UTAH BIG GAME
RANGE TREND SPECIAL STUDY
2014
La Sal Mountain Goat Habitat

PUBLICATION NUMBER 15-19
REPORT FOR FEDERAL AID PROJECT W-82-R-59

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCE

Utah Big Game Range Trend Special Study
2014
La Sal Mountain Goat Habitat

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LA SAL MOUNTAIN GOAT
VEGETATION MONITORING METHODS

Study sites were placed in areas identified by the US Forest Service where rare and endemic plants occur within the alpine plant community. Rare plants surveyed were depauperate fleabane (*Erigeron mancus*), dwarf mountain ragwort (*Senecio fremontii* var. *inexpectatu*s), showy draba *(Draba abajoensis*), and Sweetflower rockjasmine (*Androsace chamaejasme* ssp. *carinata*). Monitoring methods were chosen by consulting with the Ashley National Forest and the Manti-La Sal National Forest. Similar monitoring methods are being used to monitor alpine vegetation by the Ashley National Forest. In addition, at the request of the Manti-La Sal National Forest, nested frequency and modified Daubenmire cover were also added. The following is a brief summary of the methods used for sampling vegetation data on the study sites.

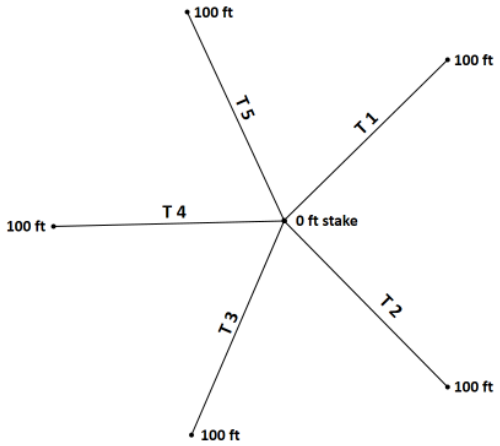
Location and Rare Plant Sampled

Study Name	Location	Rare/Endemic Species Sampled	Years Read
Beaver Basin 1	North Mountain Range	depauperate fleabane, sweetflower rockjasmine	2013, 2014
Beaver Basin 2	North Mountain Range	dwarf mountain ragwort	2013, 2014
Dark Canyon 1	Middle Mountain Range	depauperate fleabane, sweetflower rockjasmine	2013, 2014
*Dark Canyon 2	Middle Mountain Range	None	2013
Dark Canyon 3	Middle Mountain Range	dwarf mountain ragwort, showy draba	2014
Manns Peak1	North Mountain Range	dwarf mountain ragwort, showy draba	2013, 2014
Manns Peak 2	North Mountain Range	depauperate fleabane	2013, 2014
Mt Tuk 1	Middle Mountain Range	depauperate fleabane	2013, 2014
Mt Tuk 2	Middle Mountain Range	dwarf mountain ragwort, showy draba	2013, 2014

Table 1: Location of study sites by mountain group (middle and north), rare plant surveyed, and years read.
*Established to monitor general habitat conditions and ground cover with no rare plants present.

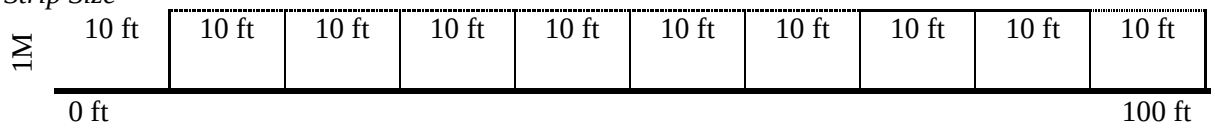
Study Site Setup

Study sites were placed specifically to monitor trends of rare plant species and/or monitor mountain goat habitat. Five 100 foot transects were established at each study originating from a permanent central stake (see example below). An exception to this is the Beaver Basin II transect which was setup using a 300 foot linear transect with two transects originating from the 100 foot and 200 foot stakes.



Density/Utilization
Density of rare species were counted within a density strip, which is a 1 meter by 90 feet band on the left side of the transect that starts at the 10 foot mark (as seen below). The species that were counted in the density strip were depauperate fleabane, dwarf mountain ragwort, and showy draba. Sweetflower rockjasmine was not counted in the density strip because of the difficulty in distinguishing individual plants. Some of the transects were altered on the Beaver Basin 2, Dark Canyon 3, Mt Tuk 1, and Mt Tuk 2 study sites to accommodate a larger sample size or avoid double sampling from adjacent transects. Utilization for each species counted within the density strip was recorded as none, light (up to 25%), moderate (25-50%), or heavy (>50%) (Bureau of Land Management, 1996; Cox, Lane, & Bybee, 2014).

Strip Size



Line Point Intercept
The line point intercept method was used to record ground cover. A pin was dropped every one foot starting at the 1-foot mark (100 points/transect x 5 transects/site = 500 points). At each point ground cover was recorded as either basal vegetation, litter, cryptogam, rock >2 cm, pavement, soil without foliar cover, or soil under foliar cover (Caratti, Point Intercept (PO) Sampling Method, 2006; Bureau of Land Management, 1996).

Line Intercept
The line intercept cover method was used to record cover along all five transect for each endemic species (depauperate fleabane, dwarf ragwort, sweetflower rockjasmine, and showy draba). Sweetflower rockjasmine was not measured in line intercept in 2013, but was measured in line intercept in 2014 (Bureau of Land Management, 1996; Cox, Lane, & Bybee, 2014).

Species Composition Strip
Species composition was recorded on one transect (transect 1) for each study and was used to estimate relative abundance as well as to obtain a species list for the site. The macro plot for the composition strip was 1 meter by 100 feet (similar to the density strip). Plants were identified to species level and given a canopy cover class measurement based on a visual estimation of its total cover within the 100-foot strip. The canopy cover class measurements were altered from the standard Firemon species composition cover classes in 2013 to <1%, 1-5%, 5-25%, 25-50%, or >50%, but in 2014 the standard cover class measurements, <1%, 1-5%, 5-15%, 15-25%, 25-35%, 35-45%, 45-55%, 55-65%, 65-75%, 75-85%, 85-95% or >95% were used (Caratti, Species Composition (SC) Sampling Method, 2006). To better classify abundance, cover classes were grouped as the following:

<1% - Infrequent
1-5% - Sparse
5-25% - Common
>25% - Abundant

General comparisons in site composition from year to year can be made using this data. However, this method was not intended as a standalone measurement and must be paired with other methods such as density and cover (described below) in order to draw conclusions regarding plant community changes.

Daubenmire Quadrat Cover and Nested Frequency
A 0.25 m^2 quadrat was used for estimating cover and determining nested frequency of rare plant species and ground cover class data on sites with depauperate fleabane. Quadrat data was collected along transects 1 and 2 on the left side of the transect (looking towards the 100 foot end). A total of 40 quadrats were read along the

two transects starting at the five foot mark and at each consecutive five foot mark. A modified Daubenmire cover method (seven cover classes within the quadrat) and nested frequency (five divisions within the quadrat) were used to estimate cover and frequency of individual species and ground cover class data (Bureau of Land Management, 1996; Cox, Lane, & Bybee, 2014). On two of the studies (Beaver Basin 1 and Dark Canyon 1), all plant species were sampled with this method. On sites where only endemic species were recorded, species composition was estimated to get relative abundance and species composition for the site.

Pellet Group Transects

Ungulate pellet groups were recorded by randomly placing 50 1/100 acre samples across the study site and counting current years pellet groups by species. The counts were then converted to days use/acre (Cox, Lane, & Bybee, 2014). Following the introduction of mountain goats on the La Sal mountain range in 2014, deer and mountain goat pellets were combined due to difficulty in distinguishing between the two species (Chadwick, 2002; Murie, 1997).

Repeat Photos

Photos were taken from the 0-foot mark looking toward the 100-foot mark of each transect in 2013 and 2014 and will be taken in subsequent readings of the sites.

Data Collection: Sampling Methods by Study Site and Year

Study Name	Density	Line point Intercept	Line Intercept	Species Composition	Daubenmire Quadrat	Pellet Group	Photos
Beaver Basin 1	2013, 2014	2013, 2014	2013, 2014	-	*2013, *2014	2013, 2014	2013, 2014
Beaver Basin 2	2013, 2014	2013, 2014	2013, 2014	2013, 2014	-	2013, 2014	2013, 2014
Dark Canyon 1	2013, 2014	2013, 2014	2013, 2014	2014	*2013, 2014	2013, 2014	2013, 2014
Dark Canyon 2		2013	ŦŦ2013	2013	-	2013	2013
Dark Canyon 3	2014	2014	2014	2014	-	2014	2014
Manns Peak1	2013, 2014	2013, 2014	2013	2013, 2014	-	2013, 2014	2013, 2014
Manns Peak 2	2013, 2014	2013, 2014	2013, 2014	2013, 2014	2013, 2014	2013, 2014	2013, 2014
Mt Tuk 1	2013, 2014	2013, 2014	2013, 2014	2013, 2014	2013, 2014	2013, 2014	2013, 2014
Mt Tuk 2	2013, 2014	2013, 2014	2013, 2014	2013, 2014	-	2013, 2014	2013, 2014

Table 2: Sampling methods used on each site by year. * All plant species were sampled. Ŧ Line intercept of *Ribes montigenum*

LA SAL MOUNTAIN GOAT VEGETATION STUDIES

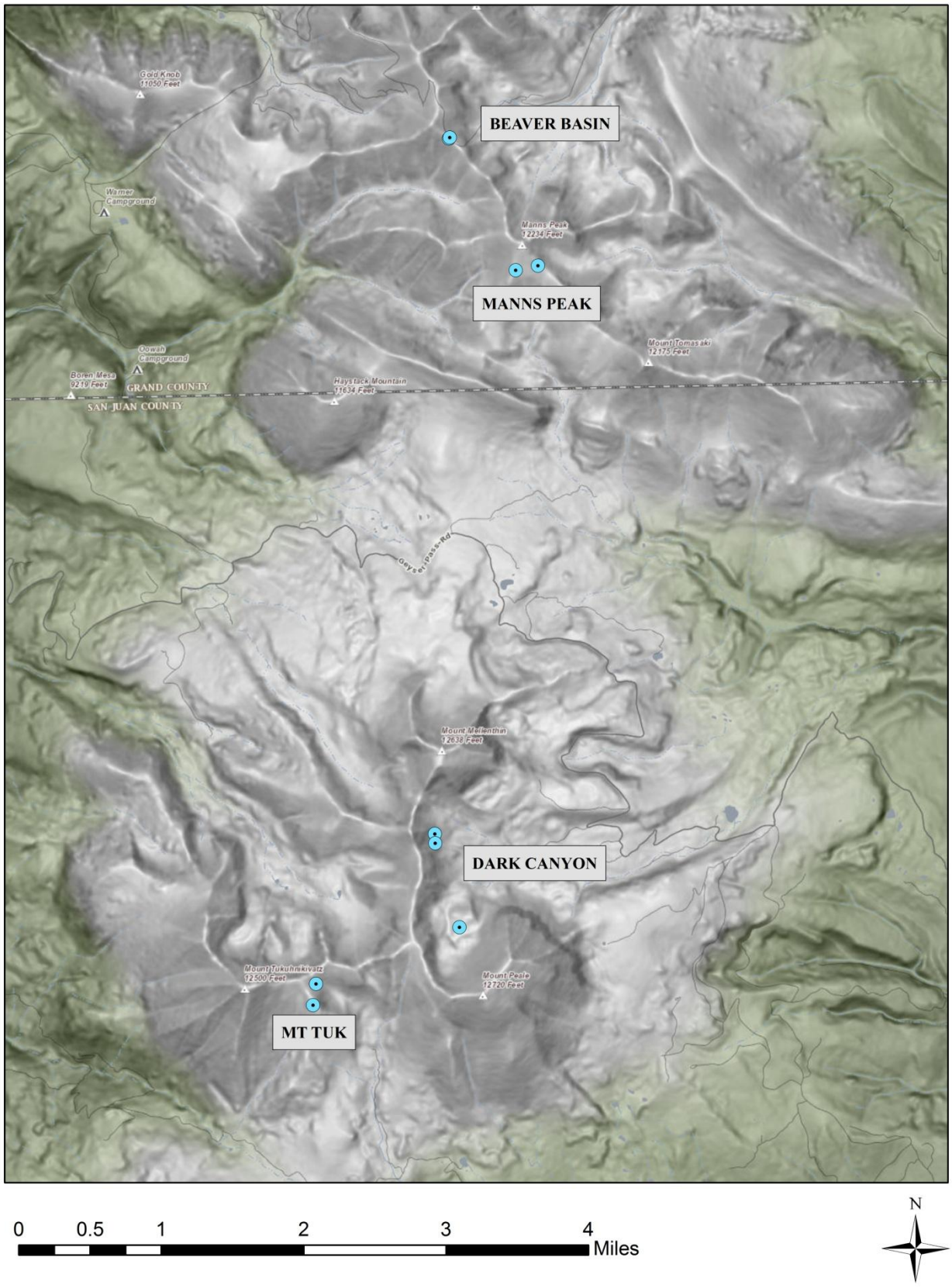


Figure 1: Location of monitoring sites on the La Sal Mountains.

