PETITION TO LIST

HOLMGREN'S MILKVETCH
***(Astragalus holmgreniorum* Barneby)**

AND

SHIVWITS MILKVETCH
***(Astragalus ampullarioides* (Welsh) Welsh)**

AS FEDERALLY ENDANGERED SPECIES

June, 1999

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Diversity

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PETITION

This is a formal petition to list Holmgren's and Shivwits milkvetches (*Astragalus holmgreniorum* and *A. ampullarioides*, respectively) as endangered pursuant to the Endangered Species Act, 16 U.S.C. 1531 et seq. (ESA). This petition is filed under U.S.C. 553(e) and 50 CFR 424.14 (1997) which grants interested parties the right to petition for issuance of a rule from the Secretary of Interior.

Petitioners request Critical Habitat be designated concurrent with the listing, pursuant to 50 CFR 424.12 and the Administrative Procedures Act (5 U.S.C. 553).

PETITIONERS

The Southwest Center for Biological Diversity is a non-profit public interest organization dedicated to protecting the diverse life forms of the American Southwest and northern Mexico. The Southern Utah Wilderness Alliance is a non-profit public interest organization dedicated to protecting the open space and wilderness values of southern Utah.

SUMMARY

Holmgren's and Shivwits milkvetches are two of the rarest plants in Utah. Although they do not occur directly together, they are both endemic to specific geologic substrates found only within a localized area of southwestern Utah and adjacent northwestern Arizona. Both species are rare by virtue of their limited distribution and low population numbers. As such, both species are extremely vulnerable to natural and human-caused threats.

The small area where they are found near St. George, Utah is rapidly being developed to accommodate one of the fastest growing counties in the United States. Both plant species are threatened primarily by urban development on state and private lands. Further urbanization is being facilitated by land exchanges with the BLM.

Concomitant with the increased human population in the area, comes basic infrastructure, power transmission lines, new highways etc. all of which are threats to one or both of these rare plant species. Increased development has also resulted in heavy recreation demands, as seen by the increase in off-road vehicle impacts, and introduced weeds. Gypsum mining and livestock grazing are also threats to some populations.

Sufficient losses of both plants and habitat to date, make it clear that present mechanisms to conserve these two species and their habitats are not effective. Listing under the ESA is therefore urgently needed before additional losses are incurred, and more populations are fragmented, diminished or otherwise destroyed.

TAXONOMY

Order: Fabales
Family: Fabaceae

Synonomy: Papilionaceae, Leguminosae

Subfamily: Papilionoideae (in Leguminosae)
Genus: *Astragalus*

Species: *holmgreniorum*
Synonomy: none

Astragalus holmgreniorum was first collected as a scientific specimen in 1941 by Melvin Ogden. Rupert Barneby and Noel and Patricia Holmgren's rediscovered the species in 1979. Barneby (1980) recognized the species as a unique taxon and named it after its co-discoverers. He also dubbed it "paradox milkvetch" in the most recent treatment (Barneby 1989) but that common name has not been used much by modern botanists.

Species: *ampullarioides*
Synonomy: *A. eremiticus* var. *ampullarioides*

Astragalus ampullarioides (Shem or Shivwits milkvetch) was first discovered by Duane Atwood in 1976 from near Shem, Utah on the Shivwits Indian Reservation. Welsh (1986) described the taxon and named it for its similarities to *A.. ampullarius* but Barneby (1989) later included it within the concept of *A. eremiticus*. In a recent treatment, Welsh (1998) reexamined specimens and their relationship to *A. eremiticus* and concluded it should be recognized at the species level, thus changing its name to the current form.

Nomenclature for the genus used herein follows Barneby (1989), as well as his previous works (e.g. 1964) and subsequent additions by Welsh (1990 and 1998).

DESCRIPTION

TECHNICAL:

