin boulder clay and were modified by preglacial sediments. (Coupland 1950, Wershler and Wallis 1986, Alberta Recreation and Parks 1989) Black chernozemic soils characterize the fescue grassland (PCAP 1989-1994).

5.3 Biological Characteristics

The Alberta sites occur in the Foothills Grassland Sub-Region. The major natural vegetation of this area is rough and Idaho fescues and intermediate oat grasses. There are more forbs in this grassland type, including some found in the mountain areas to the west, such as Perennial Lupine, Sticky Purple Geranium, and Common Yarrow. These grasslands are characterized by a much greater variety and cover of forbs than exist in the Northern Fescue Grasslands. (Alberta Recreation and Parks 1989)

Five basic types of vegetation were mapped within the Ross Lake area; namely, fescue grassland (the most common, occuring on flatter upland surfaces), mixed meadow on the slopes of the area containing more forb species than on

the flatter uplands, sage prairie on drier hilltops and well-drained gravel deposits which is more sparsely vegetated, rich meadows of grasses, sedges and forbs on coulee bottoms, and thickets of shrubs which grow on sheltered, moist north-facing slopes of a few coulees. Hare-footed Locoweed prefers the sage prairie of the drier hilltops. (Alberta Recreation and Parks 1989)

The sage prairie is characterized by good drainage and strong exposure to sunshine. This makes for drier conditions and the grasses give way to a community of smaller, hardy forbs dominated by sage. The most common plants here are the sages, Prairie Sagewort and Pasture Sagewort, along with Small-leaved Everlasting, Alpine Goldenrod and Moss Phlox. Some grasses like June Grass, spear Grass and Northern Wheat Grass are found here as well as some drought tolerant grasslike plants (graminoids) like rushes and sedges. The sage prairie communities at Ross Lake tend to be found in rather small patches, occuring on valley ridges, south-facing slopes or gravelly deposits, wherever drier conditions are found. (Figure 4) (Alberta Recreation and Parks 1989). These areas are somewhat more common west and south of Lake Shanks. (Figures 7-8, 10-12)

Oxytropis lagopus apparently requires a combination of factors in order to establish and thrive; namely, a sufficient elevation, a sharp elevation gain, a particular species composition, and a gravelly location. If any of these factors varied from the typical the species was not found (see Map 3). Many areas in addition to those at which the species was found were checked. Often the ridges were too low or did not gain elevation rapidly. (Smith 1993)

Ross Lake Community Pasture (Site 3, Map 2) (Figures 3-5)

This site was situated on a southeast-facing, gravelly, unglaciated plateau rim with numerous other low-growing plants including *Cryptantha nubigena* (Greene) Payson, *Hymenoxys richardsonii* (Hook.) Cockerell, *Bupleurum americanum* Coult. & Rose, *Artemisia frigida* Willd. (dominant plant), *Poa* sp., *Phlox hoodii* Richards., *Selaginella densa* Rydb., *Hymenoxys acaulis* (Pursh) Packer on the upland portion and *Oxytropis viscida* Nutt., *Thermopsis rhombifolia* (Nutt.) Richards., *Oxytropis sericea*, *Eriogonum flavum* Nutt., *Musineon divaricatum* (Pursh) Nutt. and *Phlox alyssifolia* Greene on the downslope portion. Away from the 10 m wide area along the plateau rim *Oxytropis lagopus* becomes uncommon as the grassland below and above this strip is lush and apparently too dense to support this species. (Wallis et al. 1986)

Smith (1993) found the following species, in addition to those listed above, associated with *Oxytropis lagopus* on the plateau rim at the Ross Lake Community Pasture site: *Draba oligosperma* Hook., *Poa cusickii* Vasey, *Erigeron compositus* Pursh, *Potentilla concinna* Richards., *Androsace septentrionalis* L., *Heuchera flabellifolia* Rydb., and *Carex pensylvanica* Lam. var. *digyna* Boeckl. The grassy slopes below the area which supports *Oxytropis lagopus* were dominated by *Festuca idahoensis* Elmer and *Lupinus sericeus* Pursh. *Arabis nutallii* Robinson, *Poa cusickii*, *Hedysarum sulfurescens* Rydb., and *Thermopsis rhombifolia* were also scattered along the grassy slopes of the lower ridge area. A few *Oxytropis lagopus* were noted to occur along the upper slopes of the grassy hillside. The species preferred only the sides of the semi-barren

rocky plateau. *Oxytropis viscida* was noted to be restricted to the disturbed area near the gravel pile away from *Oxytropis lagopus*. (Figure 5) *Oxytropis sericea* was fairly common on the hilltops with *Oxytropis lagopus*.

During investigations by Smith (1993) the habitat of the other sites was found to be similar to that stated above with the following modifications or exceptions listed by specific location.

Sommerfeldt Ranch (Site 2, Map 2) (Figure 2)

Barbara Sommerfeldt has been an active participant in the spring flowering count project since 1986. She has compiled a list of nearly 300 species which occur on her ranch. She has sent specimens to the Northern Alberta Forestry Station for identification or confirmation. *Oxytropis lagopus* again is mostly restricted to the gravelly plateau rims on the ridge north of Whiskey Gap. Although not relocated in 1993 (Smith) the species has been recorded in 1986, 1987, and 1991 from this area.

The upper slopes and plateau rim are very similar to the Ross Lake Community Pasture site, in fact, they are located on the same ridge system (Map 3). In addition to those species previously described *Antennaria umbrinella* Rydb., *Astragalus gilviflorus* Sheldon, *Penstemon nitidus* Dougl., *Arabis nuttallii*, *Erigeron radicatus* Hook., *Plantago canescens* Adams, *Physaria didymocarpa* (Hook.) A. Gray, *Minuartia rubella* (Wahl.) Graebn., and *Artemisia campestris* L. were also found on the ridge tops and upper gravelly slopes in conjunction with *Oxytropis lagopus*. *Oxytropis viscida* and *Oxytropis sericea* were rather common the the ridge tops.

West of Lake Shanks, south of Highway #62 crossing of North Milk River (Site 6, Map 2) (Figures 6-9)

This site is again fairly typical of those described above. *Antennaria umbrinella* (both male and female plants) were very common on the upper ridge areas but the major associates of *Oxytropis lagopus* were *Festuca brachyphylla* Schultes, *Carex pensylvanica* var. *digyna*, and *Astragalus crassicarpus*, *Oxytropis sericea*, *Phlox alyssifolia* and *Phlox hoodii*. *Cryptantha nubigena*, *Artemisia campestris*, *Eriogonum flavum*, *Physaria didymocarpa*, and *Poa cusickii* were less common. *Oxytropis lagopus* was noted to prefer locations separate from *Oxytropis viscida*, although it was frequently associated with *Oxytropis sericea*. *Oxytropis viscida* preferred mostly the middle to lower slopes at this site. (Figure 7)

Wallis *et al.* (1986) has noted that Site 6 was similar in species composition to that found at the Ross Lake Community Pasture.

Immediately south of Lake Shanks (Site 8, Map 2) (Figures 10-12)

Very similar to the Site 6 west of Lake Shanks. *Oxytropis lagopus* was found growing on the upper slopes of the plateau rim as well as on the gravelly plain on top of the plateau (to 10 m away from edge). Again the habitat was semi-barren with abundant *Phlox alyssifolia* and *Artemisia campestris*.

Southeast of Lake Shanks, Road from Del Bonita to Twin Rivers (Site 9, Map 2)

This site was the best found for *Oxytropis lagopus*. The species was common here and was found growing not only on the typical gravelly plateau rims and upper slopes (Figure 11) but extended right to the edges of the grassy middle slopes. (Figure 12) *Oxytropis lagopus* grew right to the edge of the *Oxytropis viscida* areas at this site. Otherwise, the site was very similar to sites 8 and 6, immediately south and west of Lake Shanks.

Overlooking North Milk River, Ranch Road West of Lake Shanks (Site 7, Map 2)

This site was rather different than those described above. *Oxytropis lagopus* was found growing in association with grasses, mostly *Festuca idahoensis* as well as *Thermopsis rhombifolia*. Neither species was found associated with *Oxytropis lagopus* at its other locations. Other species found at the site were as follows: *Oxytropis sericea, Artemisia frigida, Plantago canescens,* and *Antennaria microphylla* Rydb. No *Oxytropis viscida* was found at this site. The grass was taller and less grazed than at other sites. The area was fenced and there was no indication of active grazing.

Wallis et al. (1986) noted that Site 7 was similar in species composition to that found at the Ross Lake Community Pasture. The author did not find this to be the case. Perhaps slightly different populations were examined.