SUMMARY

Rare Plants

Average cover and density of rare plants remained relatively similar from 2013 to 2014. *Erigeron mancus* cover averaged 2-3%, while *Senecio fremontii* var. *inexpectatus* cover was 1.9-2.5% (Figure 2a). An additional study (Dark Canyon 3) with *Senecio fremontii* var. *inexpectatus* was added in 2014. The density of *Senecio fremontii* var. *inexpectatus* varied slightly from 1.3 plants/m^2 in 2013 to 1.5 plants/m^2 in 2014. *Erigeron mancus* also varied from 7.4 plant/m^2 to 8.5 plants/m^2 (Figure 2b).

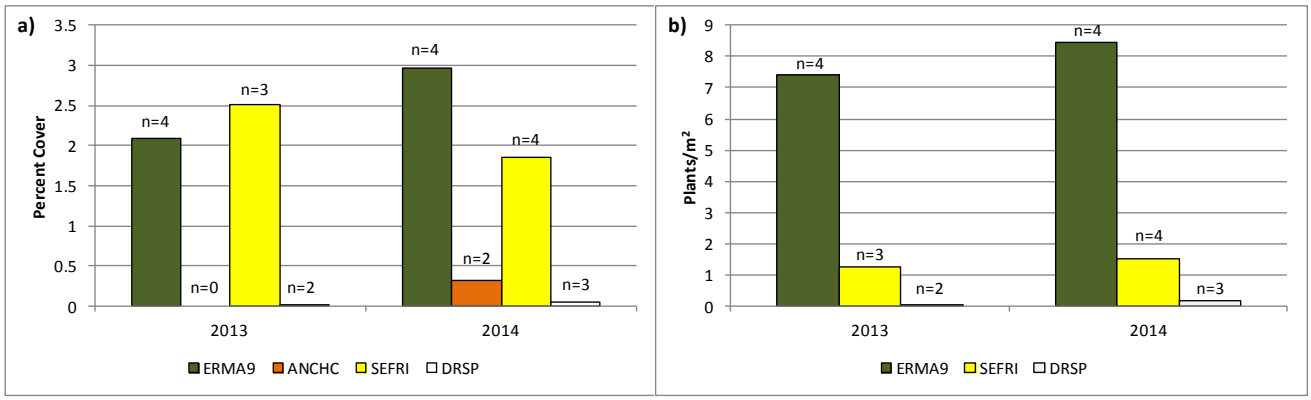


Figure 2: Rare plant summary. a) Average cover of rare plants. Line intercept cover of *Androsace chamaejasme* ssp. *carinata* was not sampled in 2013. b) Density of rare plants. Density of *Androsace chamaejasme* ssp. *carinata* was not sampled due to growth form and difficulty in distinguishing individual plants

Basic Ground Cover

Basic ground cover characteristic changed very little from 2013 to 2014 with the exception of basal vegetation and litter on the *Erigeron mancus* study sites (Figure 3). Basal vegetation increased while litter decreased (Figure 3a).

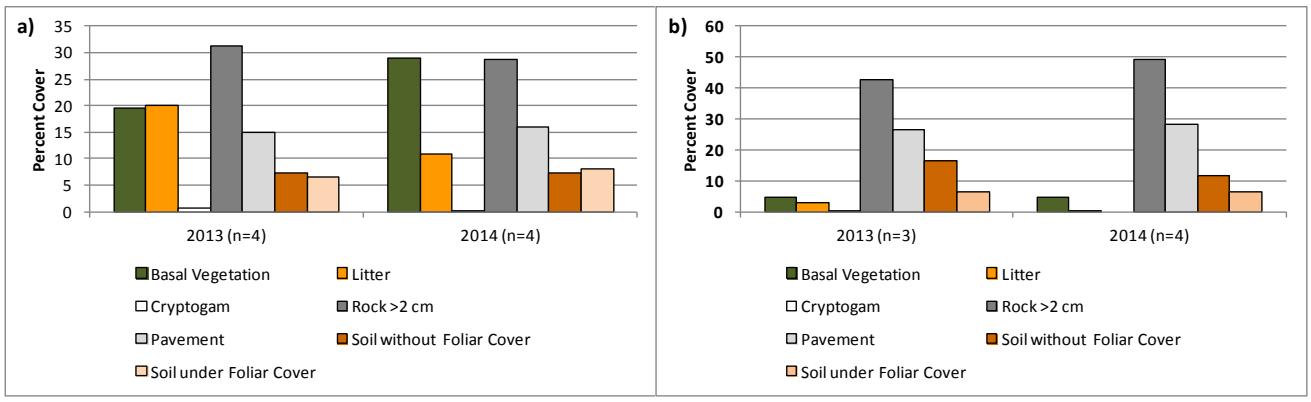


Figure 3: Basic ground cover summary of line point intercept. a) Average cover of *Erigeron mancus* study sites. b) Average cover of *Senecio fremontii* var. *inexpectatus* study sites.

Occupancy

Pellet group transect data indicates low presence of animals on these study sites. In 2013, deer were the primary animals sampled on the study sites, though cattle pellets were sampled on the Dark Canyon 2 study. Following the introduction of mountain goats on the La Sal mountain range in 2014, deer and mountain goat pellets were combined due to difficulty in distinguishing between the two species (Figure 4)(Chadwick, 2002)(Murie, 1997). No pellets were encountered on the middle mountain group study site in 2014 (Figure 4b).

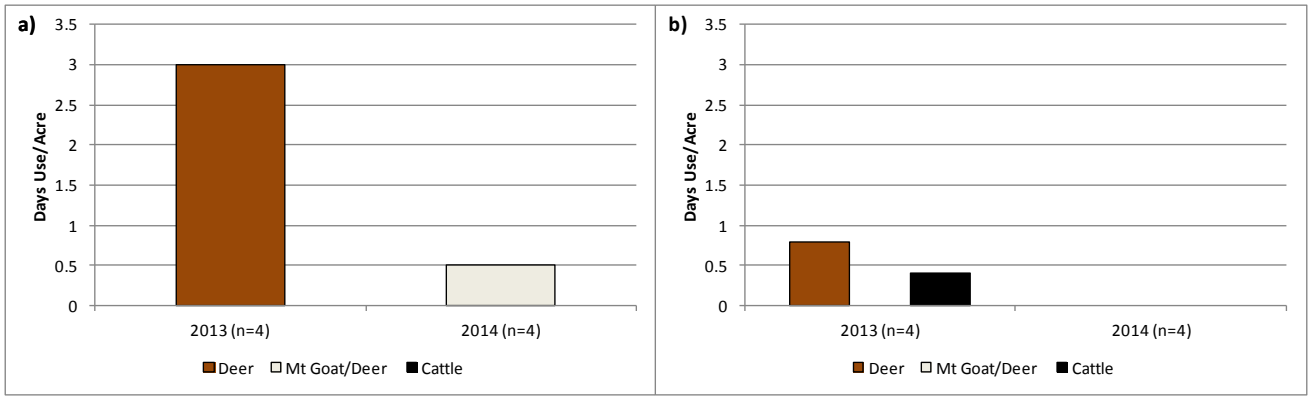


Figure 4: Pellet transect summary. a) Northern mountain group, Beaver Basin and Manns Peak study sites. b) Middle mountain group, Dark Canyon and Mt Tuk study sites.

Precipitation

Vegetation trends are dependent upon annual and seasonal precipitation patterns. The Natural Resources Conservation Service (NRCS) Lasal Mountain SNOTEL site (572) precipitation data from October 2012 to October 2014 shows a decrease in overall snow depth and precipitation accumulation from 2013 to 2014 water years.

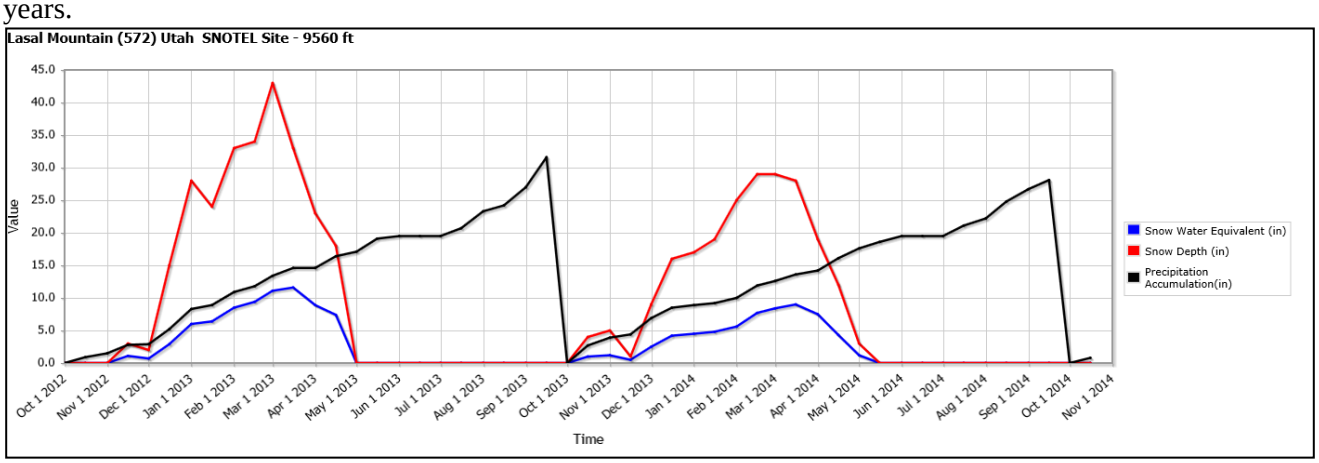
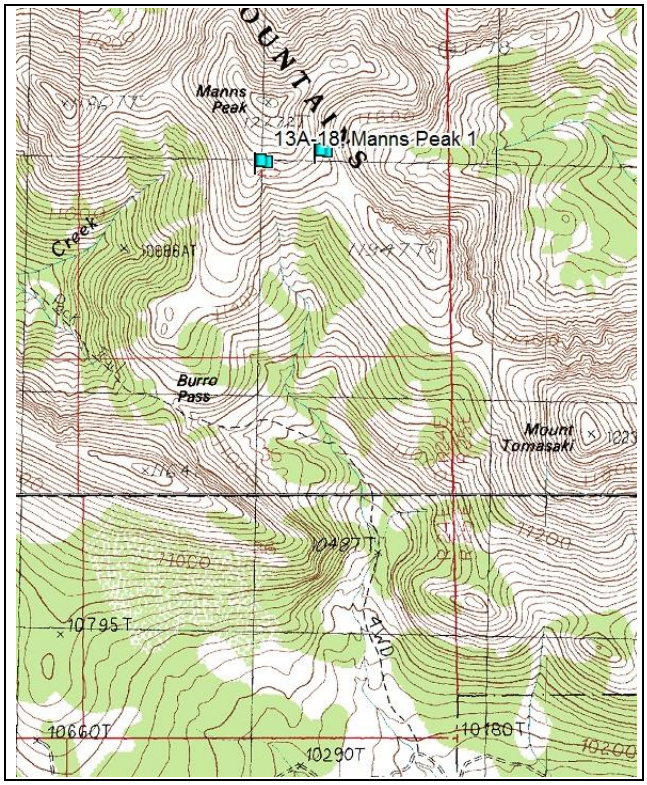
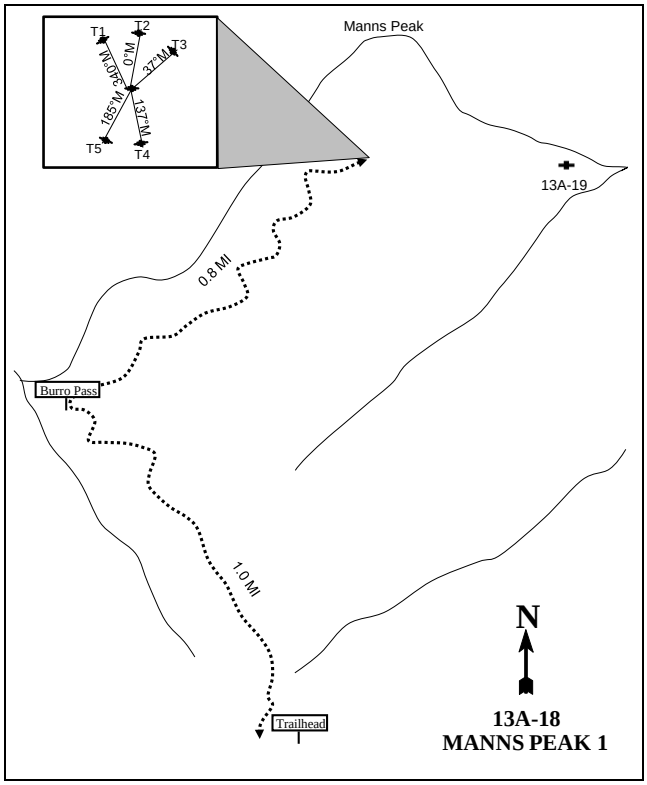


Figure 5: Lasal Mountain SNOTEL precipitation (in) data based on water year (Oct. 1-Sept. 30) from October 2012 to October 2014 (NRCS, 2015).