Astragalus holmgreniorum was described by Barneby (1989) as follows: Dwarf, tufted, strictly acaulescent, perennial herb, except for yellowish-green upper face of leaflets, stipules and pods pilose throughout with fine, spreading, basifixed hairs; stipules imbricate on root-crown petiolar-cauline, free, the lanceolate or lance-attenuate free blades membranous becoming papery, 3-8 mm long; leaves mostly appressed to ground, 4-13 (15) cm long; leaflets (5) 9-15 (17), broadly obovate - emarginate to obcordate, up to 8 - 16 mm long; peduncles scapiform, 2 -8.5 cm long, early procumbent; racemes shortly (4) 6- to 16- flowered, the flowers widely ascending, the axis in fruit 0.4 - 3.5 cm long; fruiting pedicels persistent; calyx 10.5 - 12.5 mm long, white pilose, the cylindric tube 8-9.5 mm long, broadly subulate teeth 2-3 mm long; petals purple, the gently recurved banner 21.5 - 23.5 mm long, the wings 3-4 mm shorter, the obtuse keel 16.5 - 18 mm long; ovary glabrous; ovules 30-34; pod ascending, humistrate, disjointing from receptacles, in profile shallowly lunate-elliptic, (25) 30-50 (55) x 6.5 -9 mm, abruptly obtuse at base, contracted distally into a triangular-acuminulate, unilocular beak, otherwise trigonously compressed, carinate by the gently concave, ventral structure, openly sulcate dorsally, the lateral faces low-convex or almost plain, the lateral angles obtuse, the lustrous, green or purplish brown, thinly fleshy valves becoming coriaceous stramineous inflexed as a complete septum 3 - 4 mm wide; dehiscence both apical and basal, after falling, the valves gaping to release the seeds.

NON-TECHNICAL

Holmgren's milkvetch is a small, tufted, perennial herbaceous plant that occupies warm desert areas. It has no stem and the pinnately compound leaves arise directly from the root crown. The leaves are appressed to the ground 4-13 cm. (1.5 to 5.1 inches) long with, commonly, 9 to 15 leaflets. The leaflets are 0.8 to 1.6 cm. (0.3 to 0.6 inches) long and broadly obovate in shape. *A. holmgreniorum* flowers are pink-purple, 1.8 to 2.4 cm. (0.7 to 0.9 inch) long, and have the distinctive papilionaceous legume flower shape. Usually there are six to sixteen flowers in a raceme (stalk-like) inflorescence approximately 2 to 8.5 cm (0.8 to 3.6 inches) long. The fruit is a bilocular pod commonly 3 to 5 cm (1.2 to 2 inches) long and half as wide. The infloresence is erect during anthesis and prostrate with the leaves when in fruit (Barneby 1980, 1989, Welsh et. al. 1987).

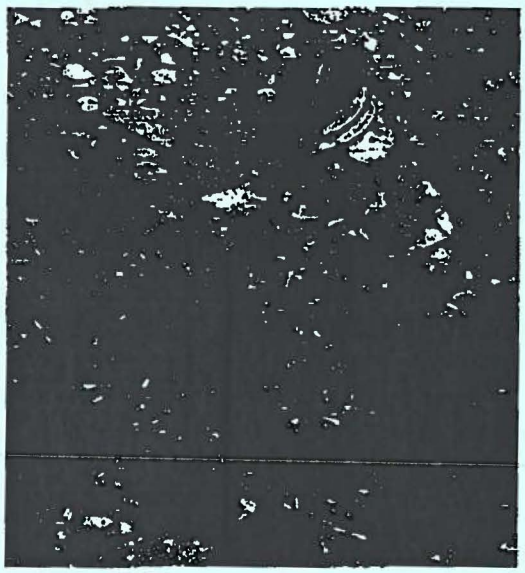

Figure 1. *Astragalus holmgreniorum* in flower and showing previous years fruits. Photo courtesy R. Van Buren.

TECHNICAL:

Astragalus ampullarioides was described by Welsh (1998) as follows: Moderate, caulescent perennial, 20-63 cm tall, from a branching subterraneal caudex. Pubescence thinly strigulose, basifixed. Stems decumbent to erect, buried for a space of 2-10 cm. Stipules 3-9 mm long, all distinct. Leaves 5-22 cm long: leaflets 13-21 4-24 mm long, 3-17 mm wide, ovate to obovate, lanceolate, or elliptic obtuse to retuse, stringose (along veins) beneath, ciliate, glabrous above.Peduncles (4) 9-23 cm long: racemes (15) 20- to 40- flowered, the flowers ascending anthesis, the axis (4) 10-16 cm long in fruit: bracts 1.5-4 mm long; pedicels 0.7-3.5 mm long; bracteoles 0-2. Calyx 5-6 mm long, the tube 4-5 mm long, short-cylindric, strigose the teeth 0.5-0.9 (1.2) mm, triangular to subulate. Flowers (11) 14-18 mm long, ochroleucous, the keel immaculate, the banner recurved through ca 25 deg. Pods erect, slenderly stipitate, the stipe 7-15 mm long, the body ovoid to ellipsoid, inflated, papery, 12-18 mm long 8-10 (12) mm thick obcompressed glabrous, essentially unilocular, the septum to ca 0.2 mm wide.