1.5 miles southwest of Cardston (Site 1, Map 2)

This location was checked for *Oxytropis lagopus*. No specimens were found but the following species composition indicated that perhaps, at one time, this site was capable of supporting the species: *Poa cusickii, Oxytropis sericea, Phlox hoodii, Astragalus crassicarpus, Heuchera flabellifolia, Arabis holboellii* Hornem., var. *retrofracta* (Graham) Rydb., *Viola adunca* J.E. Smith, *Besseya cinerea* (Raf.) Pennell, *Viola vallicola* A. Nels., and *Balsamorhiza sagittata* (Pursh) Nutt. Many of the species are indicative of previously described *Oxytropis lagopus* sites. Neither *Phlox alyssifolia* or *Oxytropis viscida*, both indicator species, were found at this site. Whether the site was introduced as suggested by Wallis et al. (1986) or eradicated by a still operational gravel extraction operation is unknown.

The lower elevation site in the Ross Lake Community Pasture (**Site 4, Map 2**), east of the Ross Lake Community Pasture, Site 3, was apparently different in species composition and occurred on a gravelly dry grassland just east of a coulee north of the North Milk River. *Oxytropis lagopus* was noted to be rare at this site. (Wallis et al. 1986)

6.0 Population Biology and Ecology

Ross Lake Community Pasture (Site 3, Map 2)

It was found that *Oxytropis lagopus* becomes uncommon away from a 10 m wide area centred on the plateau rim (Figures 8, 10). Below and above this strip, the grassland is lush and apparently too dense to support the species (Figure

12). Hare-footed Locoweed is less common on southwest-facing rims where the exposure is drier and grazing is heavier. The species exhibits a semi-continuous distribution in 10 m wide area which occupies several hundred metres of the valley rim. This is the typical distribution pattern noted for the species. Plants are generally three to four decimetres apart, in some cases in small mats. On the best sites there were 13 clumps/m^2 with the larger size clumps being 0.5 dm by 0.5 dm. The population was estimated to contain 500 to 1000 plants (Wallis et al. 1986).

Population data collected by Smith (1993) for the Ross Lake Community Pasture site indicated a fairly stable population although the population was estimated to contain 250 to 300 plants. Stems were sometimes single but mostly occurred in small clumps of 4 to 8 stems, 1 dm^2 (larger clumps).

Ross Lake Community Pasture, second site (Site 4, Map 2)

Wallis (1986) reported the species as rare in a lower elevation (1250 m) site just east of the site described above. He found the plants growing on a gravelly dry grassland just east of a coulee north of the North Milk River.

Sommerfeldt Ranch (Site 2, Map 2)

Hare-footed Locoweed was found at this site in 1986, 1987 and 1991 by Sommerfeldt (pers. comm.) (Figure 2). The species was never very common but was scattered here and there on the steep plateau rim. Plants are mostly found as single stems or as small patches. No specimens were found in 1993 (Smith).

West of Lake Shanks, South of Highway #62 Crossing of North Milk River (Site 6, Map 2)

The population on the steep ridge site was estimated to contain in excess of 1000 plants (probably in the low thousands) on the northern range of ridges west of Lake Shanks (Figure 8). Clumps ranged in size up to 1 dm x 1 dm and sometimes contained up to 10 plants in a group. Clumps contained up to 15 to 20 stems/clump with an average of 6 stems/clump. Single stems were infrequent but noted to occur in a sparse distribution. Although the species could be found commonly in some spots it was not distributed evenly over the ridge system (Map 3). There were many areas along the ridge where the species was not found at all. The southern range of ridges was not checked but is also good potential habitat for the species (Figure 9, Map 3). The population for the two ridges west of Lake Shanks is estimated in the low to mid-thousands. A more intensive survey of this exceptional site is required to fully document the population distribution along these ridge systems. (Smith 1993)

Wallis et al. (1986) recorded the species as common in this general area along west- and northwest-facing gravelly rims of an unglaciated plateau.

Immediately South of Lake Shanks (Site 8, Map 2)

Hare-footed Locoweed was common on the upper slopes and just below the

plateau rim of the steep ridge system (Figure 10). The species was restricted mainly to the northwest-facing slopes of the ridge but infrequently occurred just over the top of the plateau rim (Figure 11). Nearly 1000 plants were counted. Again the distribution was not continuous but was localized with approximately 20 to 600 plants occurring in stations along the upper slopes (Map 3). Additional suitable habitat was noted to exist further west and east of the area surveyed (Map 3). This ridge system south of Lake Shanks was estimated to contain a population in the low thousands of plants. (Smith 1993)

Southeast of Lake Shanks, Road from Del Bonita to Twin Rivers (Site 9, Map 2)

This site was the best site surveyed by Smith (1993). The site consists of a series of low hills, again sharply rising from the surrounding area. The first hill contained some 500 plants as did the second hill. This set of low hills is estimated to contain in the low thousands of plants if fully surveyed. In places *Oxytropis lagopus* practically carpets the upper slopes of the lower hills. There is also a larger hill to the southeast which appears to be good habitat as well. This hill is estimated to contain in the mid-thousands of plants. This area contains, by far, the highest concentration of plants found in Alberta and is designated as the primary site for protection in order to assure the species survival in Canada. (Map 4) It would not be surprising to the author if this hill series was found to contain in excess of 10,000 plants. (Smith 1993)

Overlooking North Milk River, Ranch Road West of Lake Shanks (Site 7, Map 2)

Plants were found scattered amongst taller grasses at this site but the clumps were still .5-1dm x 1 dm in size and contained 10+ stems/clump. Often the plants were found in patches of 10-20 clumps. The population is fairly widespread and contains approximately 300-400 plants. (Smith 1993) Wallis (1986) reported scattered plants at this location along an east-facing gravelly rim of an unglaciated plateau.

Oxytropis lagopus exhibits a noticeable pattern of population distribution with its core concentrated in the area southeast of Lake Shanks (Site 9) and immediately south (Site 8) and west (Site 6) of Lake Shanks in southwestern Alberta (Map 2). The population of the species noticeably decreases from the low to mid-thousands in the Lake Shanks area to the low to mid-hundreds along the ridge marking its most westerly and northern distribution limits, Whiskey Gap to Ross Lake (Sites 2 to 5, Map 2).

There is no population data provided for two collections (1983, 1985) made near Ross Lake (Site 5, Map 2). As a result of bad weather which made the road through the pasture impassable the author was unable to visit these sites in 1993.

Other areas within the range of the species were checked but no specimens of Hare-footed Locoweed were found (Map 3). (Smith 1993) Other areas along the St. Mary River and Lee Creek were examined by Wallis in 1986 but no specimens were found in either of these locations.

6.1 Reproductive Ecology

Little data is available on the reproductive ecology of Hare-footed Locoweed.

At the Ross Lake Community Pasture site (Site 3, Map 2) most plants were either in flower or with well-developed pods -- most were in the pod stage as of the collection date, May 28-29, 1986. (Wallis *et al.* 1986) On May 22, 1993 it was recorded that 85% of the plants were in fruit with withered flowers. (Smith 1993)

Oxytropis lagopus was found in flower on the last weekend of May in 1986, 1987 and 1991 by Sommerfeldt (a participant in the spring flowering survey) on their ranch at Whiskey Gap (Site 2, Map 2). The species was probably there every year but just not in flower on this particular weekend according to Sommerfeldt (pers. comm.). She stated the best time for flowering for the species is towards the end of April to the first weekend in May. The species had probably already gone to fruit and was more difficult to spot as it does not occur with any frequency at this site. It was not found in flower in 1993 (Smith) on May 22.

About 50% of the plants had set fruit at the site west of Lake Shanks (Site 7, Map 2) by May 22, 1993 (Smith).

The species was found to be still in full flower, just starting to go to fruit, at the site immediately west of Lake Shanks (May 22, 1993) (Site 6, Map 2). This is apparently a good reproductive site with the onset of fruiting proceeding quite successfully. Plants at the site immediately south of Lake Shanks were still in full bloom on May 22, 1993. Hardly any were in fruit. The site between Del Bonita and Twin Rivers was also in full bloom with fruit set hardly started on this date. (Site 8, Map 2). These populations all are apparently good reproductive sites.

6.2 Population Ecology

No information was found on *Oxytropis lagopus* population ecology.

7. Land Ownership and Management Responsibility

The Whiskey Gap site is on crown land under grazing lease to the Sommerfeldt Ranch. The Ross Lake sites are on crown land presently under lease as community pasture. The other sites are on crown land under various grazing leases. Site 7 (Map 2) is situated west of an access road to a ranch, overlooking that ranch.

8. Management Practices and Experience

There is very little protection for areas of Foothills Grassland which is found almost entirely in Alberta. The area of Foothills Grassland protected within

Waterton National Park is very small. Another area with significant habitats and species is Police Outpost Provincial Park. Elkwater and Cypress Hills Provincial Parks provide a degree of protection for the more easterly fescue grassland. The range of Hare-footed Locoweed does not extend to any of these parks or to Waterton National Park. Their are no protected areas within the range of *Oxytropis lagopus* within Alberta. The potential Ross Lake Candidate Ecological Reserve has been studied by Alberta Recreation and Parks (1989) but has not been established to date. Should this reserve become established several of the most westerly and northern populations of Hare-footed Locoweed would be protected. (Wallis 1987, Alberta Recreation and Parks 1989) The most critical sites in the vicinity of Lake Shanks would not be protected by this reserve.