MANNS PEAK 1 - TREND STUDY NO. 13A-18





Location Information

USGS 7.5 min Map Info	Mount Waas; Township 26S, Range 24E, Section 25
GPS (0' Stake)	NAD 83, UTM Zone 12, 654915 East 4264137 North

Transect Information

Browse Tag # (0' Stake)	None
Transect Bearing	T1: 340° M, T2: 0° M, T3: 37° M, T4: 137° M, T5: 185° M
Length	100ft

Site Information

Land Ownership	USFS
Allotment	None
Elevation	11,916 ft (3,632 m)
Aspect	Southeast
Slope	25%
Sample Dates	08/19/2013, 08/11/2014

Directions to Site

Drive south of Moab on US 191 and turn left (east) on to Old Airport Road. Proceed 0.6 miles and turn right on to Spanish Valley Drive/La Sal Mountain Loop Road. Stay on this road for 9 miles and turn right on to Geyser Pass Road. Proceed 9 miles to Burro Pass turnoff and turn right. Follow this road for 1.1 miles to the Burro Pass trailhead. From the trailhead, hike approximately 1 mile to Burro Pass. From Burro Pass, the trail will split, take the trail heading north up the ridge heading towards Manns Peak. Continue on this trail approximately 0.8 miles to the study site. The site is marked with a single rebar as the center stake.

Site Notes

The site was placed to monitor dwarf mountain ragwort (*Senecio fremontii* var. *inexpectatus*). It was noted that there was herbivory of the silky phacelia (*Phacelia sericea*) and whipple's penstemon (*Penstemon whippleanus*) in both sample years.

Data Collected

- Density of dwarf mountain ragwort and showy draba (*Draba spectabilis* var. *spectabilis*)
- Line point intercept
- Species composition strip
- Line intercept of mountain ragwort and showy draba
- Pellet group transect
- Photos

Data Tables

Table 13A-18.1. Rare/endemic species line-intercept cover, quadrat cover, nested frequency measurements by year for the Manns Peak 1 study site.

Year	Line Intercept Cover (%)
Senecio fremontii var. *inexpectatus*	
13	0.87
14	*Not collected
Draba spectabilis var. *spectabilis*	
13	0.03
14	*Not collected

*Line intercept data was not collected on this site in 2014.

Table 13A-18.2. Rare/endemic species density and utilization for the Manns Peak 1 study site.

Year	Density	Utilization			
	Plants per m^2	% None	% Light	% Moderate	% Heavy
Senecio fremontii var. *inexpectatus*					
13	0.37	100	0	0	0
14	1.44	100	0	0	0
Draba spectabilis var. *spectabilis*					
13	0.05	100	0	0	0
14	0.06	100	0	0	0

Table 13A-18.3. Point intercept cover by year of basic ground cover for the Manns Peak 1 study site.

Cover Type	Line Point Intercept Cover (%) '13	'14
Basal Vegetation	7.60	6.64
Litter	1.20	0.00
Cryptogam	0.20	0.00
Rock >2 cm	39.60	26.36
Pavement	18.20	44.27
Soil without Foliar Cover	22.00	14.08
Soil under Foliar Cover	11.20	8.65

Table 13A-18.4. Line vegetation species composition for the Manns Peak 1 study site. Ocular cover classes were categorized into the following groups: infrequent <1%, sparse 1-5%, common 5-25%, abundant>25%.

Type	Plant Code	Plant Species	Ocular Cover Class (%) '13	'14
G	CANO3	*Carex nova*	Sparse	Sparse
G	ELTR	*Elymus trachycaulus*	Infrequent	Infrequent
G	FEBR	*Festuca brachyphylla*	Sparse	Sparse
G	LUSP4	*Luzula spicata*	-	Infrequent
G	POAR2	*Poa arctica*	Sparse	Infrequent
G	PORE	*Poa reflexa*	-	Infrequent
G	TRSP2	*Trisetum spicatum*	Infrequent	Infrequent
F	ACMI2	*Achillea millefolium*	-	Infrequent
F	AGAU2	*Agroseris aurantiaca*	Infrequent	Infrequent
F	ANSE4	*Androsace septentrionalis*	Infrequent	Infrequent
F	ANME2	*Antennaria media*	Common	Sparse
F	ARDR	*Arabis drummondii*	Infrequent	Infrequent
F	ARKI	*Arenaria kingii*	Infrequent	Infrequent
F	ARSC	*Artemisia scopulorum*	-	Infrequent
F	CEAR4	*Cerastium arvense*	Infrequent	Infrequent
F	CEBE2	*Cerastium beeringianum*	Infrequent	Infrequent
F	DRCR2	*Draba crassifolia*	Infrequent	Infrequent
F	DRSP	*Draba spectabilis* var. *spectabilis*	Infrequent	Infrequent
F	ERUR2	*Erigeron ursinus*	Infrequent	Infrequent
F	GERO2	*Geum rossii*	Common	Common
F	HEVI4	*Heterotheca villosa*	Infrequent	Infrequent
F	HYHO	*Hymenoxys hoopesii*	Infrequent	-
F	LEPY2	*Lewisia pygmaea*	Infrequent	Infrequent
F	ORBA	*Oreoxis bakeri*	-	Infrequent
F	PEWH	*Penstemon whippleanus*	-	Infrequent
F	PHSE	*Phacelia sericea*	Infrequent	-
F	PODI2	*Potentilla diversifolia*	Sparse	Sparse
F	PSMO	*Pseudocymopterus montanus*	Infrequent	Infrequent
F	RAIN	*Ranunculus inamoenus*	Infrequent	Infrequent
F	SELA	*Sedum lanceolatum*	Infrequent	Infrequent
F	SEFRI	*Senecio fremontii* var. *inexpectatus*	Infrequent	Infrequent
F	SIPR	*Sibbaldia procumbens*	Common	Common
F	SOMU	*Solidago multiradiata*	Infrequent	Infrequent
F	TEGR3	*Tetraneuris grandiflora*	Infrequent	Infrequent
F	TRNA2	*Trifolium nanum*	Infrequent	Infrequent

Table 13A-18.5. Animal pellet group transect data by year on the Manns Peak 1 study site.

Type	Days use per acre (ha) '13	'14
Deer	5 (13)	-
Mt Goat/Deer	-	1 (2)

Figure 6: Manns Peak 1, 13A-18. a) Belt 1, 2013. b) Belt 1, 2014.

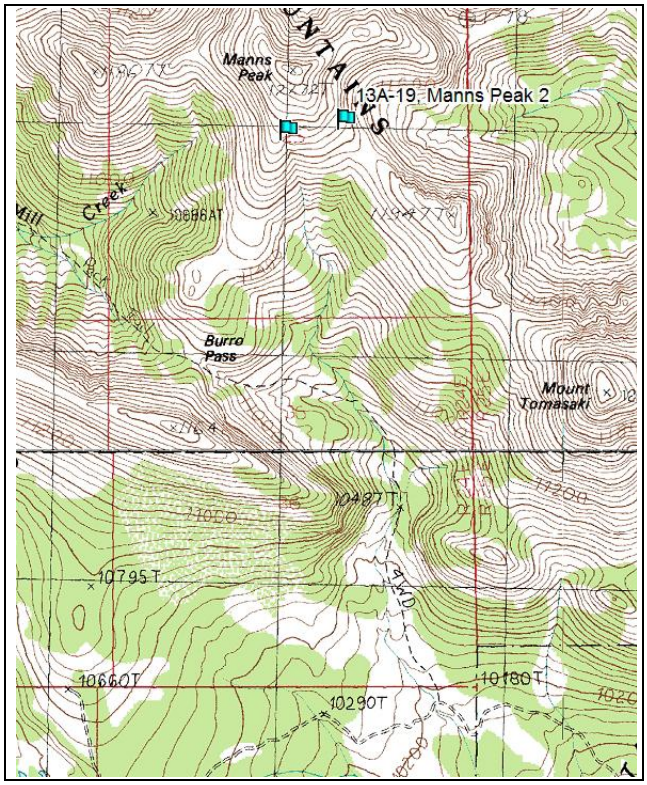
Figure 7: Manns Peak 1, 13A-18. a) Belt 2, 2013. b) Belt 2, 2014.

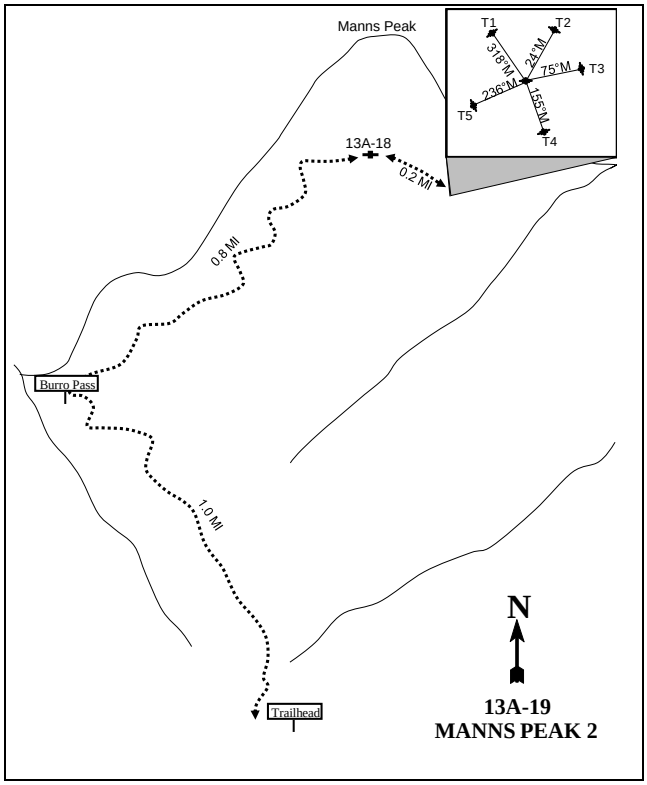
Figure 8: Manns Peak 1, 13A-18. a) Belt 3, 2013. b) Belt 3, 2014.

Figure 9: Manns Peak 1, 13A-18. a) Belt 4, 2013. b) Belt 4, 2014.

Figure 10: Manns Peak 1, 13A-18. a) Belt 5, 2013. b) Belt 5, 2014.

MANNS PEAK 2 - TREND STUDY NO. 13A-19





Location Information

USGS 7.5 min Map Info	Mount Waas; Township 26S, Range 24E, Section 25
GPS (0' Stake)	NAD 83, UTM Zone 12, 655168 East 4264188 North

Transect Information

Browse Tag # (0' Stake)	None
Transect Bearing	T1: 318° M, T2: 24° M, T3: 75° M, T4: 155° M, T5: 236° M
Length	100 ft

Site Information

Land Ownership	USFS
Allotment	None
Elevation	11,861 ft (3,615 m)
Aspect	Southeast
Slope	35%
Sample Dates	09/04/2013, 08/11/2014

Directions to Site

Drive south of Moab on US 191 and turn left (east) on to Old Airport Road. Proceed 0.6 miles and turn right on to Spanish Valley Drive/La Sal Mountain Loop Road. Stay on this road for 9 miles and turn right on to Geyser Pass Road. Proceed 9 miles to Burro Pass turnoff and turn right. Follow this road for 1.1 miles to the Burro Pass trailhead. From the trailhead, hike approximately 1 mile to Burro Pass. From Burro Pass, the trail will split, take the trail heading north up the ridge heading towards Manns Peak. Continue on this trail approximately 0.8 miles to the Manns Peak 1 study site. The site is 0.2 miles to east. The site is marked with a single rebar as the center stake.

Site Notes
The site was established to monitor depauperate fleabane (*Erigeron mancus*).

Data Collected
- Density of depauperate fleabane
- Line point intercept
- Species composition strip
- Quadrat nested frequency and cover of depauperate fleabane and ground cover
- Line intercept of depauperate fleabane
- Pellet group transect
- Photos

Data Tables

Table 13A-19.1. Rare/endemic species line-intercept cover, quadrat cover, nested frequency measurements by year for the Manns Peak 2 study site.

Year	Line Intercept Cover (%)	Quadrat Cover (%)	[1]Nested Frequency
Erigeron mancus			
13	2.92	2.98	71
14	2.40	4.50	68

[1]Maximum nested frequency value is 200

Table 13A-19.2. Rare/endemic species density and utilization for the Manns Peak 2 study site.

Year	Density	Utilization			
	Plants per m^2	% None	% Light	% Moderate	% Heavy
Erigeron mancus					
13	4.41	100	0	0	0
14	5.66	100	0	0	0

Table 13A-19.3. Point intercept cover by year of basic ground cover for the Manns Peak 2 study site.

Cover Type	Line Point Intercept Cover (%) '13	'14
Basal Vegetation	26.20	38.79
Litter	10.60	0.20
Cryptogam	0.40	0.20
Rock >2 cm	22.40	20.00
Pavement	26.40	22.83
Soil without Foliar Cover	4.20	6.26
Soil under Foliar Cover	9.80	11.72

Table 13A-19.5. Modified Daubenmire quadrat cover by year of basic ground cover for the Manns Peak 2 study site.

Cover Type	Quadrat Cover (%) '13	'14
Vegetation	50.63	56.63
Rock	19.19	18.60
Pavement	15.08	12.93
Litter	2.89	0.06
Cryptogam	7.83	13.20
Bare ground	3.03	2.93

Table 13A-19.6. Line vegetation species composition for the Manns Peak 2 study site. Ocular cover classes categorized into the following groups: infrequent <1%, sparse 1-5%, common 5-25%, abundant>25%.