NON-TECHNICAL:

Shivwits milkvetch is a perennial herbaceous plant, with decumbent stems commonly 20 to 50 cm (8 to 20 inches) tall sometimes up to 1 meter (40 inches) tall arising from a subterranean caudex. The leaves are pinnately compound 4 to 18 cm (1.6 to 7.1 inches) long with elliptical leaflets. Flowers are ochroleucous (yellow-white), about 2 cm (0.8 inch) long, and have the distinctive papilionaceous legume flower.

The fruit is a short, broad, long-stipitate bilocular pod (0.8 to 1.5 cm (0.3 to 0.6 inches) long and 0.6 to 1.2 cm (0.2 to 0.5 inches) wide. *A. ampullarioides* commonly has up to 45 flowers in a raceme inflorescence which are borne on a peduncle up to 21 cm (8.5 inches) long.

Figure 2. *Astragalus ampullarioides* in flower. Photo courtesy R. Van Buren.

Figure 3. *Astragalus ampullarioides* fruits.
Photo courtesy R. Van Buren.

HABITAT

Holmgren's milkvetch is known to occur in drainages within gravelly clay hills at the upper edge of the creosote (Larrea) zone at about 820-850 m (Barneby, 1989). Associated soils are shallow and sparsely vegetated. They are primarily derived from the

Virgin Limestone member of the Moenkopi formation, although at least one occurrence is known on Chinle Shale (Stubben 1997). Harper (1997) reported two occurrences are located on the Upper Redbed of the Moenkopi Formation.

Habitat for Holmgren's milkvetch is characterized as having an average of less than 15% vegetative cover (Van Buren pers.comm.). According to Harper (1997), Holmgren's milkvetch always occurs with two shrub species: *Acamptopappus sphaerocephalus* (golden-head) and *Lycium andersonii* (wolfberry). Other plant species commonly associated include *Atriplex confertifolia* (saltbush), *Ambrosia (Fransera) dumosa* (bur-sage), *Ceratoides lanata* (winterfat), *Coleogyne ramosissima* (blackbrush), *Ephedra torreyeana* (Mormon-tea), *Grayia spinosa* (hop-sage), and *Hilaria jamesi* and *H. rigida* (galleta grasses).

According to Van Buren (pers. comm.), exotic aggressive annual plants are actually the most closely associated species to both Holmgren's and Shivwits milkvetches. These include: *Bromus rubens* (red brome), *Bromus tectorum* (cheatgrass), *Malcomia africana* (malcomia), and *Erodium circutarium* (filaree). Each of these introduced species is indicative of early seral, recently disturbed sites.

Shivwits milkvetch is found exclusively on clays derived from the Chinle Formation. These are gypsiferous substrates on the Chinle formation surrounded by creosote bush and juniper communities at about 1050-1150 m elevation.

This is an unusual and harsh environment that few plant species can tolerate. The substrate is high in clay minerals that expand greatly on wetting and shrink in equal proportions on drying. It is an

Shivwits milkvetch is presently known to occur in only 5 occurrences within two general areas (Figure 7). Shivwits milkvetch populations are located west of St. George on and near the Shivwits Indian Reservation (near Shem); and northeast of St. George (at Harrisburg Junction). All locations lie within Washington County, Utah. Armstrong (pers. comm.) estimates less than 100 acres of habitat are actually occupied.

Knowledgeable botanists working on these species for the BLM, Utah Valley State College, and FWS are confident that the range of both species is confined to the known areas but that additional occurrences within the range could be found. They are also confident that the majority of habitat on public lands has been surveyed to date (Van Buren; Douglas; Armstrong, England; pers. comm.).

SYMPATRY WITH OTHER RARE AND ENDEMIC TAXA

Federally protected plant species in the same general vicinity of the Holmgren's and Shivwits milkvetches include dwarf bear-claw poppy (*Arctomecon humilis)* listed as endangered and Siler pincushion cactus (*Pediocactus sileri*) listed as threatened.

The Virgin thistle (*Cirsium virginensis)* is another rare taxon known only from the same general area. Other plants endemic to Washington county and adjacent Arizona include Gould's evening primrose (*Camissonia gouldii), Enceliopsis argophylla*, Parry's monkeyflower (*Mimulus parryi)*, *Penstemon petiolatus*, *Phacelia laxiflora* and *Sphaeromeria ruthiae* (Stubben, 1997).