Future uncertainty regarding possible contruction of dams, changes in grazing patterns, clearing for cultivation or resource development pose problems regarding the survival of the species within its limited Alberta range. Loss of primary habitat as well as destruction of specific habitats is a serious concern regarding survival of endangered species. (Wallis 1987)

8.1 Habitat Management

The grasslands natural region in Alberta is considered to be among the most threatened of Alberta's natural regions. They are being lost or converted at an extemely rapid rate. (Wallis 1987) Alberta Recreation and Parks (1989) has noted that the Foothills Grassland is rated as a high priority for preservation due to the high proportion of natural vegetation in the region which has been altered by agriculture and grazing activities. Alberta is not alone in the problem of loss of habitat. Similar problems exist across the prairies.

8.2 Cultivation

Everett (1981) notes that species of *Oxytropis* are best adapted to cultivation in sunny rock gardens. They need deep, very well-drained soil. They do not transplant well so young plants should be raised in pots and then planted permanently with a spacing of 9" to 1' or seeds sown directly where plants are to grow. *Oxytropis* are not well known to gardeners and are difficult to almost impossible to cultivate.

8.3 Current Management Policies

The North Milk River sites are currently managed under grazing leases. The Whiskey Gap site is managed by the Sommerfeldt Ranch of southwestern Alberta. Access is limited to the area. Permission to go on the land must be obtained from the ranchers. (Smith 1993) Sommerfeldt has informed the author that they have no intention of harming the sites; rather, they have a continuing interest in the local flora. The other sites are also operated under grazing leaseholds.

9. Evidence of Threats to Survival

The Grasslands Natural Region is one of the most threatened natural regions in Alberta. Fescue Grassland has been reduced to 27% of its original area owing to cultivation (PCAP 1989-1994). Critical habitat is defined by Wallis (1987) as "most crucial to the survival of population, species, races or form. When these critical habitats are disturbed there will be major effects on the plants and animals that depend upon them." Over half of the birds and mammals now listed by COSEWIC are found in the three prairie provinces as a result of habitat loss in Western Canada. (Hummell 1987) The government of Alberta has priorized the threatened grassland region for representation and protection in the form of ecological reserves but overall representation of ecological reserves in this region of Alberta is very poor to date.

9.1 Gravel Removal

Because of the abundance of gravel on the preferred Hare-footed Locoweed sites, gravel operations are the single most important threat to the future security of the species in Alberta. Although specimens had been collected from the site 1.5 miles southwest of Cardston in both 1966 and 1967, inn 1986 and again in 1993 when the site was examined no specimens were found. It is possible that the record from Cardston represents a chance introduction in a disturbed gravel pit. Other areas along the St. Mary River and Lee Creek were examined but no plants were found. (Wallis *et al.* 1986) No plants were found at that site in 1993. It is very possible that the site 3.2 km southwest of Cardston (Site 1, Map 2) has been destroyed by the extensive and active gravel pit now operating at that site. Other species found at this site have been associated with Hare-footed Locoweed; namely, *Poa cusickii*, *Oxytropis sericea*, *Phlox hoodii*, and *Astragalus crassicarpus*. It could be, though, that the site does not have sufficient elevation gain as indicated by other discoveries of the species to have been established entirely by natural processes. Whether introduced or eradicated the site does appear to have been eliminated by continued gravel operations. (Smith 1993)

Gravel operations have already removed a significant amount of habitat at the Ross Lake Community Pasture site (Site 3, Map 2) (Wallis *et al.* 1986). Upon recognition of the discovery of *Oxytropis lagopus* at this site in 1986, removal of gravel has been halted and the operation abandoned. (Sommerfeldt, pers. comm. 1993) A fresh gravel pile was noted at the site in 1993 but their were no signs of extraction (Figure 3) (Smith 1993).

Gravel operations were not observed at any of the other Hare-footed Locoweed sites (Smith 1993).

9.2 Grazing

Grazing does not seem to be sufficiently heavy to eliminate Hare-footed Locoweed at the Ross Lake Community Pasture site (Site 3, Map 2) but Hare-footed Locoweed disappears on north-facing rims and becomes less common on southwest-facing rims where exposure is drier and grazing is heavier. (Wallis *et al.* 1986) Active grazing of cattle, deer and antelope have been associated with almost all of the known sites for Hare-footed Locoweed in southern

Alberta. At many of these sites the species continues to thrive, particularly the Lake Shanks and more southern sites (Sites 6, 8, 9, Map 2), despite the effects of grazing, often rather heavily. The Sommerfeldt Ranch (Site 2, Map 2) is grazed by cattle in winter and by wildlife in all seasons. The species was never common on the ranch sites according to Sommerfeldt but occurs in scattered small patches (first collected 1986, again noted in 1987, 1991 by Sommerfeldt). No change in distribution or population has been noted over this period. (Smith 1993, Sommerfeldt per. comm. 1993)

Perhaps the high elevations and gravelly sites which the species perfers acts as a deterrent. Also, perhaps the cattle do not graze this species as it is an inducer of locoism. It would seem that ranchers would have acted to eradicate the species if it were noted that cattle grazing the species suffered ill effects. The continued grazing probably indicates only winter range use or a tendency of livestock to avoid the species. In any case, grazing does not appear to have substantially adversely affected the survival of the species. Plants are thriving and readily setting seed.

On the other hand, there was no indication that *Oxytropis lagopus* found growing at site 7, west of Lake Shanks (Map 2) were subjected to grazing. The area was fenced and the *Oxytropis lagopus* was found growing amongst *Festuca idahoensis* and other taller grasses. This is not typical of the other sites where *Oxytropis lagopus* was usually found only on the upper plateau rims away from the denser grassy areas. Perhaps the absence of grazing allows the species to survive in more marginal or atypical habitat. If this is the case then grazing might cause the species to become more restricted to the less accessible upper ridge slopes and semi-barren plateau rims. Also, at site 9 (southeast of Lake Shanks, Map 2), where grazing was noted to be less intensive than at sites 6 and 8 near Lake Shanks, *Oxytropis lagopus* was found to be able to survive on mid-slopes right to the edge of the grassier areas. Perhaps grazing does influence population distribution even if it is not apparently a serious threat to the survival of the species at present levels and patterns. More thorough studies of the effects of grazing on Hare-footed Locoweed would be advantageous. (Smith 1993)

9.3 Cultivation

Only 27% of the original fescue grassland remains. Areas of extensive cultivation surround the Alberta habitat for the species (Figure 4). Cultivation of natural habitats has eliminated many sites but the steepness of most remaining areas makes further cultivation difficult. (Wallis *et al.* 1986)

In summary, *Oxytropis lagopus* does not appear to be substantially threatened at any of its known locations. Should management practices change leading to adverse effects on the species, i.e. resumption of gravel extraction, switch in grazing pattern or intensity, or resource extraction, then the security of the species would have to be reevaluated.

10. Present Legal or Other Formal Status

Argus and Pryer (1990) note that *Oxytropis lagopus* var. *conjugans* is endemic and list the following rank designations: Nature Conservancy Rank: G4T2; Canada Rank: N1T1; Alberta S1; U.S. Rank: Montana S2; Canadian Priority: 2. No specific legal status is accorded *Oxytropis lagopus* var. *conjugans* in any part of Canada. Alberta has no legislation which covers plant or endangered species.

In Canada, Hare-footed Locoweed naturally occurs only in southwestern Alberta along the North Milk River. As a result of this limited distribution the species is considered rare from a national perspective. Argus and White (1978) and Packer and Bradley (1984) identified Hare-footed Locoweed as rare in Alberta. Hare-footed Locoweed is also designated as rare in Montana (Argus and Pryer 1990). This species appears to be rare throughout its limited range (Alberta, Montana, Idaho and Wyoming). (Wallis et al. 1987)

All the lists of rare species for the prairie provinces are relatively long. The most recent Alberta list (Packer and Bradley 1984) contains 360 species, representing 24% of the native flora.