Type	Plant Code	Plant Species	Ocular Cover Class (%) '13	'14
G	FEBR	*Festuca brachyphylla*	Common	Sparse
G	POAR2	*Poa arctica*	Infrequent	Sparse
G	POSE	*Poa secunda*	Infrequent	Infrequent
F	ANSE4	*Androsace septentrionalis*	-	Infrequent
F	ARKI	*Arenaria kingii*	Infrequent	Infrequent
F	CAOC4	*Castilleja occidentalis*	-	Infrequent
F	CEBE2	*Cerastium beeringianum*	Sparse	Infrequent
F	DRAU	*Draba aurea*	Infrequent	Infrequent
F	ERMA9	*Erigeron mancus*	Sparse	Sparse
F	GERO2	*Geum rossii*	Infrequent	Infrequent
F	MIOB2	*Minuartia obtusiloba*	Common	Common
F	NOFE3	*Noccaea fendleri*	Infrequent	-
F	ORBA	*Oreoxis bakeri*	Abundant	Common
F	OXPA2	*Oxytropis parryi*	Sparse	Infrequent
F	PHSE	*Phacelia sericea*	-	Infrequent
F	POVI	*Polemonium viscosum*	Infrequent	Infrequent
F	PODI2	*Potentilla diversifolia*	Sparse	Sparse
F	POGR9	*Potentilla gracilis*	Infrequent	Infrequent
F	SELA	*Sedum lanceolatum*	Infrequent	Infrequent
F	SEDE2	*Selaginella densa*	Common	Common
F	TEGR3	*Tetraneuris grandiflora*	Infrequent	Infrequent
F	TRNA2	*Trifolium nanum*	Sparse	Sparse

Table 13A-19.7. Animal pellet group transect data by year on the Manns Peak 2 study site.

Type	Days use per acre (ha) '13	'14
Deer	2 (5)	-
Mt Goat/Deer	-	1 (2)

Figure 11: Manns Peak 2, 13A-19. a) Belt 1, 2013. b) Belt 1, 2014.

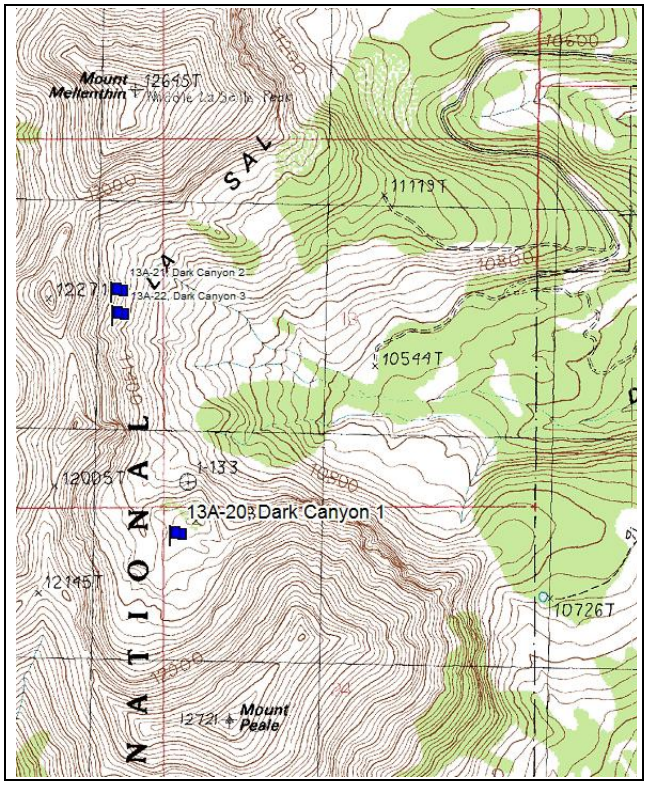
Figure 12: Manns Peak 2, 13A-19. a) Belt 2, 2013. b) Belt 2, 2014.

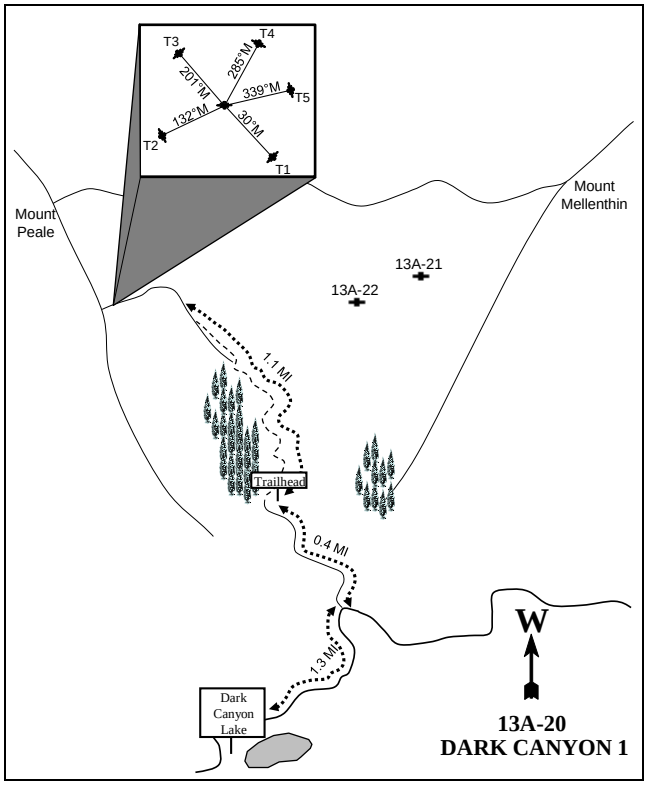
Figure 13: Manns Peak 2, 13A-19. a) Belt 3, 2013. b) Belt 3, 2014.

Figure 14: Manns Peak 2, 13A-19. a) Belt 4, 2013. b) Belt 4, 2014.

Figure 15: Manns Peak 2, 13A-19. a) Belt 5, 2013. b) Belt 5, 2014.

DARK CANYON 1 - TREND STUDY NO. 13A-20





Location Information

USGS 7.5 min Map Info	Mount Peale; Township 27S, Range 24E, Section 24
GPS (0' Stake)	NAD 83, UTM Zone 12, 655168 East 4264188 North

Transect Information

Browse Tag # (0' Stake)	None
Transect Bearing	T1: 30° M, T2: 132° M, T3: 201° M, T4: 285° M, T5: 339° M
Length	100 ft

Site Information

Land Ownership	USFS
Allotment	La Sal
Elevation	11,500 ft (3,505 m)
Aspect	Southwest
Slope	15%
Sample Dates	08/20/2013, 08/13/2014

Directions to Site

Drive south of Moab on US 191 and turn left (east) on to Old Airport Road. Proceed 0.6 miles and turn right on to Spanish Valley Drive/La Sal Mountain Loop Road. Stay on this road for 9 miles and turn right on to Geyser Pass Road. Proceed 12.9 miles to a two-track road that heads up Dark Canyon. Follow this road for 0.4 miles to the end of the road. Hike approximately 1.1 mile to the site. Follow the conifer tree line to the south of the canyon to the tree line then proceed to the south basin. The site is on the lower hill slope of the small hill nestled below Mount Peale. The site is marked with a single rebar as the center stake.

Site Notes
The site was placed to monitor depauperate fleabane (*Erigeron mancus*).

Data Collected
- Density of depauperate fleabane
- Line point intercept
- Species composition strip
- Quadrat nested frequency and cover of all species and ground cover
- Line intercept of depauperate fleabane and sweetflower rockjasmine (*Androsace chamaejasme* ssp. *carinata*)
- Pellet group transect
- Photos

Data Tables

Table 13A-20.1. Rare/endemic species line-intercept cover, quadrat cover, nested frequency measurements by year for the Dark Canyon 1 study site.

Year	Line Intercept Cover (%)	Quadrat Cover (%)	[1]Nested Frequency
Erigeron mancus			
13	0.13	1.04	39
14	0.45	0.65	32
Androsace chamaejasme ssp. *carinata*			
13	*Not collected	0.46	24
14	0.12	0.61	20

*Line intercept data was not collected for *Androsace* in 2013. [1]Maximum nested frequency value is 200.

Table 13A-20.2. Rare/endemic species density and utilization for the Dark Canyon 1 study site.

Year	Density	Utilization			
	Plants per m^2	% None	% Light	% Moderate	% Heavy
Erigeron mancus					
13	0.74	100	0	0	0
14	0.64	100	0	0	0

Table 13A-20.3. Point intercept cover by year of basic ground cover for the Dark Canyon 1 study site.

Cover Type	Line Point Intercept Cover (%) '13	'14
Basal Vegetation	18.31	30.86
Litter	46.88	29.46
Cryptogam	1.41	0.40
Rock >2 cm	16.70	22.44
Pavement	1.21	1.60
Soil without Foliar Cover	9.05	10.22
Soil under Foliar Cover	6.44	5.01

Table 13A-20.4. Modified Daubenmire quadrat cover by year of basic ground cover for the Dark Canyon 1 study site.

Cover Type	Quadrat Cover (%) '13	'14
Vegetation	60.19	60.25
Rock	18.00	16.54
Pavement	1.30	2.49
Litter	24.06	12.41
Cryptogam	13.74	11.24
Bare ground	11.76	12.64

Table 13A-20.5. Line vegetation species composition for the Dark Canyon 1 study site. Ocular cover classes were categorized into the following groups: infrequent <1%, sparse 1-5%, common 5-25%, abundant>25%.

Type	Plant Code	Plant Species	[1]Nested Frequency '13	'14*	Quadrat cover (%) '13	'14*
G	CAREX	*Carex sp.*	140	-	15.31	-
G	ELSC4	*Elymus scribneri*	3	-	0.10	-
G	ELTR	*Elymus trachycaulus*	49	-	5.20	-
G	FEBR	*Festuca brachyphylla*	116	-	8.96	-
G	POAR2	*Poa arctica*	49	-	1.33	-
G	TRSP2	*Trisetum spicatum*	53	-	4.74	-
F	ACMI2	*Achillea millefolium*	68	-	4.41	-
F	ANCHC	*Androsace chamaejasme* ssp. *carinata*	24	20	0.46	0.61
F	ARKI	*Arenaria kingii*	71	-	3.50	-
F	ARSC	*Artemisia scopulorum*	45	-	1.26	-
F	ASTER	*Aster sp.*	2	-	0.01	-
F	CEBE2	*Cerastium beeringianum*	44	-	2.28	-
F	DRAU	*Draba aurea*	38	-	0.86	-
F	ERMA9	*Erigeron mancus*	39	32	1.04	0.65
F	GECA	*Gentiana calycosa*	2	-	0.09	-
F	GEAM3	*Gentianella amarella*	13	-	0.26	-
F	GERO2	*Geum rossii*	110	-	6.85	-
F	MEOB	*Mertensia oblongifolia*	16	-	1.16	-
F	MIOB2	*Minuartia obtusiloba*	21	-	1.33	-
F	NOFE3	*Noccaea fendleri*	80	-	1.28	-
F	ORBA	*Oreoxis bakeri*	8	-	0.53	-
F	POVI	*Polemonium viscosum*	54	-	2.69	-
F	POHI6	*Potentilla hippiana*	1	-	0.08	-
F	PSMO	*Pseudocymopterus montanus*	6	-	0.48	-
F	SARH2	*Saxifraga rhomboidea*	17	-	0.06	-
F	SEDE2	*Selaginella densa*	94	-	11.93	-
F	SOMU	*Solidago multiradiata*	120	-	12.14	-
F	TEGR3	*Tetraneuris grandiflora*	6	-	0.09	-
F	TRNA2	*Trifolium nanum*	96	-	7.88	-

[1]Highest nested frequency value is 200. *Quadrat data for other species (-) was not collected in 2014 due poor weather conditions.

Table 13A-20.6. Animal pellet group transect data by year on the Dark Canyon 1 study site.

Type	Days use per acre (ha) '13	'14
-	-	-

Figure 16: Dark Canyon 1, 13A-20. a) Belt 1, 2013. b) Belt 1, 2014.

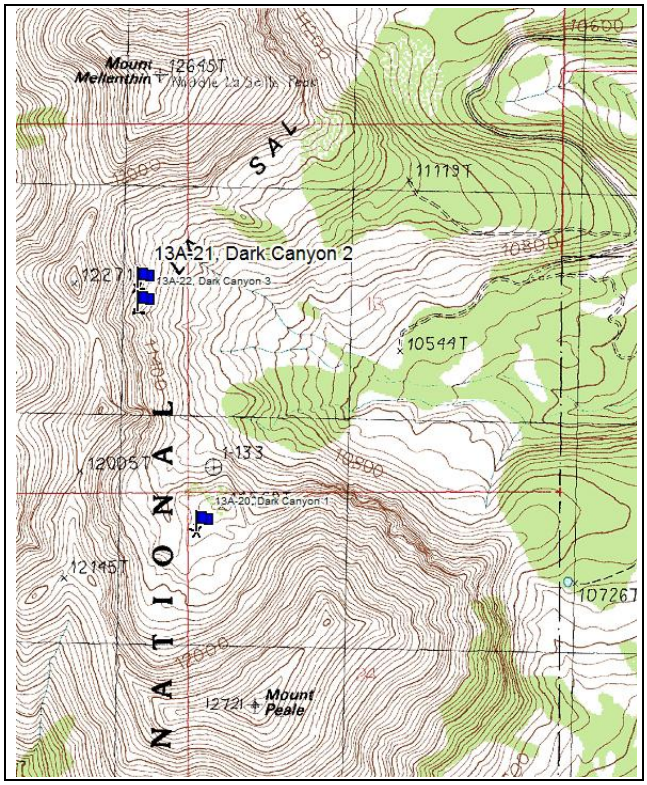
Figure 17: Dark Canyon 1, 13A-20. a) Belt 2, 2013. b) Belt 2, 2014.