The desert tortoise (*Goperhus agassizii*), listed as threatened, also occurs within the Virgin River valley. Additional rare, endangered and unique wildlife in the St. George area include the willow flycatcher (*Empidonax trailii extimus*) (endangered), Merriam's kangaroo rat (*Dipodomys merriami frenatus*), Virgin River chub (*Gila robusta seminuda*) (BLM 1997).

PHENOLOGY

Holmgren's milkvetch flowers may appear as early as February (Stubben 1997). Plants enter deep dormancy period with no visible above-ground growth by June.

Shivwits milkvetch flowers in April and May.

ECOLOGY

Both species are short-lived (less than 5 years) and both are sensitive to dry winters (Harper 1997). Flowers and fruits of both are also known to be damaged by late frosts. Their persistence seems to be insured primarily by their relatively large, hard coated seeds. When suitable moisture and temperature conditions occur, seedlings appear in profusion. Mortality among seedlings is reportedly high for both species, but some individuals survive to flower in the year following germination (Harper 1997).

Van Buren (pers. comm.) and Harper (1997) estimate there are approximately 5,000 plants known collectively at the Holmgren's occurrences and less than 2,000 known at the Shivwits sites. Van Buren (pers. comm.) reported average population densities to be less than 2 plants per 4 square meters in Holmgren's milkvetch sites. Whereas Shivwits milkvetch sites have highly variable plant densities ranging from "a few dozen plants to nearly 300" from year to year.

Demographic monitoring was conducted for *A. holmgreniorum* between 1992 and 1998.

Data at these sites suggest the Holmgren's milkvetch occurrences are stable or increasing slightly in number since 1992. In contrast, between 1996 and 1998, monitoring indicate *A. ampullarioides* plants may be declining.

Stubben (1997) found size class diversity of Holmgren's milkvetch at 9 sites increased with the amount of gravel in the soil. Total milkvetch density at these sites correlated positively with percent clay and the ratio of Ca/Mg in the soil. Stubben suggested these conditions are a function of the geomorphology associated with a network of ephemeral drainages. He reported seedlings to be overwhelmingly concentrated in channels of intermittent, gravelly bottomed washes. Adult plants are largely confined to the bases of slopes and bottoms of washes which suggests good but limited dispersal abilities. It is possible that the hard coated seeds of Holmgren's milkvetch are scarified during flash floods in the habitat and thus prepared for germination.

Little is known about the pollination ecology of both species although they are presumed to be pollinated by bees.

As with several other caulescent (upright) members of the *Astragalus* genus, *A. ampullarioides* is palatable and heavily used by grazing animals. Van Buren (pers. comm.) reported that plants are often hedged in their entirety.

STATUS THREATS

Biological Setting

One in ten species of plants in Utah is found nowhere else in the world. These Utah endemics are ecological specialists, most of which have developed unique physiological mechanisms to cope with the rigors of the cold desert habitat. The majority are physically restricted to isolated and unusual soil types, although some species have wider ecological amplitudes than others. From studies of geographic patterns, botanists have concluded that Utah endemics are recently evolved, or "neo-endemics", and have been a major source of speciation within the genus (Barneby, 1989).

Although population data for Holmgren's milkvetch indicate a slight increase in plant numbers, these two species are so rare in occurrence and extent of occupied habitat as to make plant numbers meaningless. Because these species occur in such restricted areas within a limited range, they are vulnerable to both natural and man-caused catastrophes. Their physiological adaptations to rare habitats are both a "blessing and a curse" because they allow them to populate areas other plants cannot, however it severely limits their abilities to disperse to new areas. Either regional or local events could cause their extinction either suddenly or slowly through cumulative effects.

HISTORICAL DECLINES AND CURRENT INSTABILITY

There is little or no documented and verifiable records available to determine the extent to which population numbers have historically declined or how many occurrences have been extirpated. This is primarily due to the fact that these are relatively new taxa to be recognized by botanists. However, the extent of habitat development and conversions in the St. George and Bloomington, Utah areas has most certainly involved former habitat for *A. holmgreniorum* and possibly also *A. ampullarioides*. At least two occurrences of *A. holmgreniorum* have been relinquished by BLM during recent land exchanges (Douglas, pers.comm.). Both Harper (1997) and Stubben (1997) report that construction of residential developments has destroyed potential and occupied habitat for both species in the past 5 years.