Kershaw (1987) acknowledges three major groups of distribution patterns of rare species in the prairie provinces. Over 80% of the "rare" species in the prairie provinces appear to belong to a group composed of species extending into the provinces from nearby (non-disjunct) widespread populations. Such populations add considerably to the species diversity of the provinces, probably accounting for more than 20% of the total floras. A second group is composed of species extending into the province as small disjunct populations and is composed of less than 10% of the number of total rare species in the prairie provinces. A third group, composed of endemic species, is limited to a local area and is restricted geographically. *Oxytropis lagopus* is an endemic species restricted to Alberta and three adjoining American states. (Kershaw 1987)

The entire Milk River area is a very unique region. It is a major area of peripherality. Numerous species of plants and animals whose range barely extends into Alberta are found here. Some 400 species of native plants occur in the Milk River Canyon area. The only exposures of igneous rock found in western Canada occur along the Milk River. There are massive sandstone outcrops along the Milk River. (Anderson 1986)

II. Assessment of Status

11. General Assessment

The following criteria have been used to assess the status of *Oxytropis lagopus* Nutt. var. *conjugans* Barneby in Canada:

taxonomy (*Oxytropis lagopus* is one of 9 species of Locoweed in Alberta and one of 14 species in Canada. It is a showy and distinctive species as a result of its silvery pilose herbage and pink/purple flowers.)

abundance (Hare-footed Locoweed is common within its restricted range in Alberta.)

distribution (restricted in Canada to southwestern Alberta along the North Milk River, from 8 closely distributed locations, in the Whiskey Gap-Del Bonita area near the American border. Endemic to Alberta, Montana, Idaho and Wyoming. Noted to be a rare species in Montana.)

habitat distribution (restricted throughout its range in Canada, Alberta: United States, Montana, Idaho, Wyoming.)

habitat stability (apparently stable at this time, gravel removal is the primary threat to continued viability.)

population trend (8 locations in Alberta, 10 to 20 thousand specimens within a restricted range, too early to recognize trends.)

reproductive potential (initial observation indicates a stable population, actively reproducing, more study required.)

international standing (unique in North America to Canada (Alberta) and the United States, not internationally)

protective status (low, no formal designation, concern about future landowners, management of grazing leases, and potential development on sites)

All preceding criteria are items of concern in assessing the status of this species. In Canada, *Oxytropis lagopus* var. *conjugans* is known only from a few sites. Continuity of populations may be affected by many factors including changes in land use, increase in habitat destruction and grazing patterns in the remaining known and potential habitats. The lack of formal protection for potential sites with a viable management plan is a critical problem for the species' survival in Canada.

12. Status Recommendation

Hare-footed Locoweed (*Oxytropis lagopus* Nutt. var. *conjugans* Barneby) is proposed for listing as a vulnerable species in Canada as a result of its

substantial population base and relative freedom from threats to its continued success within its restricted distribution in southwestern Alberta. Should gravel operations be increased to any scale within the species range the status recommendation should be reevaluated. This species is an endemic with limited distribution within the United States (3 adjoining states) and is considered rare in at least one of these states (Montana). Therefore, any threat to its Alberta population base would have to be taken as a serious threat to the species' continued survival.

13. Recommended Critical Habitat

The series of low hills south of Lake Shanks just north of the American border (primary site), the high ridge system to the immediate west of Lake Shanks, and the high ridge immediately south of Lake Shanks (secondary and tertiary sites) form the centre core of the population distribution within Alberta. These areas should be designated as critical habitat. The population of the species has a pattern of decreasing towards its northern range limit at Ross Lake and its western range limit at Whiskey Gap from this central area of population concentration. Naturally, given the extremely limited distribution of the species in Alberta all of its sites are important and should be protected but this area, representing 5 collection sites, is by far the most well represented and, if managed properly, should ensure the survival of the species in Canada. (Map 4)

14. Conservation Recommendations

Detailed monitoring plans should be prepared for *Oxytropis lagopus* as a means of ensuring that habitat loss does not esculate to a point where status designation should be reconsidered. There must be a clear recognition of the value of foothills grassland for rare plants and animals. Changes in land use and development should be considered as necessary in order to assure continuation of populations of Hare-footed Locoweed in Canada.

Management of the native habitats should be undertaken to enhance or maintain both species richness and key individual species. Endangered species such as Hare-footed Locoweed should have priority. The management plant should place restrictions on further development of roads, oil and gas pipelines, and cultivation in the North Milk River area. Further developments of these types, especially gravel extraction, could have serious consequences for this species. It is recommended that gravel operations be sited in areas away from the plateau rims where there is the greatest concentration of rare species. Abundant gravel is found on lower terraces which do not seem to support the diversity of rare species. Future developments such as dugouts, dams, and fencing should be reviewed during the planning stage to avoid impacts on significant resources. A designated vehicle route plan should be formulated for all users of the areas. Plans to limit off-trail vehicle activity should be drawn up and implemented. (Wershler and Wallis 1986)

Introduction of non-native species such as crested wheat grass should be closely monitored and recovery plans devised as necessary.

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16. Collections Consulted

The following botanical collections have been consulted:

National Museum of Canada, Ottawa, ON
Department of Agriculture, Ottawa, ON
University of Calgary, Calgary, AB
Northern Forestry Centre, Edmonton, AB
Provincial Museum of Alberta, Edmonton, AB
University of Lethbridge, Lethbridge, AB

17. Fieldwork

During the summer of 1993, the author visited the known sites and general area between Whiskey Gap and Lake Shanks, the U.S. border and Ross Lake in an attempt to verify known locations as well as to search for additional locations. Most known locations, with the exception of the Cardston site, were verified. Site 5 (Map 2) near Ross Lake which was not visited due to bad weather which made the access impassable. As well, several additional sites were located, notably sites south and west of Lake Shanks as well as the furthest south location for the species, southeast of Del Bonita near the U.S. border (Site 9, Map 2). Population counts were undertaken for all sites visited. As well, various areas within the range of the species were examined for suitable species habitat (Map 3).

Prior to this survey, in 1986, Clifford Wallis conducted field research on the species in the same area. Four locations were discovered, including two sites west of Lake Shanks and two sites in the Ross Lake Community Pasture. At this time the Cardston site was checked but no specimens were found. Also, other areas along the St. Mary River and Lee Creek were examined and no plants were found.

The Ross Lake site (Site 5, Map 2) which is the furthest north location for the species was visited by Lorna Allen *et al.* of the Provincial Museum of Alberta in 1983 and 1985.

Also, in 1986, Barbara Sommerfeldt discovered the species on her ranch just north of Whiskey Gap, Alberta. She has a long standing interest in botanical fieldwork and sends her specimens to the Northern Forestry Centre Herbarium for verification and/or identification by Derek Johnson. She has participated in the spring flowering count since 1986. During these counts Sommerfeldt listed the species as being in flower during 1986, 1987 and 1991 on her ranch. Undoubtedly, Sommerfeldt says it was there every year but only in bloom for these three years during that particular weekend. (Sommerfeldt, pers. comm.)

18. Knowledgeable Individuals

1. Bonnie Smith, 4640A - 4th St. N.W., Calgary, AB T2K 1A2. Phone: (403) 230-2355.

- author of COSEWIC report on *Oxytropis lagopus* var. *conjugans*. Conducted fieldwork on Alberta sites, summer 1993.

2. Barbara Sommerfeldt, Whiskey Gap, AB Phone: (403) 653-2136.

- collected Whiskey Gap specimen, has kept field data since 1986 on the Whiskey Gap site and area.

3. Clifford Wallis, Cottonwood Consultants Ltd., 615 Deer Croft Way SE, Calgary, AB T2J 5V4. Phone: (403) 271-1408.

- collected specimens from four locations (two from the Ross Lake Community Pasture and two west of Lake Shanks) during 1986 field season.

3. Lorna Allen, Provincial Museum of Alberta, Edmonton, AB Phone: (403) 427-5209.

- collected Ross Lake specimens in 1983, 1985.

19. Summary of Materials on File

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IV. Authorship

20. Initial Authorship of Status Report

The initial author of this report was:

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21. Maintenance of Status Report

Bonnie Smith, #9, 6440 - 4th St. N.W., Calgary, AB T2K 1B8, phone (403) 288-4724), will be responsible for receiving new information and making revisions and corrections to this status report and passing information on to COSEWIC.

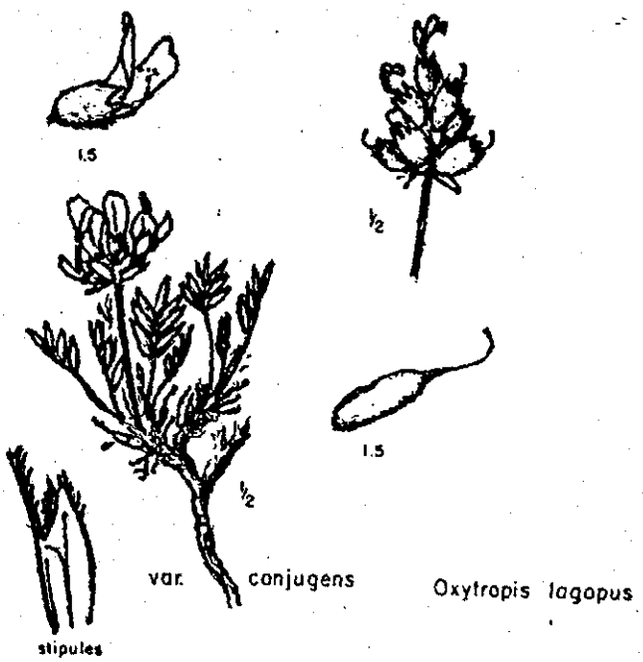


Figure 1: *Oxytropis lagopus* Nutt. (Hitchcock et al. 1964)