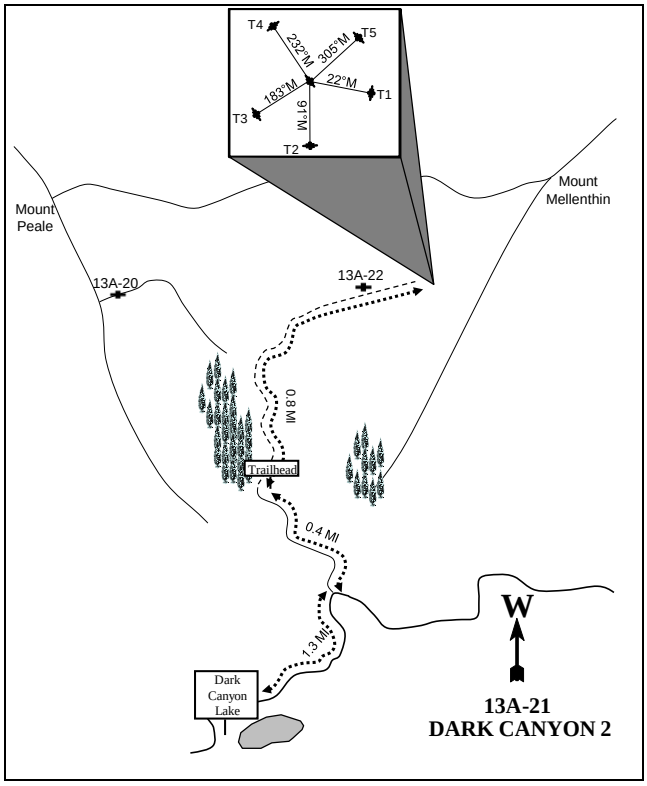
Figure 18: Dark Canyon 1, 13A-20. a) Belt 3, 2013. b) Belt 3, 2014.

Figure 19: Dark Canyon 1, 13A-20. a) Belt 4, 2013. b) Belt 4, 2014.

Figure 20: Dark Canyon 1, 13A-20. a) Belt 4, 2013. b) Belt 4, 2014.

DARK CANYON 2 - TREND STUDY NO. 13A-21





Location Information

USGS 7.5 min Map Info	Mount Peale; Township 27S, Range 24E, Section 14
GPS (0' Stake)	NAD 83, UTM Zone 12, 654000 East 4257759 North

Transect Information

Browse Tag # (0' Stake)	None
Transect Bearing	T1: 22° M, T2: 91° M, T3: 183° M, T4: 232° M, T5: 305° M
Length	100ft

Site Information

Land Ownership	USFS
Allotment	La Sal
Elevation	11,627 ft (3,544 m)
Aspect	East
Slope	60%
Sample Dates	08/20/2013

Directions to Site

Drive south of Moab on US 191 and turn left (east) on to Old Airport Road. Proceed 0.6 miles and turn right on to Spanish Valley Drive/La Sal Mountain Loop Road. Stay on this road for 9 miles and turn right on to Geyser Pass Road. Proceed 12.9 miles to a two-track road that heads up Dark Canyon. Follow this road for 0.4 miles to the end of the road. Hike approximately 0.8 mile to the site. Follow the conifer tree line to the south of the canyon to the tree line then proceed up the steep canyon to the east. The site is located mid slope up a ridge near a large boulder. The site is marked with a single rebar as the center stake.

Site Notes
The site was placed to monitor mountain goat habitat.

Data Collected
- Line point intercept
- Species composition strip
- Line intercept of gooseberry currant (*Ribes montigenum*)
- Pellet group transect
- Photos

Data Tables

Table 13A-21.1. Major shrub species line-intercept cover by year for the Dark Canyon 2 study site.

Year	Line Intercept Cover (%)
Ribes montigenum	
13	10.13

Table 13A-21.2. Point intercept cover by year of basic ground cover for the Dark Canyon 2 study site.

Cover Type	Line Point Intercept Cover (%) '13
Basal Vegetation	4.00
Litter	12.60
Cryptogam	0.00
Rock >2 cm	23.00
Pavement	10.40
Soil without Foliar Cover	20.80
Soil under Foliar Cover	29.20

Table 13A-21.3. Line vegetation species composition for the Dark Canyon 2 study site. Ocular cover classes were categorized into the following groups: infrequent <1%, sparse 1-5%, common 5-25%, abundant>25%.

Type	Plant Code	Plant Species	Ocular Cover Class (%) '13
G	BRMA4	*Bromus marginatus*	Infrequent
G	BRAN	*Bromus anomalus*	Infrequent
G	CAREX	*Carex sp.*	Infrequent
G	ELTR	*Elymus trachycaulus*	Infrequent
G	FEBR	*Festuca brachyphylla*	Infrequent
G	FETH	*Festuca thurberi*	Sparse
G	POAR2	*Poa arctica*	Infrequent
G	POFE	*Poa fendleri*	Infrequent
F	ACMI2	*Achillea millefolium*	Sparse
F	ZIEL2	*Zigadenus elegans*	Infrequent
F	DRCR2	*Draba crassifolia*	Infrequent
F	ERSP4	*Erigeron speciosus*	Sparse
F	HEQU2	*Helianthella quinquenervis*	Infrequent
F	HEVI4	*Heterotheca villosa*	Sparse
F	HYHO	*Hymenoxys hoopesii*	Sparse
F	LALA3	*Lathyrus lanszwertii*	Sparse
F	MEAR6	*Mertensia arizonica*	Infrequent
F	MOGL	*Monardella glauca*	Sparse
F	PEWA	*Penstemon watsonii*	Infrequent
F	PHSE	*Phacelia sericea*	Infrequent
F	POGR9	*Potentilla gracilis*	Infrequent
F	PSMO	*Pseudocymopterus montanus*	Infrequent
F	SOMU	*Solidago multiradiata*	Infrequent
F	THFE	*Thalictrum fendleri*	Sparse
F	VICA4	*Vicia canadensis*	Infrequent
B	JUCO6	*Juniperus communis*	Common
B	RIMO2	*Ribes montigenum*	Sparse

Table 13A-21.4. Animal pellet group transect data by year on the Dark Canyon 2 study site.

Type	Days use per acre (ha) '13
Deer	4 (10)
Cattle	2 (5)

Figure 21: Dark Canyon 2, 13A-21. a) Belt 1, 2013.

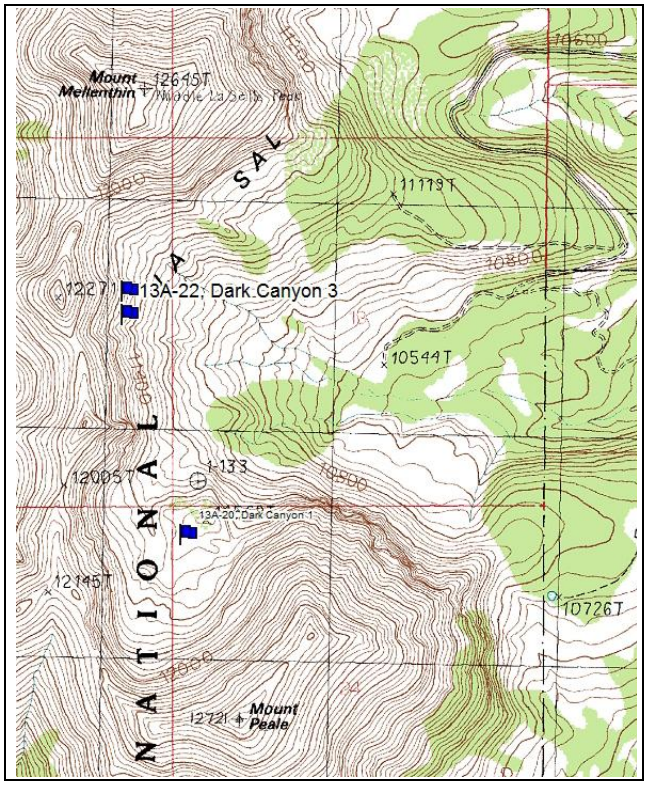
Figure 22: Dark Canyon 2, 13A-21. a) Belt 2, 2013.

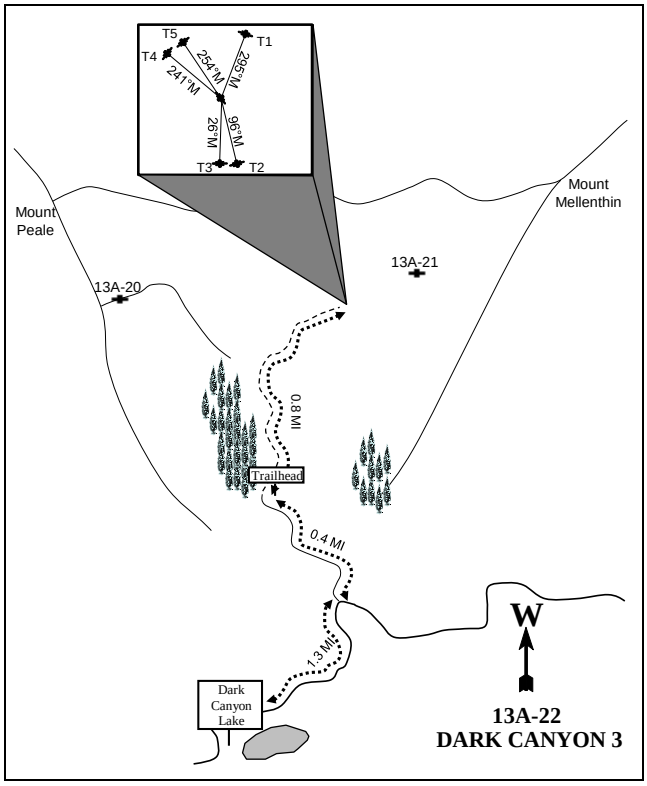
Figure 23: Dark Canyon 2, 13A-21. a) Belt 3, 2013.

Figure 24: Dark Canyon 2, 13A-21. a) Belt 4, 2013.

Figure 25: Dark Canyon 2, 13A-21. a) Belt 5, 2013.

DARK CANYON 3 - TREND STUDY NO. 13A-22





Location Information

USGS 7.5 min Map Info	Mount Peale; Township 26S, Range 24E, Section 25
GPS (0' Stake)	NAD 83, UTM Zone 12, 654915 East 4264137 North

Transect Information

Browse Tag # (0' Stake)	None
Transect Bearing	T1: 295° M, T2: 96° M, T3: 26° M, T4: 241° M, T5: 254° M
Length	100ft

Site Information

Land Ownership	USFS
Allotment	La Sal
Elevation	11,518 ft (3,511 m)
Aspect	East
Slope	60%
Sample Dates	08/13/2014

Directions to Site

Drive south of Moab on US 191 and turn left (east) on to Old Airport Road. Proceed 0.6 miles and turn right on to Spanish Valley Drive/La Sal Mountain Loop Road. Stay on this road for 9 miles and turn right on to Geyser Pass Road. Proceed 12.9 miles to a two-track road that heads up Dark Canyon. Follow this road for 0.4 miles to the end of the road. Hike approximately 0.8 mile to the site. Follow the conifer tree line to the south of the canyon to the tree line then proceed up the steep canyon to the east. The site is located mid slope up the canyon. The site is marked with a single rebar as the center stake.

Site Notes
The site was placed to monitor dwarf mountain ragwort (*Senecio fremontii* var. *inexpectatus*).

Data Collected
- Density of dwarf mountain ragwort and showy draba (*Draba spectabilis* var. *spectabilis*)
- Line point intercept
- Species composition strip
- Line intercept of mountain ragwort and showy draba
- Pellet group transect
- Photos

Data Tables

Table 13A-22.1. Rare/endemic species line-intercept cover by year for the Dark Canyon 3 study site.

Year	Line Intercept Cover (%)
Senecio fremontii var. *inexpectatus*	
14	0.78
Draba spectabilis var. *spectabilis*	
14	0.03

Table 13A-22.2. Rare/endemic species density and utilization for the Dark Canyon 3 study site.

Year	Density	Utilization			
	Plants per Meter^2	% None	% Light	% Moderate	% Heavy
Senecio fremontii var. *inexpectatus*					
14	0.41	100	0	0	0
Draba spectabilis var. *spectabilis*					
14	0.24	100	0	0	0

Table 13A-22.3. Point intercept cover by year of basic ground cover for the Dark Canyon 3 study site.

Cover Type	Line Point Intercept Cover (%) '14
Basal Vegetation	6.24
Litter	0.80
Cryptogam	0.00
Rock >2 cm	59.56
Pavement	12.47
Soil without Foliar Cover	13.88
Soil under Foliar Cover	7.04

Table 13A-22.4. Line vegetation species composition for the Dark Canyon 3 study site. Ocular cover classes were categorized into the following groups: infrequent <1%, sparse 1-5%, common 5-25%, abundant>25%.