Known occurrences of *A. ampullarioides* have been fragmented by highway corridors (Interstate 15) in recent history. Van Buren and Armstrong (pers. comm.) believe that this fragmentation of the population into highway medians etc. has negatively affected pollination and therefore gene flow. This is quite possibly part of the reasons for suspected population declines and instability for that species.

PRESENT OR THREATENED DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Urbanization of Habitat

The urban center of St. George, Utah has been and continues to be developed for commercial, municipal and residential purposes. From 1990 to 1994, Washington County was the fifth fastest growing county in the United States with a 45% increase in population (Stubben 1997). Further, it is predicted to double in population within the next 20 years (Harper, 1997; Stubben, 1997). Development of a residential community is planned near Harrisburg Junction which could destroy one of five known occurrences of Shivwits milkvetch (England, pers.comm.).

Due to the heavy vehicular traffic between St. George, Utah and Las Vegas, Nevada there is a perceived need for alternate routes that would not increase traffic in the smaller cities, towns, and communities in the outlying areas. Utah Department of Transportation is currently proposing to construct a new highway corridor west of St. George. The area of this proposed new highway corridor contains habitat for Holmgren's milkvetch and is likely to affect known populations of plants (Van Buren and Armstrong, pers. comm.). This is expected to have direct negative effects as well as indirect impacts in the form of habitat fragmentation and reduction.

Public Land Management

A significant amount of expansion in and around St. George, Utah has been facilitated by land exchanges with the BLM. These land transfers occur in a more or less piece-meal fashion without the benefit of a comprehensive growth and development plan. The proposed Resource Management Plan for the Dixie Resource Area (1998) of the BLM would continue the present (ineffectual) strategy of "survey and protect" on a case by case basis. This strategy has not and will not insure viability and persistence of these two plant species whose potential habitats are deteriorating at rapid rates. Through public land habitat losses, reductions and disruptions, genetic diversity could be compromised, if not lost, altogether.

Recreation

As a result of this increased development and human population, habitat for both plant species is being directly converted to other uses and indirectly affected by associated human activities. For example, recreational use of off-road vehicles is particularly popular in the area because of the open, rolling hills and washes. This highly destructive form of recreation not only destroys plants but it compacts soils, denudes entire hillsides, and disrupts hydrologic functioning (Van Buren, pers. comm.; Stubben, 1997).

Exotic Plants

The ground disturbances associated with recreation and construction activities also create conditions highly suitable for establishment of introduced aggressive weeds. These plants can outcompete native plants such as Holmgren's and Shivwits milkvetches for nutrients and water. Once established, these noxious weeds can dominate whole sites. This results in disruption of population dynamics of native plants and can alter entire ecosystems upon which the native species depend. For example, species such as red brome have been known to change the timing and frequency of natural fire regimes which alters community composition, structure and function.

Hydrologic Dysfunction

As construction of man-made structures continues in the St. George area, it disrupts the natural flow of water and changes the hydrologic functioning in the Virgin River Valley. This is particularly critical to Holmgren's milkvetch which may depend upon flash flooding for scarification of seeds and/or deposition of germination substrates (Stubben, 1997). Each highway, road, subdivision, shopping mall, etc. that is constructed in the area contributes to this disruption of ecoystem processes by altering the natural flow of water, especially flash-flooding that characterizes the area.

OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC, OR EDUCATIONAL PURPOSES

Livestock Grazing

Grazing of Shivwits milkvetch by livestock on private, state, and BLM lands is a serious threat to its continued existence. Harper (1997) reported that the two western occurrences of Shivwits were grazed in their entirety by cows. Consequently, this may be the cause of potential population declines detected since 1996 at Shivwits milkvetch sites.

Mining

Habitat for *A. ampullarioides* has value for commercial extraction of bentonite clay and gypsum. At least one occupied site has already been impacted for this purpose (Armstrong, pers. comm.). None of the areas of habitat for these two species have been withdrawn from mineral entry. Therefore the known and potential desirability of these substrates for commercial or industrial purposes is a threat to both species.

DISEASE OR PREDATION

Natural phenomena such as predation of seed pods is common in *Astragalus*, however none are known to constitute a threat at this time.

INADEQUACY OF EXISTING REGULATORY MECHANISMS

Holmgren's and Shivwit's milkvetch poppulations are known to occur on federal (BLM), state (Utah and Arizona) tribal (Shivwits Paiute), and private lands.