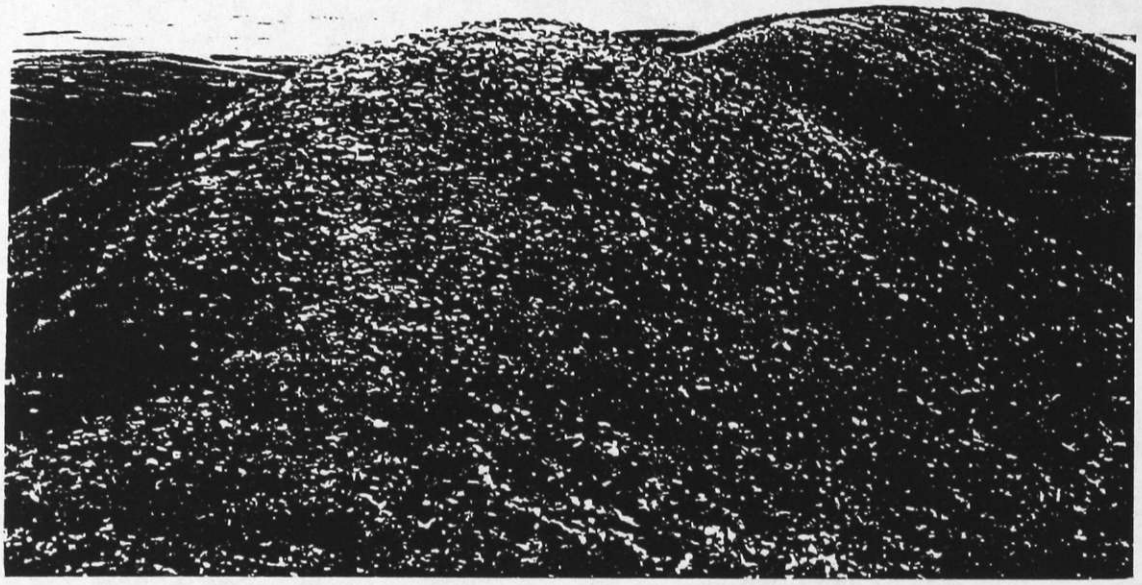


Figure 2: Site 2. Sommerfeldt Ranch, Whiskey Gap, Alberta. Oxytropis lagopus Nutt. habitat. High ridge.

Figure 3: Site 3. Oxytropis lagopus Nutt.

Figure 4: Site 3. Oxytropis lagopus Nutt. habitat, foreground. Note extensive cultivation of surrounding areas in background.

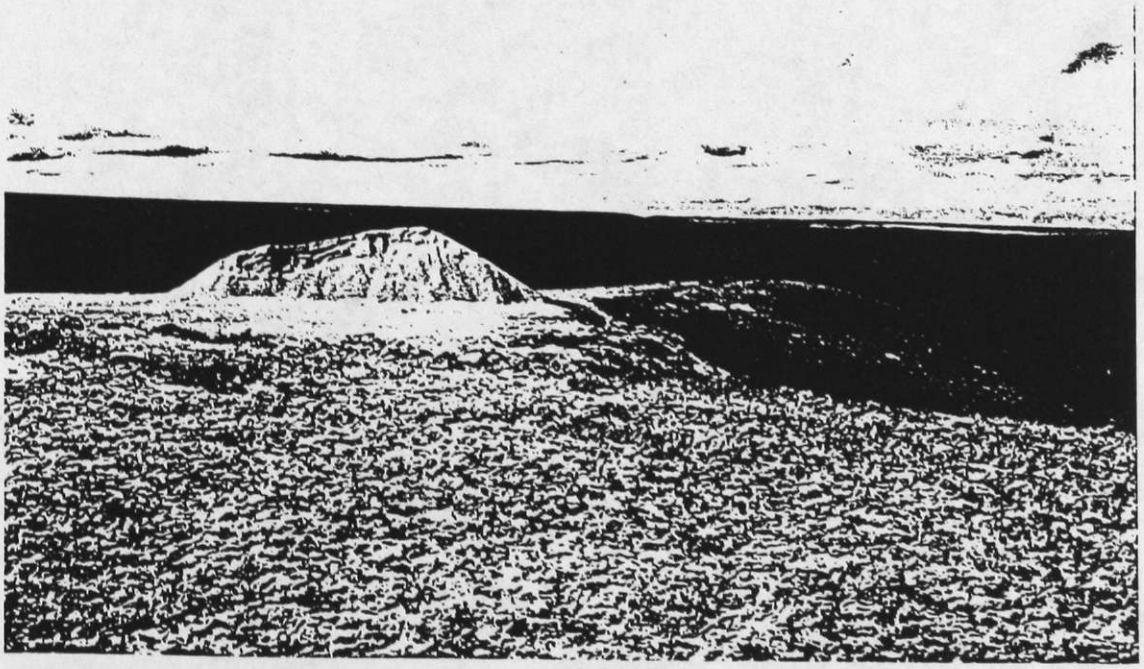


Figure 5: Site 3. Oxytropis lagopus Nutt. site disturbance, gravel pile.

Figure 6: Site 6. Oxytropis lagopus Nutt.
(Phlox alyssifolia Greene, white flowered plant in background, is also a rare species.)

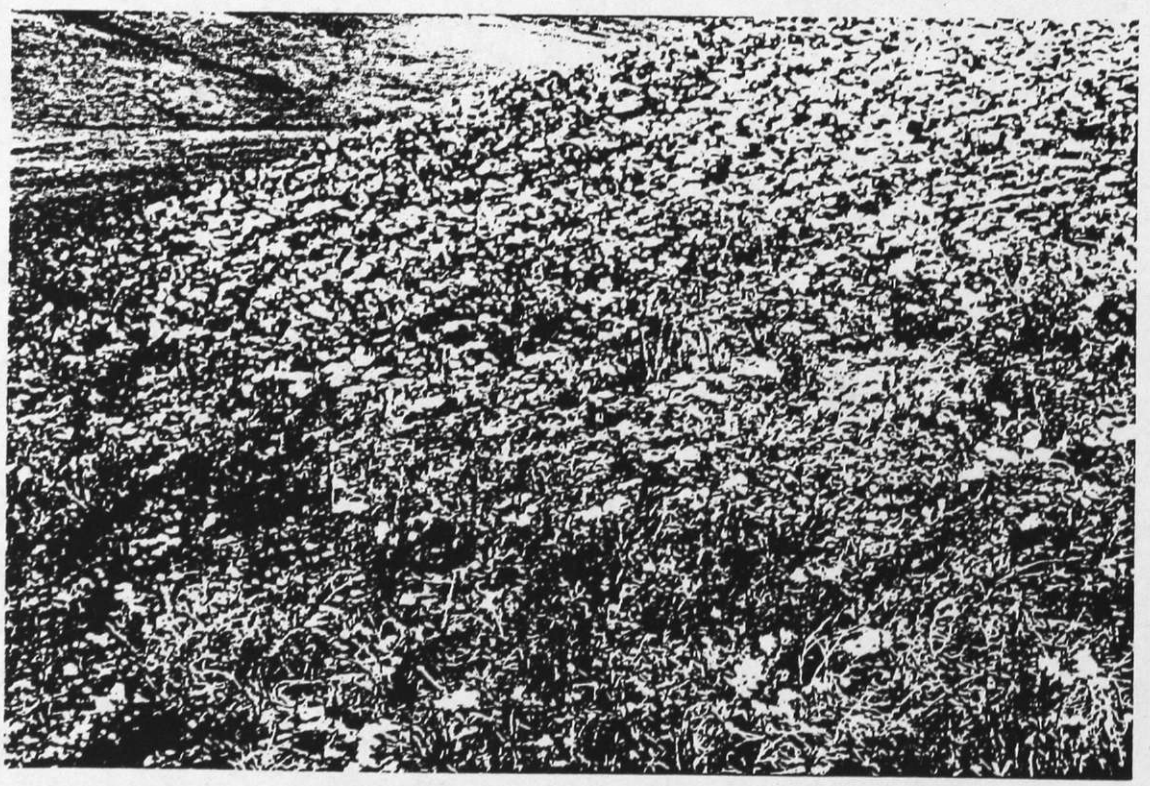


Figure 7: Site 6. Oxytropis lagopus Nutt. slope habitat.