Type	Plant Code	Plant Species	Ocular Cover Class (%) '13
G	BRMA4	*Bromus marginatus*	Infrequent
G	ELTR	*Elymus trachycaulus*	Infrequent
G	POAR2	*Poa arctica*	Infrequent
G	POSE	*Poa secunda*	Infrequent
G	TRSP2	*Trisetum spicatum*	Infrequent
F	ACMI2	*Achillea millefolium*	Infrequent
F	ARDR	*Arabis drummondii*	Infrequent
F	ARMO4	*Arnica mollis*	Sparse
F	CIRSI	*Cirsium sp.*	Infrequent
F	DRSP	*Draba spectabilis* var. *spectabilis*	Infrequent
F	ERSP4	*Erigeron speciosus*	Infrequent
F	FRVI	*Fragaria virginiana*	Sparse
F	FRSP	*Frasera speciosa*	Sparse
F	HEVI4	*Heterotheca villosa*	Sparse
F	HYHO	*Hymenoxys hoopesii*	Infrequent
F	LALA3	*Lathyrus lanszwertii*	Infrequent
F	MOGL	*Monardella glauca*	Sparse
F	NOFE3	*Noccaea fendleri*	Infrequent
F	OXDI3	*Oxyria digyna*	Infrequent
F	PEWH	*Penstemon whippleanus*	Infrequent
F	POGR9	*Potentilla gracilis*	Infrequent
F	PSMO	*Pseudocymopterus montanus*	Infrequent
F	RAIN	*Ranunculus inamoenus*	Infrequent
F	SECR	*Senecio crassulus*	Infrequent
F	SEFRI	*Senecio fremontii* var. *inexpectatus*	Infrequent
F	SOMU	*Solidago multiradiata*	Infrequent
F	THFE	*Thalictrum fendleri*	Infrequent
F	TRNA2	*Trifolium nanum*	Infrequent
F	ZIEL2	*Zigadenus elegans*	Infrequent
B	RIMO2	*Ribes montigenum*	Infrequent

Table 13A-22.5. Animal pellet group transect data by year on the Dark Canyon 3 study site.

Type	Days use per acre (ha) '14
-	-

Figure 26: Dark Canyon 3, 13A-22. a) Belt 1, 2014.

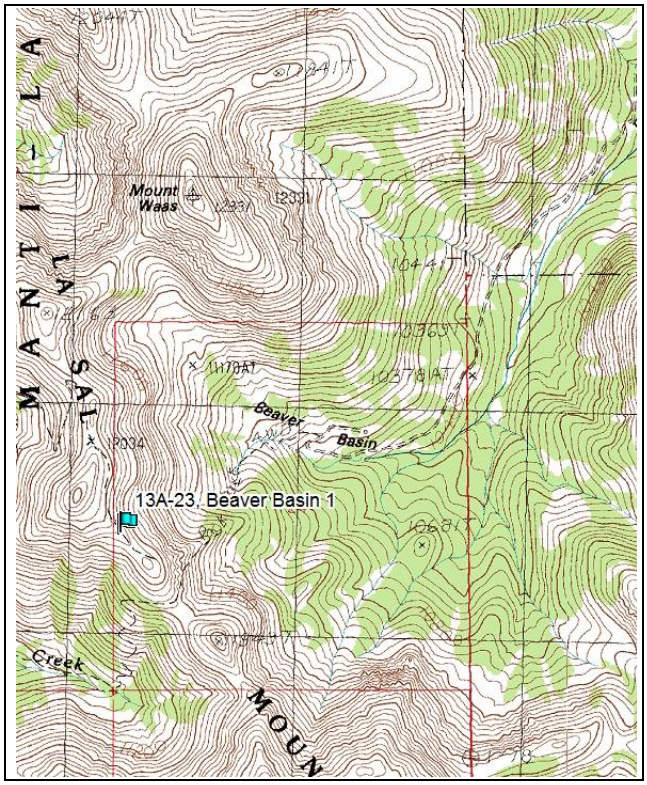
Figure 27: Dark Canyon 3, 13A-22. a) Belt 2, 2014.

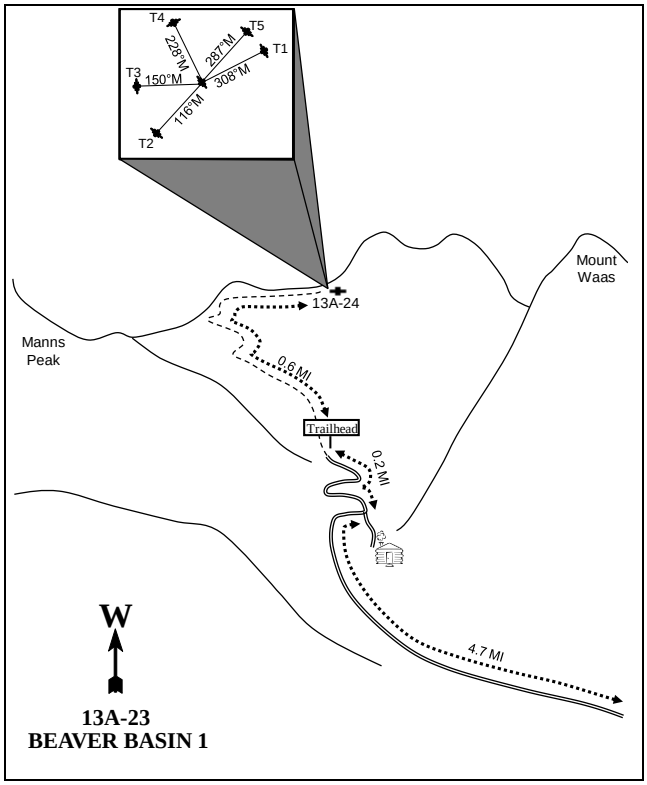
Figure 28: Dark Canyon 3, 13A-22. a) Belt 3, 2014.

Figure 29: Dark Canyon 3, 13A-22. a) Belt 4, 2014.

Figure 30: Dark Canyon 3, 13A-22. a) Belt 5, 2014.

BEAVER BASIN 1 - TREND STUDY NO. 13A-23





Location Information

USGS 7.5 min Map Info	Mount Waas; Township 26S, Range 24E, Section 24
GPS (0' Stake)	NAD 83, UTM Zone 12, 654160 East 4265626 North

Transect Information

Browse Tag # (0' Stake)	None
Transect Bearing	T1: 308° M, T2: 116° M, T3: 150° M, T4: 228° M, T5: 287° M
Length	100ft

Site Information

Land Ownership	USFS
Allotment	None
Elevation	11,916 ft (3,632 m)
Aspect	South
Slope	45%
Sample Dates	08/21/2013, 08/12/2014

Directions to Site

Drive east of Moab on SR 128 and turn left (south) on Castleton Road. Proceed 10.7 miles and stay left on to North End Road and continue for 10.2 miles. Turn left on Dons Lake Road proceed for 4.7 miles to a fork. Park near here the road becomes nearly impassable. Hike up the road for 0.2 miles to the trailhead. From the trailhead, hike approximately 0.6 mile up the ridge to the top. The study is located on the ridge top. The site is marked with a single rebar as the center stake.

Site Notes
The site was placed to monitor depauperate fleabane (*Erigeron mancus*).

Data Collected
- Density of depauperate fleabane
- Line point intercept
- Species composition strip
- Quadrat nested frequency and cover of all species and ground cover
- Line intercept of depauperate fleabane and sweetflower rockjasmine (*Androsace chamaejasme* ssp. *carinata*)
- Pellet group transect
- Photos

Data Tables

Table 13A-23.1. Rare/endemic species line-intercept cover, quadrat cover, nested frequency measurements by year for the Beaver Basin 1 study site.

Year	Line Intercept Cover (%)	Quadrat Cover (%)	[1]Nested Frequency
Erigeron mancus			
13	3.15	6.84	129
14	6.10	8.01	120
Androsace chamaejasme ssp. *carinata*			
13	*Not collected	2.90	66
14	0.52	3.70	58

*Line intercept data was not collected for *Androsace* in 2013. [1]Maximum nested frequency value is 200.

Table 13A-23.2. Rare/endemic species density and utilization for the Beaver Basin 1 study site.

Year	Density	Utilization			
	Plants per m^2	% None	% Light	% Moderate	% Heavy
Erigeron mancus					
13	18.82	100	0	0	0
14	22.38	100	0	0	0

Table 13A-23.3. Point intercept cover by year of basic ground cover for the Beaver Basin 1 study site.

Cover Type	Line Point Intercept Cover (%) '13	'14
Basal Vegetation	15.00	23.45
Litter	5.20	0.40
Cryptogam	0.00	0.00
Rock >2 cm	47.60	32.26
Pavement	19.80	27.86
Soil without Foliar Cover	7.00	4.41
Soil under Foliar Cover	5.40	11.62

Table 13A-23.4. Modified Daubenmire quadrat cover by year of basic ground cover for the Beaver Basin 1 study site.

Cover Type	Quadrat Cover (%)	
	'13	'14
Vegetation	44.63	39.88
Rock	39.69	40.44
Pavement	26.41	29.51
Litter	10.08	10.91
Cryptogam	0.35	0.19
Bare ground	6.69	6.75

Table 13A-23.5. Line vegetation species composition for the Beaver Basin 1 study site. Ocular cover classes were categorized into the following groups: infrequent <1%, sparse 1-5%, common 5-25%, abundant>25%.

Type	Plant Code	Plant Species	[1]Nested Frequency		Quadrat cover (%)	
			'13	'14	'13	'14
G	CANO3	*Carex nova*	9	4	0.10	0.09
G	FEBR	*Festuca brachyphylla*	43	50	0.89	1.24
G	LUSP4	*Luzula spicata*	-	3	-	0.01
G	POAR2	*Poa arctica*	91	104	0.89	2.59
F	ANCHC	*Androsace chamaejasme* ssp. *carinata*	66	58	2.90	3.70
F	ANSE4	*Androsace septentrionalis*	12	6	0.06	0.04
F	ARKI	*Arenaria kingii*	138	120	7.70	7.50
F	CEBE2	*Cerastium beeringianum*	8	8	0.05	0.10
F	DRAU	*Draba aurea*	38	48	0.29	0.26
F	DRCR2	*Draba crassifolia*	-	4	0	0.01
F	ERMA9	*Erigeron mancus*	129	120	6.84	8.01
F	GEAM3	*Gentianella amarella*	1	-	0.01	-
F	GERO2	*Geum rossii*	136	131	6.83	9.31
F	MIOB2	*Minuartia obtusiloba*	124	117	7.09	8.38
F	NOFE3	*Noccaea fendleri*	82	58	0.36	0.51
F	ORBA	*Oreoxis bakeri*	126	110	5.73	5.33
F	OXPA2	*Oxytropis parryi*	69	62	0.95	1.15
F	POOV2	*Potentilla ovina*	6	2	0.03	0.08
F	SIAC	*Silene acaulis*	1	5	0.01	0.53
F	TEGR3	*Tetraneuris grandiflora*	31	33	0.40	0.61
F	TRNA2	*Trifolium nanum*	86	68	4.59	5.84

[1]Maximum nested frequency value is 200.

Table 13A-23.6. Animal pellet group transect data by year on the Beaver Basin 1 study site.

Type	Days use per acre (ha)	
	'13	'14
-	-	-

Figure 31: Beaver Basin 1, 13A-23. a) Belt 1, 2013. b) Belt 1, 2014.

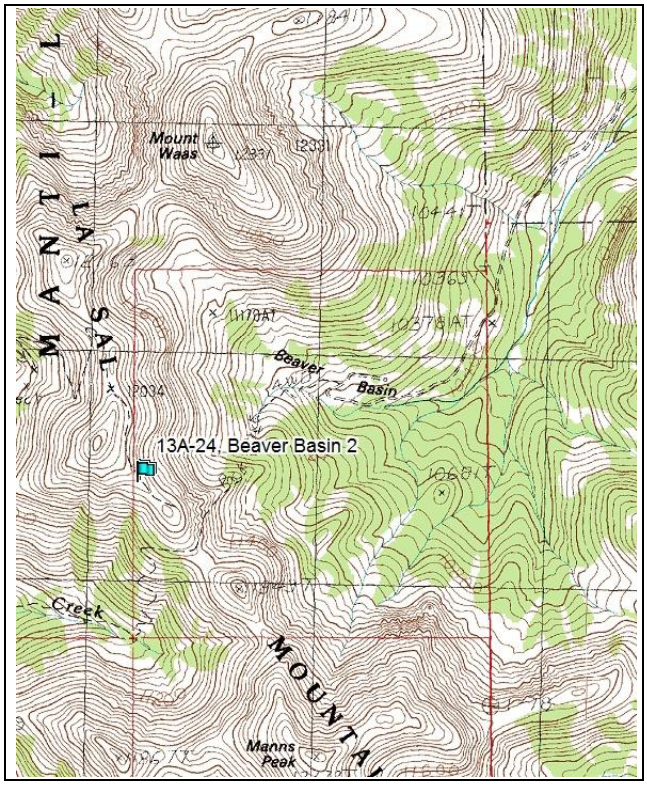
Figure 32: Beaver Basin 1, 13A-23. a) Belt 2, 2013. b) Belt 2, 2014.