There are currently no Federal laws or regulations directly protecting these two species or their habitats. Holmgren's milkvetch was a candidate for federal listing as early as 1983 and Shivwits was placed in the same category in 1990. In 1993 and 1996 respectively, Holmgren's and Shivwits milkvetches were added to the list of species for which FWS has significant information to propose as threatened or endangered. FWS has expressed concern for the perpetuation of both Holmgren's and Shivwit's milkvetches and has been investing staff time and has committed to listing both taxa for over 5 years (USDI-FWS

1994), yet no proposed rule has ever been published. FWS in Utah and the Rocky Mountain Region continue to regard them as their highest listing priorities for plants, yet the agency has been unable to propose listing. Clearly, a different avenue for listing is required.

BLM is the primary federal agency with administrative responsibility for lands with habitat for both species. BLM policy simply states that "actions authorized, funded or carried out will not contribute to the need to list any of these (candidate) species as threatened or endangered". In 1998, the BLM published a Proposed Resource Management Plan and Final Environmental Impact Statement for the Dixie Resource Area around St. George. This RMP continues the practice of surveying and protecting rare plant populations on a case by case basis. The location of these species in areas valued so highly for urban expansion will render even the best BLM intentions futile, if protections are not strengthened through listing under the ESA and better conservation planning. BLM has already relinquished two small occurrences in land exchanges in recent years.

In 1997, the BLM instigated a Conservation Strategy and Agreement to protect both species. However, completion of this effort has been precluded by "higher priorities" (Armstrong, pers. comm.).

There are no State laws or regulations that directly protect these two species or their habitats.

Conclusions

Petitioners request that *A. holmgreniorum* and *A. ampullarioides* be listed as Endangered with Critical Habitat under the ESA due to low population numbers, extremely restricted habitat, actual and potential habitat losses and disruptions within their narrow ranges, and the inadequacy of existing regulatory mechanisms. The continued urban expansion in southwestern Utah will continually threaten all populations of Holmgren's and the eastern populations of Shivwit's milkvetches in the foreseeable future (Harper, 1997; Stubben, 1997).

Scientists are not sure that the present populations of both species will ensure their continued existence (England, pers. comm.). Species numbers are sufficiently small that future losses may result in loss of population or species viability. Under these circumstances, further delay of listing as endangered under the ESA is unacceptable.

Respectfully submitted,

Peter Galvin
SW CENTER

Steve Bloch
SUWA
Bloch

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APPENDIX A- KNOWLEDGEABLE PERSONS

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Appendix B: Personal Communications

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Douglas, Bob. BLM Botanist, St. George, UT

England, Larry, FWS Botanist, Salt Lake City, UT

Van Buren, Renee. Utah Valley State College Professor of Botany, Orem, UT

Figure 4. Habitat where *Astragalus holmgreniorum* is found. Photo courtesy R. Van Buren.

unstable surface that severely disrupts root formation.

The habitat for Shivwits milkvetch has low species richness and the dominant vegetation is annual and mainly exotics. Shivwits milkvetch has few reliable shrub associates other than *Gutierrezia microcephala* (snakeweed) (Harper 1997). Other native plant species associated with *A. ampullarioides* include *Ambrosia dumosa, Ceratoides lanata, Coleogyne ramosissima, Ephedra sp., Fallugia paradoxa* (apache plume), *Hymenoclea salsola* (burrobush) and *Psorothamnus fremontii* (Fremont's dalea).

GEOGRAPHIC DISTRIBUTION

Both Holmgren's and Shivwits milkvetches are found in extreme southwestern Utah near the Arizona and Nevada borders (Figures 6). This area is floristically distinctive, at least in part, due to its overlapping Mohave, Sonoran,

Figure 5. Habitat where *Astragalus ampullarioides* is found. Photo courtesy R. Van Buren.

and Great Basin desert influences. Utah has long been renowned for numerous plant endemics attributed to the great degree of habitat diversity, geographic isolation, and climatic factors there. Shultz (1993) found more than 10% of the Utah flora is unique to the state. Stubben (1997) reported approximately 10% of the flora of Utah is found only within Washington County.

As of 1998, **Holmgren's milkvetch** has been found in 3 general areas considered metapopulations of scattered occurrences. These are located within a 7-10 mile radius to the south, west and northeast of St. George (Figure 7). The majority of the range is within Washington County, Utah however known occurrences extend into Arizona within Mohave County.