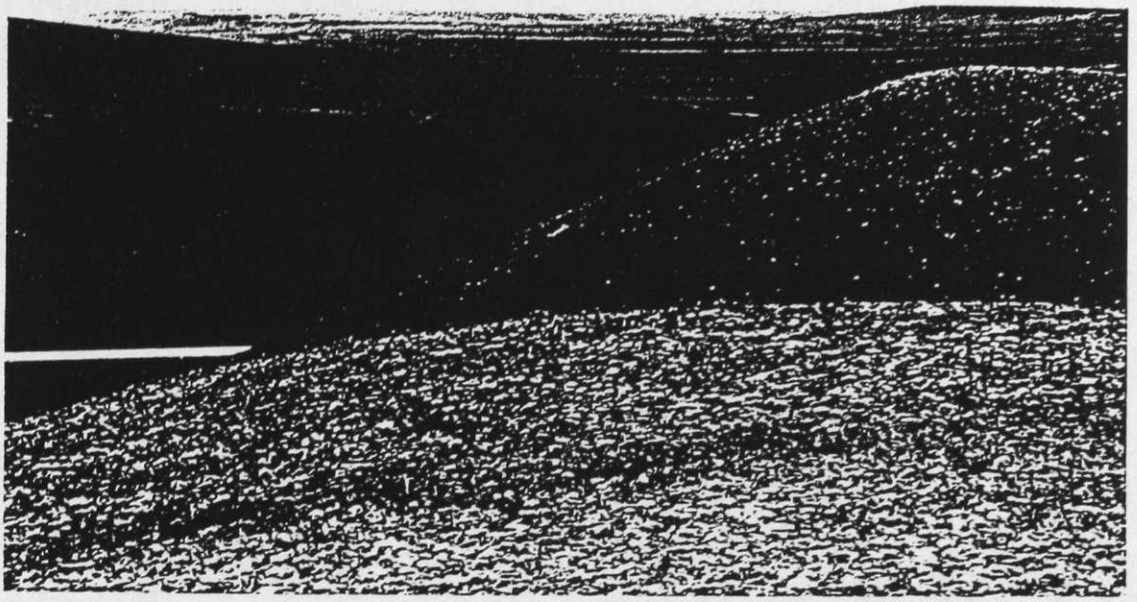


Figure 8: Site 6. Ridge systems, typical Oxytropis lagopus Nutt. habitat.

Figure 9: Site 6. Potential Oxytropis lagopus Nutt. habitat along east-running ridge. Lake Shanks in background.

Figure 10: Site 8. Oxytropis lagopus Nutt. habitat in foreground. Lake Shanks in background.

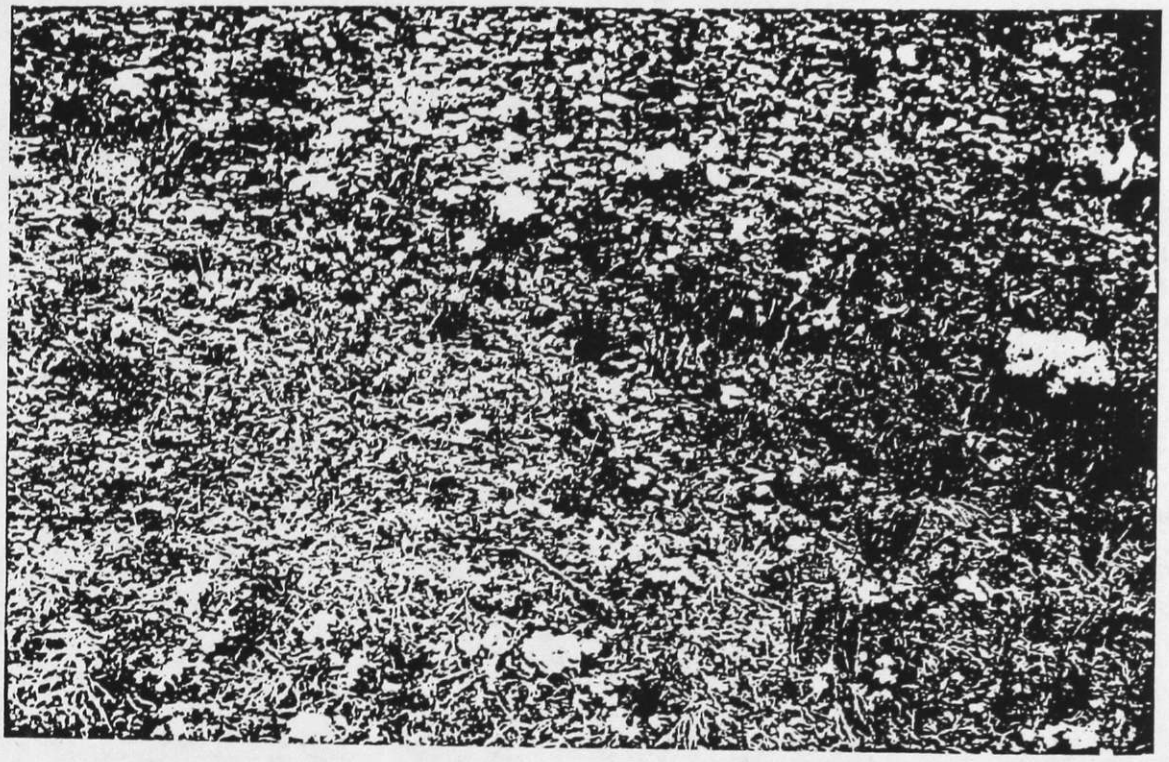
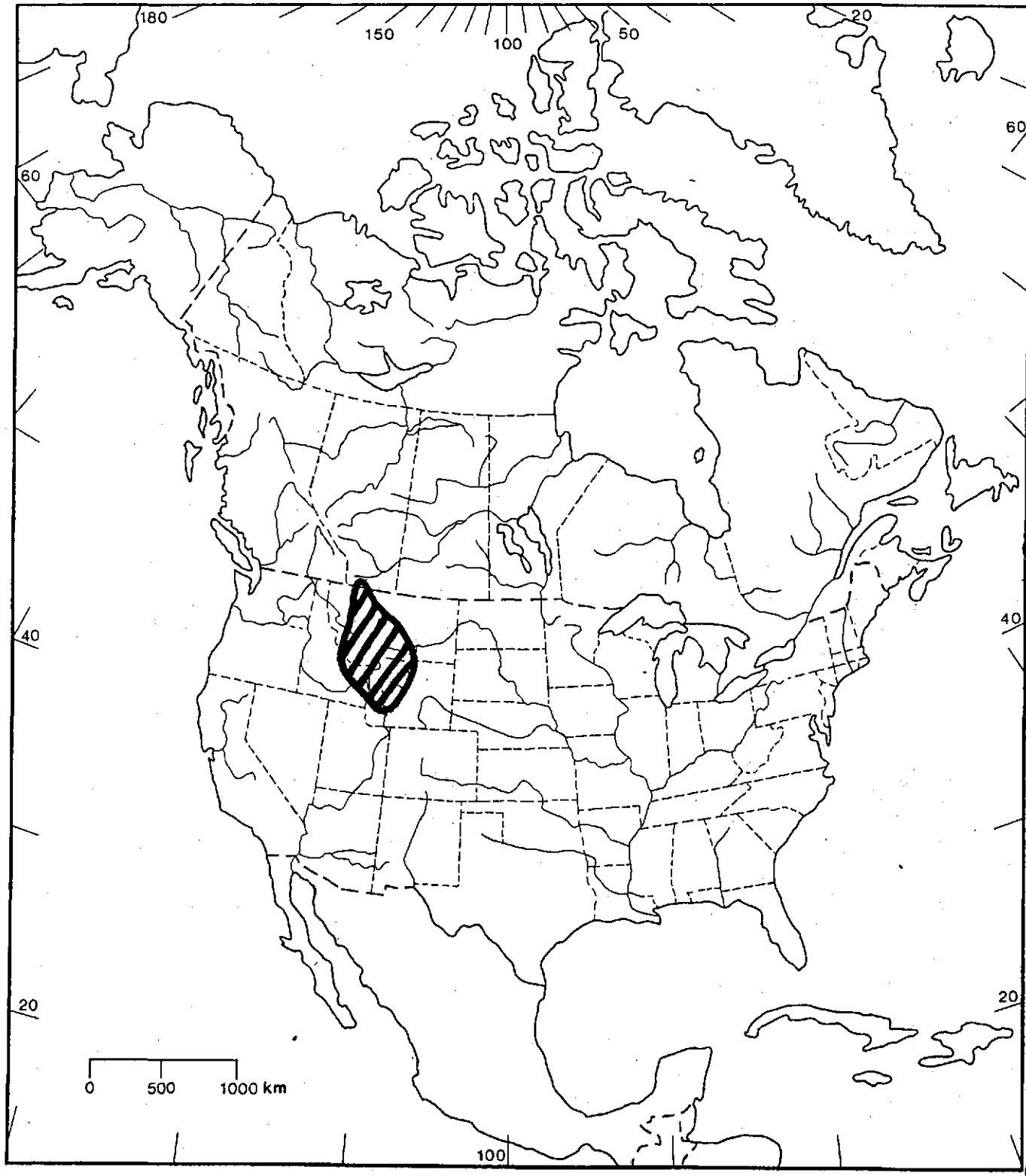


Figure 11. Site 8. Habitat at top of plateau.
Oxytropis lagopus Nutt. patches in centre.

Figure 12. Site 8. Slope habitat.
Oxytropis lagopus Nutt. patches on left at edge of grasses.



Map 1: Distribution of *Oxytropis lagopus* Nutt.

Map 2: Distribution of *Oxytropis lagopus* Nutt. in Alberta.