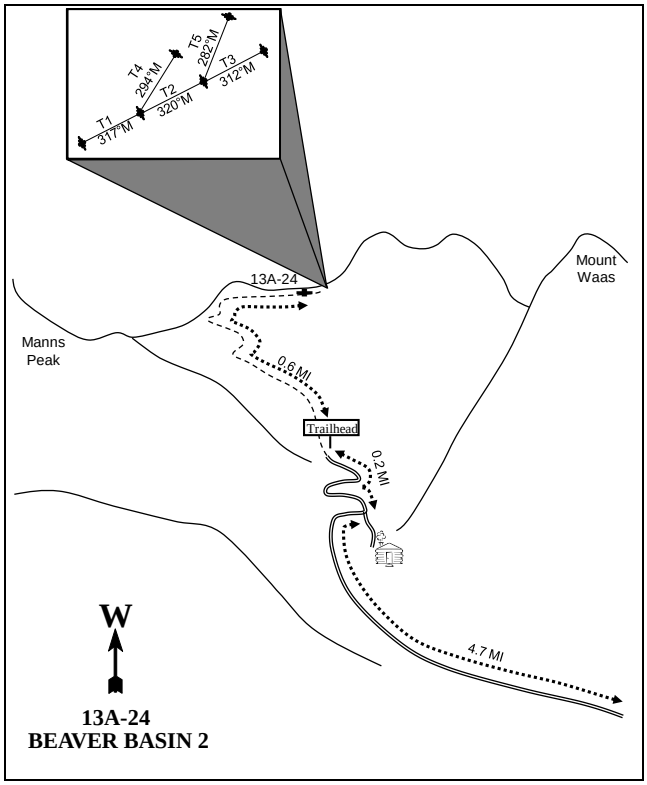
Figure 33: Beaver Basin 1, 13A-23. a) Belt 3, 2013. b) Belt 3, 2014.

Figure 34: Beaver Basin 1, 13A-23. a) Belt 4, 2013. b) Belt 4, 2014.

Figure 35: Beaver Basin 1, 13A-23. a) Belt 5, 2013. b) Belt 5, 2014.

BEAVER BASIN 2 - TREND STUDY NO. 13A-24





Location Information

USGS 7.5 min Map Info	Mount Waas; Township 26S, Range 24E, Section 24
GPS (0' Stake)	NAD 83, UTM Zone 12, 654169 East 4265637 North

Transect Information

Browse Tag # (0' Stake)	None
Transect Bearing	T1: 317° M, T2: 320° M, T3: 312° M, T4: 137° M, T5: 185° M
Length	300ft, T4 originates from 100ft stake and T5 originates from 200ft stake

Site Information

Land Ownership	USFS
Allotment	None
Elevation	11,916 ft (3,632 m)
Aspect	Northeast
Slope	60%
Sample Dates	08/21/2013, 08/12/2014

Directions to Site

Drive south of Moab on US 191 and turn left (east) on to Old Airport Road. Proceed 0.6 miles and turn right on to Spanish Valley Drive/La Sal Mountain Loop Road. Stay on this road for 9 miles and turn right on to Geyser Pass Road. Proceed 9 miles to Burro Pass turnoff and turn right. Follow this road for 1.1 miles to the Burro Pass trailhead. From the trailhead, hike approximately 1 mile to Burro Pass. From Burro Pass the trail will split take the trail heading north up the ridge heading towards Manns Peak. Continue on this trail approximately 0.8 miles to the study site. The site is marked with a single rebar as the center stake.

Site Notes

The site was placed to monitor dwarf mountain ragwort (*Senecio fremontii* var. *inexpectatus*). It was noted that there was herbivory of the silky phacelia (*Phacelia sericea*) and whipple's penstemon (*Penstemon whippleanus*) in both sample years.

Data Collected

- Density of dwarf mountain ragwort
- Line point intercept
- Species composition strip
- Line intercept of mountain ragwort
- Pellet group transect
- Photos

Data Tables

Table 13A-24.1. Rare/endemic species line-intercept cover, quadrat cover, nested frequency measurements by year for the Beaver Basin 2 study site.

Year	Line Intercept Cover (%)
Senecio fremontii var. *inexpectatus*	
13	5.37
14	3.93

Table 13A-24.2. Rare/endemic species density and utilization for the Beaver Basin 2 study site.

Year	Density	Utilization			
	Plants per m^2	% None	% Light	% Moderate	% Heavy
Senecio fremontii var. *inexpectatus*					
13	2.70	100	0	0	0
14	3.58	100	0	0	0

Table 13A-24.3. Point intercept cover by year of basic ground cover for the Beaver Basin 2 study site.

Cover Type	Line Point Intercept Cover (%) '13	'14
Basal Vegetation	3.99	2.61
Litter	3.79	1.20
Cryptogam	0.00	0.00
Rock >2 cm	33.13	43.57
Pavement	37.13	39.56
Soil without Foliar Cover	17.37	8.63
Soil under Foliar Cover	4.59	4.42

Table 13A-24.4. Line vegetation species composition for the Beaver Basin 2 study site. Ocular cover classes were categorized into the following groups: infrequent <1%, sparse 1-5%, common 5-25%, abundant>25%.

Type	Plant Code	Plant Species	Ocular Cover Class (%)	
			'13	'14
G	ELTR	*Elymus trachycaulus*	Infrequent	Infrequent
G	FEBR	*Festuca brachyphylla*	Infrequent	Infrequent
G	PHPR3	*Phleum pratense*	Sparse	Sparse
G	PHAL2	*Phleum alpinum*	-	Infrequent
G	POAR2	*Poa arctica*	Infrequent	Infrequent
F	ACMI2	*Achillea millefolium*	Common	Sparse
F	AGAU2	*Agroseris aurantiaca*	Infrequent	Infrequent
F	ANSE4	*Androsace septentrionalis*	Infrequent	Infrequent
F	ARKI	*Arenaria kingii*	Sparse	Infrequent
F	ARDR	*Arabis drummondi*	-	Infrequent
F	ARSC	*Artemisia scopulorum*	Infrequent	Infrequent
F	CAREX	*Carex nova*	Infrequent	-
F	CAOC4	*Castilleja occidentalis*	Infrequent	Infrequent
F	CEAR4	*Cerastium arvense*	Infrequent	Infrequent
F	CEBE2	*Cerastium beeringianum*	Infrequent	Infrequent
F	CHAT	*Chenopodium atrovirens*	Infrequent	-
F	OXDI3	*Oxyria digyna*	Infrequent	Infrequent
F	ERMA9	*Erigeron mancus*	Infrequent	Infrequent
F	ERUR2	*Erigeron ursinus*	Infrequent	Infrequent
F	GERO2	*Geum rossii*	Infrequent	Sparse
F	LEPY2	*Lewisia pygmaea*	Infrequent	-
F	MIOB2	*Minuartia obtusiloba*	Infrequent	Infrequent
F	NOFE3	*Noccaea fendleri*	Infrequent	Infrequent
F	ORBA	*Oreoxis bakeri*	Sparse	Infrequent
F	PEWH	*Penstemon whippleanus*	Sparse	Infrequent
F	PHSE	*Phacelia sericea*	Infrequent	Infrequent
F	PODI2	*Potentilla diversifolia*	Infrequent	Infrequent
F	POGR9	*Potentilla gracilis*	Infrequent	Infrequent
F	SEFRI	*Senecio fremontii* var. *inexpectatus*	Common	Sparse
F	SIPR	*Sibbaldia procumbens*	Infrequent	-
F	SOMU	*Solidago multiradiata*	Infrequent	Infrequent
F	TAOF	*Taraxacum officinale*	Infrequent	Infrequent
F	TEGR3	*Tetraneuris grandiflora*	Infrequent	Infrequent
F	TRNA2	*Trifolium nanum*	Sparse	Sparse
B	RIMO2	*Ribes montigenum*	Infrequent	Infrequent

Table 13A-24.5. Animal pellet group transect data by year on the Beaver Basin 2 study site.

Type	Days use per acre (ha)	
	'13	'14
Deer	5 (13)	-

Figure 36: Beaver Basin 2, 13A-24. a) Belt 1, 2013. b) Belt 1, 2014.

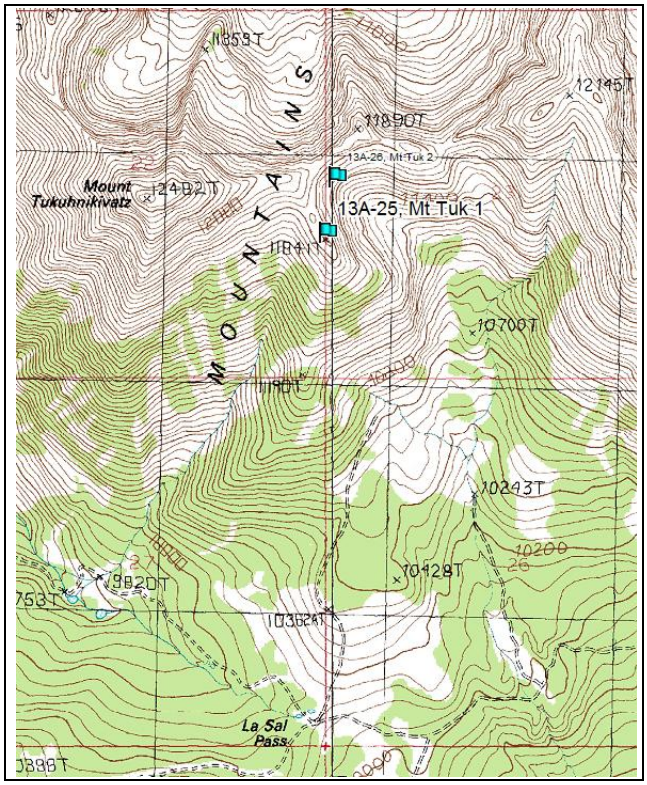
Figure 37: Beaver Basin 2, 13A-24. a) Belt 2, 2013. b) Belt 2, 2014.

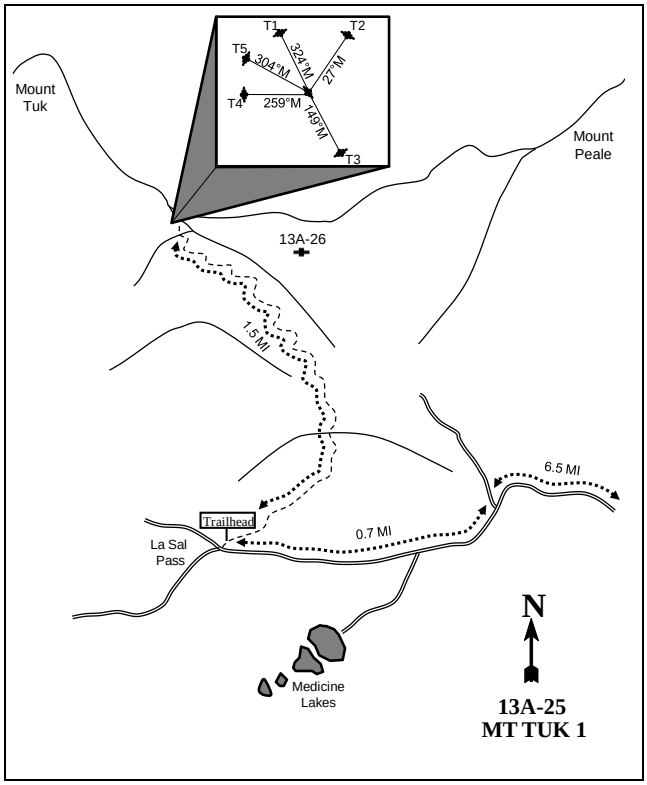
Figure 38: Beaver Basin 2, 13A-24. a) Belt 3, 2013. b) Belt 3, 2014.

Figure 39: Beaver Basin 2, 13A-24. a) Belt 4, 2013. b) Belt 4, 2014.

Figure 40: Beaver Basin 2, 13A-24. a) Belt 5, 2013. b) Belt 5, 2014.

MT TUK 1 - TREND STUDY NO. 13A-25





Location Information

USGS 7.5 min Map Info	Mount Waas; Township 26S, Range 24E, Section 24
GPS (0' Stake)	NAD 83, UTM Zone 12, 654160 East 4265626 North

Transect Information

Browse Tag # (0' Stake)	None
Transect Bearing	T1: 324° M, T2: 27° M, T3: 149° M, T4: 259° M, T5: 304° M
Length	100ft

Site Information

Land Ownership	USFS
Allotment	None
Elevation	11,763 ft (3,585 m)
Aspect	Southwest
Slope	35-45%
Sample Dates	08/22/2013, 08/14/2014

Directions to Site

Drive south of Moab on US 191 and turn left (east) on to SR 46. Drive east for 12.6 miles to Two Mile Road. From SR 46 turn on to Two Mile Road, drive 1.7 miles to the La Sal Pass Road. Turn left on to the La Sal Pass Road and drive 7.0 mile to a parking area. From the trailhead, hike approximately 1.5 mile up the ridge to the top. The study is located on the ridge top. The site is marked with a single rebar as the center stake.

Site Notes
The site was placed to monitor depauperate fleabane (*Erigeron mancus*).

Data Collected
- Density of depauperate fleabane
- Line point intercept
- Species composition strip
- Quadrat nested frequency and cover of depauperate fleabane and ground cover
- Line intercept of depauperate fleabane
- Pellet group transect
- Photos

Data Tables

Table 13A-25.1. Rare/endemic species line-intercept cover, quadrat cover, nested frequency measurements by year for the Mt Tuk 1 study site.

YEAR	Line Intercept Cover (%)	Quadrat Cover (%)	[1]Nested Frequency
Erigeron mancus			
13	2.17	3.55	62
14	2.93	5.40	76

[1]Maximum nested frequency value is 200.