Site 1: 1.5 miles southwest of Carmon

Site 2: Sommerfeldt Ranch, Whiskey Gap

Site 3: Ross Lake Community Pasture

Site 4: Ross Lake Community Pasture (lower elevation site)

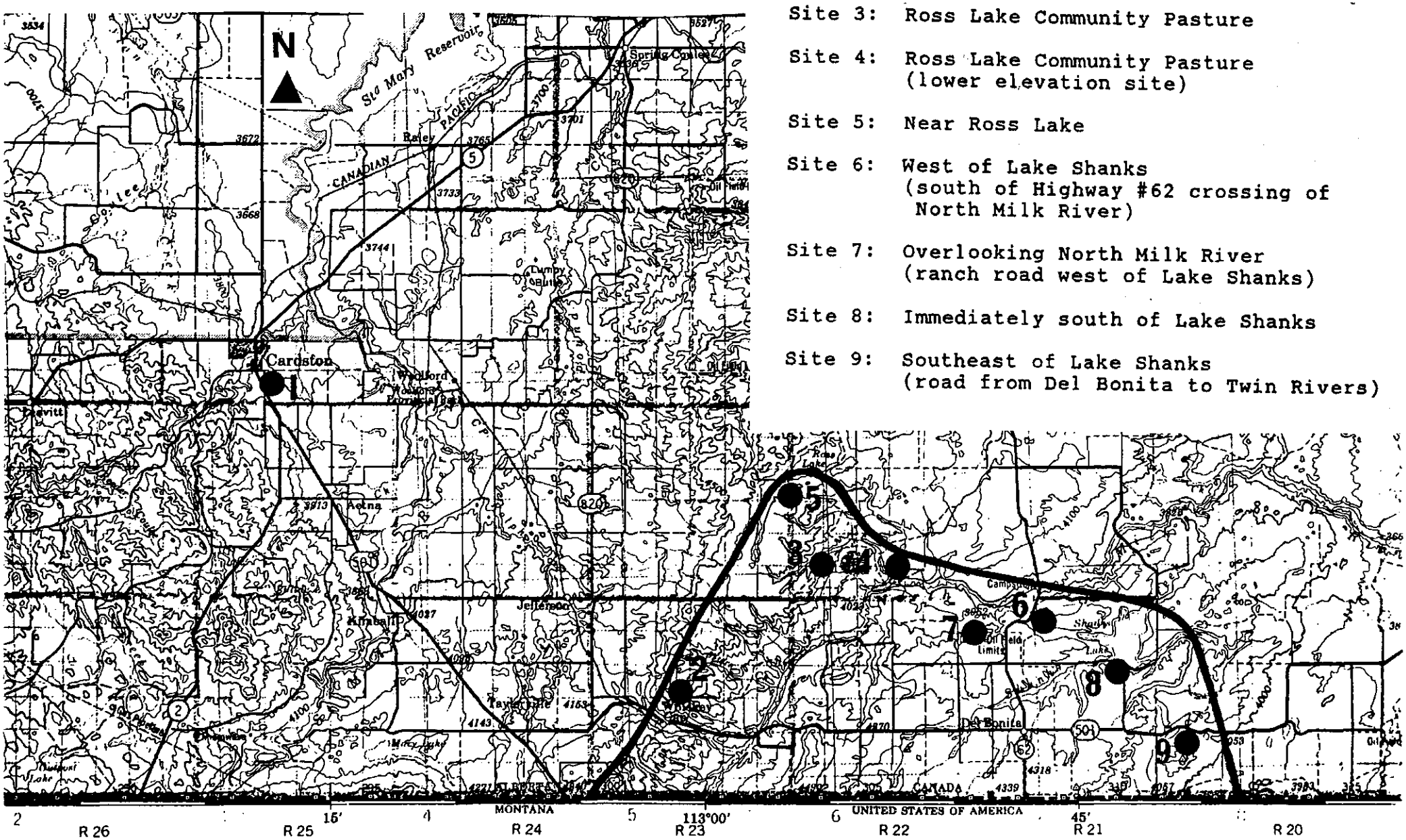
Site 5: Near Ross Lake

Site 6: West of Lake Shanks (south of Highway #62 crossing of North Milk River)

Site 7: Overlooking North Milk River (ranch road west of Lake Shanks)

Site 8: Immediately south of Lake Shanks

Site 9: Southeast of Lake Shanks (road from Del Bonita to Twin Rivers)



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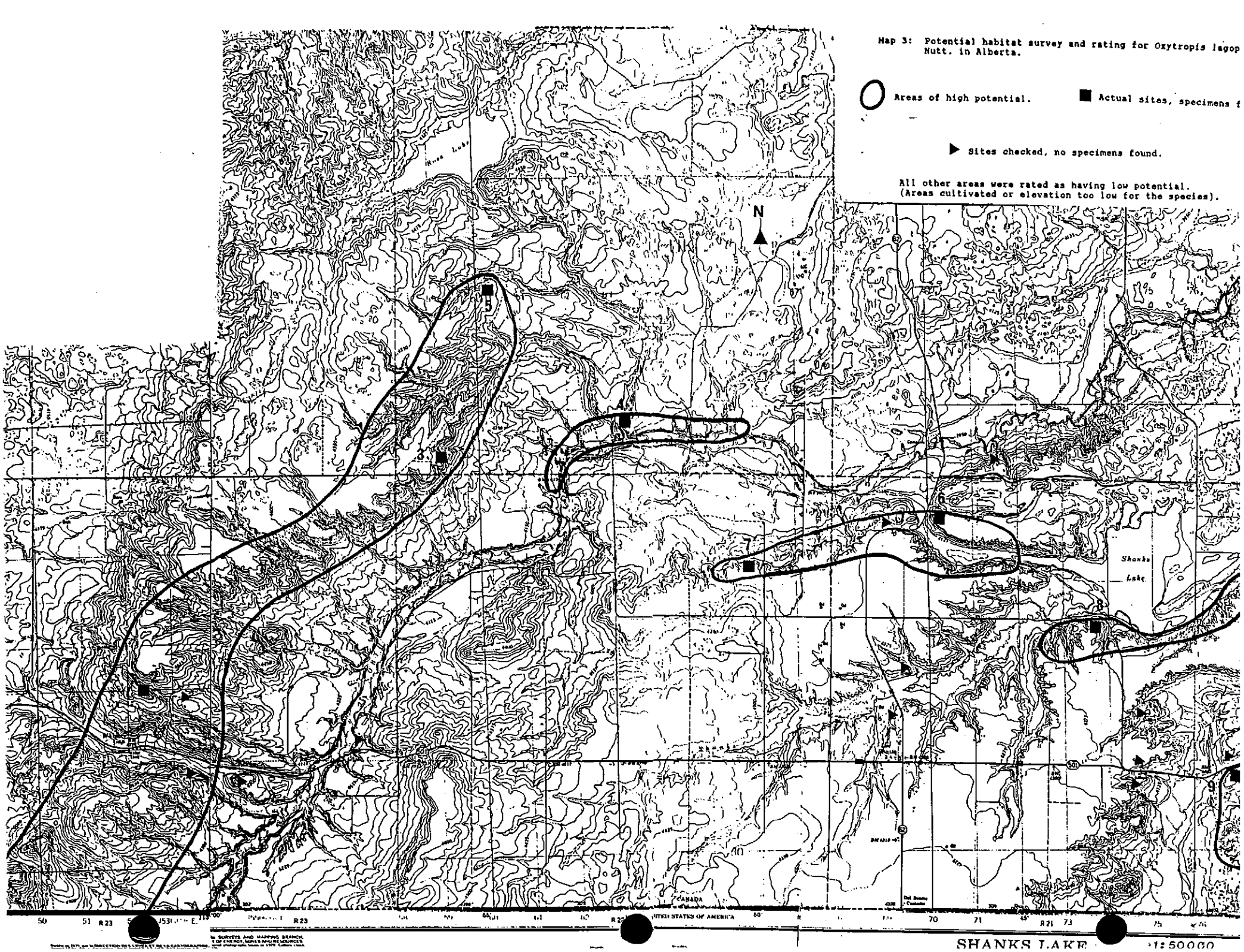
LETHBRIDGE
ALBERTA


Map 3: Potential habitat survey and rating for Oxytropis lagop
Nutt. in Alberta.
Areas of high potential.
Actual sites, specimens f
Sites checked, no specimens found.
All other areas were rated as having low potential.
(Areas cultivated or elevation too low for the species).
N
Shanks Lake
CANADA
UNITED STATES OF AMERICA
SHANKS LAKE
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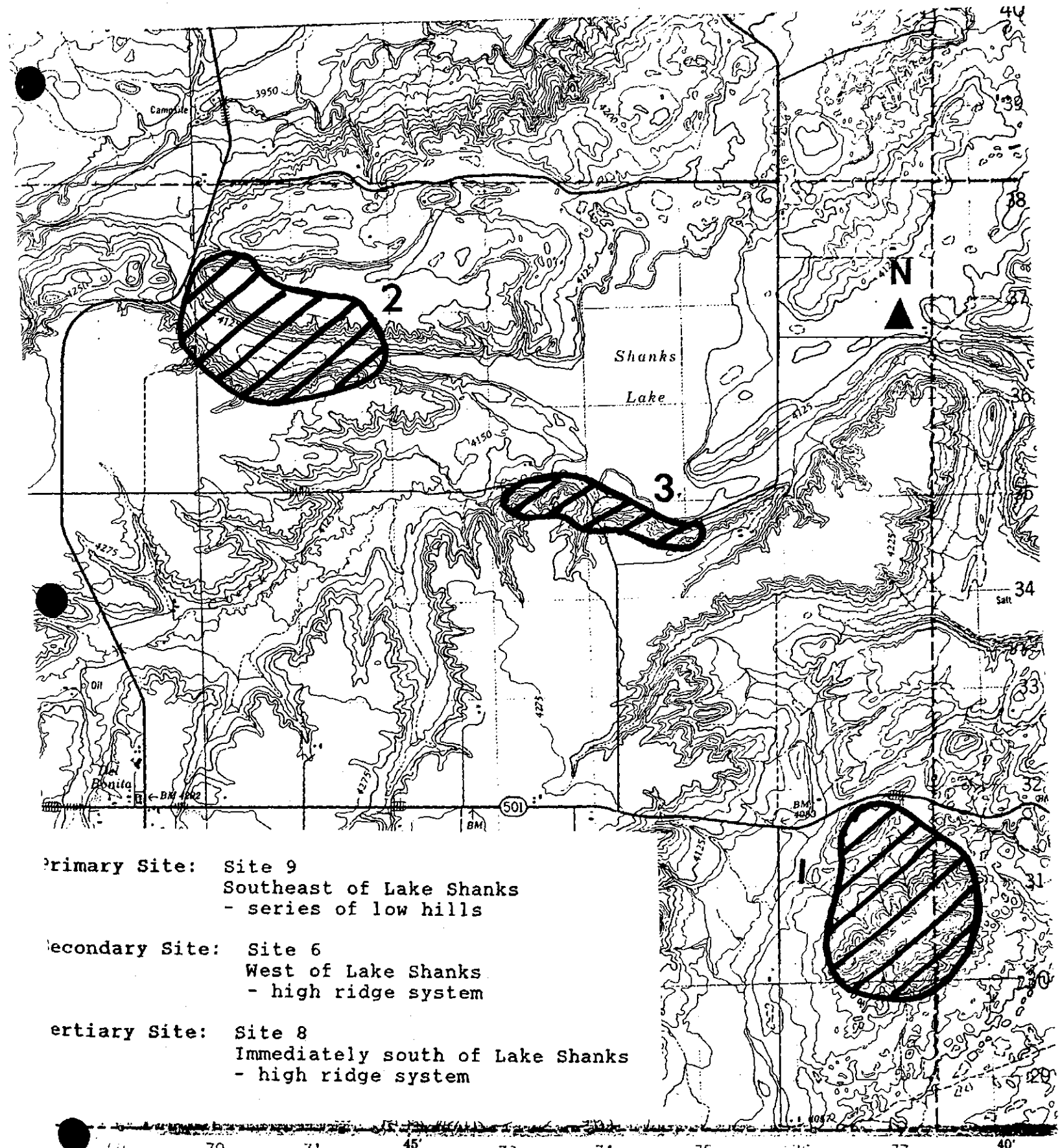
Map 4: Critical habitat of *Oxytropis lagopus* Nutt. in Alberta.



Primary Site: Site 9
Southeast of Lake Shanks
- series of low hills

Secondary Site: Site 6
West of Lake Shanks
- high ridge system

Tertiary Site: Site 8
Immediately south of Lake Shanks
- high ridge system

SHANKS LAKE

1:50000

ALBERTA

APPENDIX

The known Alberta collections include:

Site 1

1. 1 1/2 miles south of Cardston, Alberta; verified by Stanley L. Welsh; DAO.

2. 1 1/2 miles SW of Cardston, Alberta; collected on the exact site of the first collection of this species for Canada; Keith Shaw; June 5, 1966; DAO.

3. Banks of abandoned gravel pit, 2 miles SW of Cardston, Alberta; Keith Shaw (No. 340); June 6, 1967; DAO 619699; LEA s.n.

Site 2

4. On or near the Sommerfeldt Ranch, Whiskey Gap, Alberta 49°01'N 113°01'W; elevation 1280-1400 m; the major habitat is native Rough Fescue grassland which is used as winter range for cattle and is interspersed with *Carex/Juncus* meadows that is spring fed and with north running coulees; George Scotter, Lynn & Barbara Sommerfeldt; May 24, 1986; DAO; CAFB 860196.

5. Sommerfeldt Ranch, Whiskey Gap, Alberta; Barbara Sommerfeldt, May 1986, CAFB s.n. (Reported by B. Sommerfeldt to have been sent to Derek Johnson for identification and inclusion in Northern Forest Centre Herbarium.)

Site 3

8. Ross Lake Community Pasture, S 6-2-22-W4; 49°05'N 112°55'W; /Air Photo No. AS 2334 Line 1 #036; Map No. 82 H/2; elevation 1375 m; from main enrance to community pasture, proceed north along trail until junction with trail heading due east to gravel pit, follow gravel pit trail to rim of plateau; southeast-facing, gravelly, unglaciated plateau rim with numerous other low-growing plants including *Cryptantha nubigena, Hymenoxys richardsonii, Bupleurum americanum, Artemisia frigida* (dominant plant), *Poa* sp., *Phlox hoodii, Selaginella densa, Hymenoxys acaulis* on the upland portion and *Oxytropis viscida, Thermopsis rhombifolia, Oxytropis sericea, Eriogonum flavum, Musineon divaricatum* and *Phlox alyssifolia* on the downslope portion, *Oxytropis lagopus* becomes uncommon away from a 10 m wide area centred on the plateau rim; below and above this strip, the grassland in lush and apparently too dense to support it; this species disappears on north-facing rims and becomes less common on southwest-facing rims where exposure is drier and grazing is heavier; most plants either in flower or with well-developed pods; most in the pod stage; semi-continuous distribution in 10 m wide area, occupies several hundred metres of valley rim; plants are generally three to four decimetres apart, in some cases in small mats; on the best sites there were 13 clumps/m2 with the larger size clumps being 0.5 dm by 0.5 dm.; 500 to 1000 plants; gravel operations have already removed a significant amount of habitat; grazing does not seem to be sufficiently heavy to eliminate this species; C. Wallis; May 28-29, 1986; No specimen.

9. Ross Community Pasture, NE of Whiskey Gap, southern Alberta; SE 6-2-22-W4; 49°05'N 112°56'W; Bonnie Smith (No. 1035); May 22, 1993; UAC s.n.

Site 4

10. Lower elevation site (1250 m), NW 3-2-22-W4, gravelly dry grassland just east of coulee north of the N. Milk River; rare; C. Wallis; May 28-29, 1986; No specimen.

Site 5

6. N. Milk River area near Ross Lake, 2-22-W4M; Fescue Grassland; determined by L. Kershaw; L. Allen, P. McIsaac, M. Bailey; June 22, 1983; Provincial Museum of Alberta 000049, 000050.

7. Ross Lake, T22-R2-W4; dry hill top; L. Allen, S. Myers; May 23, 1985; Provincial Museum of Alberta 000048.

Site 6

4. Del Bonita, 3 miles north of the U.S.-Canada border, Highway 493; determined by B.M. Hallworth; verified by J.G. Packer 1976; Fred Fodor (No. 18); June 1, 1976; UAC 17345.

11. West- and northwest-facing gravelly rim of unglaciated plateau, five kilometres north of Del Bonita, SE 36-1-21-W4, 1287 m; common; C. Wallis; May 28-29, 1986; No specimen.

12. Just south of crossing of North Milk River, Highway 62, north of Del Bonita, southern Alberta; SE 32-1-21-W4; 49°4.5'N 112°46'W; Bonnie Smith (No. 1060); May 23, 1993; UAC s.n.

Site 7

13. East-facing gravelly rim of unglaciated plateau, 5 km nw of Del Bonita, NE 26-1-22-W4, 1287 m; scattered plants; C. Wallis; May 28-29, 1986; No specimen.

14. Overlooking North Milk River, west of access road to ranch, NW of Del Bonita, southern Alberta; NE 26-1-22-W4; 49°04'N 112°50'W; Bonnie Smith (No. 1078); May 23, 1993; UAC s.n.

Site 8

15. South side of Lake Shanks and junction of roads, NE of Del Bonita, southern Alberta; NE 22-1-21-W4, SE 27-1-21-W4; 49°3.5'N 112°44'W; Bonnie Smith (No. 1074); May 23, 1993; UAC s.n.

Site 9

16. Southeast of Lake Shanks and road to Twin Rivers from Del Bonita, southern Alberta; NW 12-1-21-W4; 49°1.5'N 112°41'W; Bonnie Smith (No. 1077); May 23, 1993; UAC s.n.