Table 13A-25.2. Rare/endemic species density and utilization for the Mt Tuk 1 study site.

Year	Density	Utilization			
	Plants per m^2	% None	% Light	% Moderate	% Heavy
Erigeron mancus					
13	5.71	100	0	0	0
14	5.13	100	0	0	0

Table 13A-25.3. Point intercept cover by year of basic ground cover for the Mt Tuk 1 study site.

Cover Type	Line Point Intercept Cover (%) '13	'14
Basal Vegetation	18.64	23.25
Litter	17.03	13.23
Cryptogam	0.80	0.00
Rock >2 cm	37.88	39.88
Pavement	12.22	11.82
Soil without Foliar Cover	8.62	8.22
Soil under Foliar Cover	4.81	3.61

Table 13A-25.4. Modified Daubenmire quadrat cover by year of basic ground cover for the Mt Tuk 1 study site.

Cover Type	Quadrat Cover (%) '13	'14
Vegetation	48.15	54.13
Rock	28.20	26.04
Pavement	14.88	9.74
Litter	0.28	0.21
Cryptogam	0.15	6.54
Bare ground	7.68	6.04

Table 13A-25.5. Line vegetation species composition for the Mt Tuk 1 study site. Ocular cover classes were categorized into the following groups: infrequent <1%, sparse 1-5%, common 5-25%, abundant>25%.

Type	Plant Code	Plant Species	Ocular Cover Class (%) '13	'14
G	CAEL3	*Carex elymoides*	-	Infrequent
G	ELSC4	*Elymus scribneri*	Sparse	Sparse
G	FEBR	*Festuca brachyphylla*	Common	Common
G	POAR2	*Poa arctica*	Sparse	Sparse
G	POFE	*Poa fendleri*	Infrequent	Infrequent
G	POSE	*Poa secunda*	Infrequent	Sparse
G	TRSP2	*Trisetum spicatum*	-	Infrequent
F	ACMI2	*Achillea millefolium*	Infrequent	Infrequent
F	ARKI	*Arenaria kingii*	Common	Common
F	CARH4	*Castilleja rhexiifolia*	-	Infrequent
F	CEAR4	*Cerastium arvense*	Infrequent	Sparse
F	CEBE2	*Cerastium beeringianum*	Infrequent	Infrequent
F	DRAU	*Draba aurea*	Infrequent	Sparse
F	ERMA9	*Erigeron mancus*	Sparse	Sparse
F	GERO2	*Geum rossii*	Infrequent	Infrequent
F	MIOB2	*Minuartia obtusiloba*	Sparse	Sparse
F	NOFE3	*Noccaea fendleri*	-	Infrequent
F	ORBA	*Oreoxis bakeri*	Infrequent	Infrequent
F	POVI	*Polemonium viscosum*	Infrequent	Infrequent
F	PODI2	*Potentilla diversifolia*	Sparse	Sparse
F	PONI2	*Potentilla nivea*	Infrequent	Infrequent
F	SELA	*Sedum lanceolatum*	Sparse	Infrequent
F	SEDE2	*Selaginella densa*	Common	Common
F	TRNA2	*Trifolium nanum*	Common	Common

Table 13A-25.6. Animal pellet group transect data by year on the Mt Tuk 1 study site.

Type	Days use per acre (ha) '13	'14
-	-	-

Figure 41: Mt Tuk 1, 13A-25. a) Belt 1, 2013. b) Belt 1, 2014.

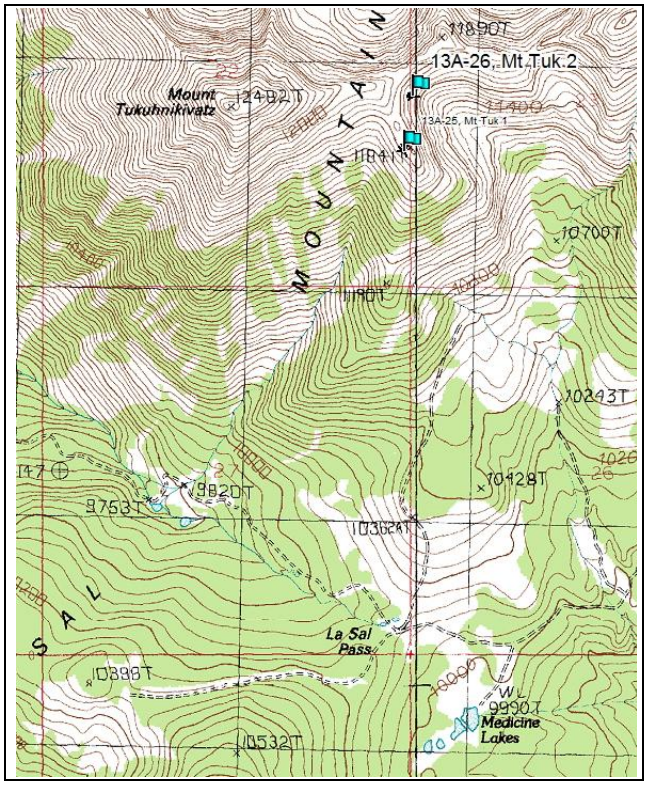
Figure 42: Mt Tuk 1, 13A-25. a) Belt 2, 2013. b) Belt 2, 2014.

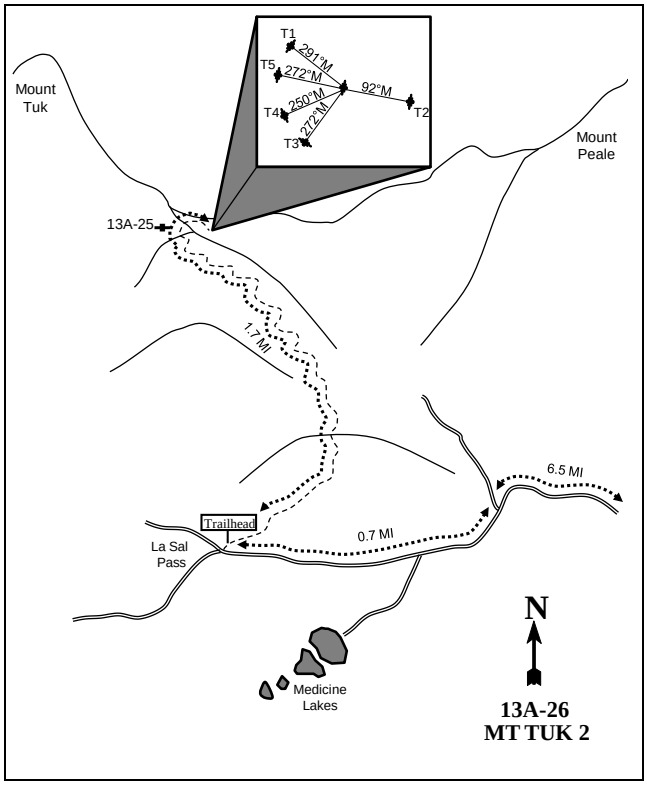
Figure 43: Mt Tuk 1, 13A-25. a) Belt 3, 2013. b) Belt 3, 2014.

Figure 44: Mt Tuk 1, 13A-25. a) Belt 4, 2013. b) Belt 4, 2014.

Figure 45: Mt Tuk 1, 13A-25. a) Belt 5, 2013. b) Belt 5, 2014.

MT TUK 2 - TREND STUDY NO. 13A-26





Location Information

USGS 7.5 min Map Info	Mount Waas; Township 26S, Range 24E, Section 25
GPS (0' Stake)	NAD 83, UTM Zone 12, 654915 East 4264137 North

Transect Information

Browse Tag # (0' Stake)	None
Transect Bearing	T1: 291° M, T2: 92° M, T3: 227° M, T4: 250° M, T5: 272° M
Length	100ft

Site Information

Land Ownership	USFS
Allotment	None
Elevation	11,676 ft (3,559 m)
Aspect	Northeast
Slope	55%
Sample Dates	08/22/2013, 08/14/2014

Directions to Site

Drive south of Moab on US 191 and turn left (east) on to SR 46. Drive east for 12.6 miles to Two Mile Road From SR 46 turn on to Two Mile Road, drive 1.7 miles to the La Sal Pass Road. Turn left on to the La Sal Pass Road and drive 7.0 mile to a parking area. From the trailhead, hike approximately 1.7 mile up the ridge to the top. The study is located on the ridge top. The site is marked with a single rebar as the center stake.

Site Notes
The site was placed to monitor dwarf mountain ragwort (*Senecio fremontii* var. *inexpectatus*).

Data Collected
- Density of dwarf mountain ragwort and showy draba (*Draba spectabilis* var. *spectabilis*)
- Line point intercept
- Species composition strip
- Line intercept of mountain ragwort and showy draba
- Pellet group transect
- Photos

Data Tables

Table 13A-26.1. Rare/endemic species line-intercept cover, quadrat cover, nested frequency measurements by year for the Mt Tuk 2 study site.

Year	Line Intercept Cover (%)
Senecio fremontii var. *inexpectatus*	
13	1.28
14	0.85
Draba spectabilis var. *spectabilis*	
13	0
14	0.08

Table 13A-26.2. Rare/endemic species density and utilization for the Mt Tuk 2 study site.

Year	Density	Utilization			
	Plants per Meter^2	% None	% Light	% Moderate	% Heavy
Senecio fremontii var. *inexpectatus*					
13	0.73	100	0	0	0
14	0.59	100	0	0	0
Draba spectabilis var. *spectabilis*					
13	0	0	0	0	0
14	0.21	100	0	0	0

Table 13A-26.3. Point intercept cover by year of basic ground cover for the Mt Tuk 2 study site.

Cover Type	Line Point Intercept Cover (%) '13	'14
Basal Vegetation	2.42	3.45
Litter	4.03	0.00
Cryptogam	0.00	0.00
Rock >2 cm	55.65	66.73
Pavement	24.00	15.82
Soil without Foliar Cover	10.08	9.13
Soil under Foliar Cover	2.82	4.87

Table 13A-26.4. Line vegetation species composition for the Mt Tuk 2 study site. Ocular cover classes were categorized into the following groups: infrequent <1%, sparse 1-5%, common 5-25%, abundant>25%.

Type	Plant Code	Plant Species	Ocular Cover Class (%)	
			'13	'14
G	ELTR	*Elymus trachycaulus*	Infrequent	-
G	FEBR	*Festuca brachyphylla*	Infrequent	-
G	PHAL2	*Phleum alpinum*	Infrequent	Infrequent
G	POFE	*Poa fendleriana*	Sparse	Sparse
G	PORE	*Poa reflexa*	Sparse	Infrequent
F	ACMI2	*Achillea millefolium*	Sparse	Sparse
F	AGAU2	*Agroseris aurantiaca*	Infrequent	Infrequent
F	ANSE4	*Androsace septentrionalis*	Infrequent	Infrequent
F	ARDR	*Arabis drummondi*	-	Infrequent
F	ARMO4	*Arnica mollis*	Sparse	Infrequent
F	CARH4	*Castilleja rhexiifolia*	Infrequent	Infrequent
F	CEBE2	*Cerastium beeringianum*	Infrequent	Infrequent
F	DEBA2	*Delphinium barbeyi*	Sparse	Sparse
F	DRAU	*Draba aurea*	Infrequent	Infrequent
F	DRCR2	*Draba crassifolia*	-	Infrequent
F	DRSP	*Draba spectabilis* var. *spectabilis*	Infrequent	Infrequent
F	EPHO	*Epilobium hornemannii*	Infrequent	Infrequent
F	ERUR2	*Erigeron ursinus*	Infrequent	Infrequent
F	GERO2	*Geum rossii*	Infrequent	Infrequent
F	HYHO	*Hymenoxys hoopesii*	Infrequent	Infrequent
F	LEPY2	*Lewisia pygmaea*	-	Infrequent
F	PEWH	*Penstemon whippleanus*	Infrequent	Infrequent
F	PHSE	*Phacelia sericea*	Infrequent	Infrequent
F	POVI	*Polemonium viscosum*	-	Infrequent
F	PODI2	*Potentilla diversifolia*	Infrequent	Infrequent
F	PSMO	*Pseudocymopterus montanus*	Infrequent	Infrequent
F	RAIN	*Ranunculus inamoenus*	Infrequent	Infrequent
F	SEFRI	*Senecio fremontii* var. *inexpectatus*	Infrequent	Infrequent
F	SENEC	*Senecio crassulus*	Sparse	Common
F	SIPR	*Sibbaldia procumbens*	Sparse	Infrequent
F	TAOF	*Taraxacum officinale*	-	Infrequent
F	TRNA2	*Trifolium nanum*	Sparse	Infrequent

Table 13A-26.5. Animal pellet group transect data by year on the Mt Tuk 2 study site.

Type	Days use per acre (ha)	
	'13	'14
-	-	-

Figure 46: Mt Tuk 2, 13A-26. a) Belt 1, 2013. b) Belt 1, 2014.

Figure 47: Mt Tuk 2, 13A-26. a) Belt 2, 2013. b) Belt 2, 2014.

Figure 48: Mt Tuk 2, 13A-26. a) Belt 3, 2013. b) Belt 3, 2014.

Figure 49: Mt Tuk 2, 13A-26. a) Belt 4, 2013. b) Belt 4, 2014.

Figure 50: Mt Tuk 2, 13A-26. a) Belt 5, 2013. b) Belt 5, 2014.

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