

**Alpine Vegetation Impact Assessment of the Mt. Peale Research Natural Area:
2015 Survey Report**



Prepared for:

**Moab-Monticello Ranger District
Manti-La Sal National Forest**

Prepared by:

**Wild Utah Project
Salt Lake City, Utah**

Recommended Citation:

Wild Utah Project. 2015. Alpine Vegetation Impact Assessment of the Mt. Peale Research Natural Area: 2015 Survey Report. Prepared for Moab-Monticello Ranger District Manti-La Sal National Forest. October, 2015. Salt Lake City. <http://wildutahproject.org>

I. Introduction

The La Sal Mountains of the Manti-La Sal National Forest (MLNF) in Utah support an alpine vegetation community uncommon to the Colorado Plateau. Occurring only on high alpine ridges and peaks with unique biological soils, several rare and endemic plant species rely on mountain ranges like the La Sals to serve as ‘sky islands’ of habitat. Numerous special status plant species are found in the La Sal Mountains including but not limited to *Erigeron mancus*, *Androsace chamaejasme* var. *carinata* and *Draba abajoensis*, (three both US Forest Service sensitive species), *Besseyia alpina*, *Carex perglobosa*, *Erigeron melanocephalus*, *Oreoxis bakeri*, *Podistera eastwoodiae*, *Saxifraga bronchialis* and *Senecio fremontii* var. *inexpectatus*; some of these occurrences represent the only populations in the state of Utah. Each of these species has a NatureServe (2015) state ranking as imperiled or critically imperiled. Importantly, the endemic *Erigeron mancus* (the La Sal Daisy) occurs only on the La Sal Mountains, and nowhere else in the world.

In the fall of 2013, Utah Division of Wildlife Resources (UDWR) introduced 20 non-indigenous mountain goats into the La Sal Mountains, and 15 more in early September of 2014. In addition to the effects of the introduction of a non-native ungulate species which the rare special status plant species in the area did not evolve to co-occur with, these plants have also been susceptible to historic and contemporary impacts of human recreation in this small and popular mountain range. Trampling effects subsequent to human activity have been well documented as an impact on alpine soils and vegetation (Willard and Marr 1970, Hartley 2000, Whinam and Chilcott 2003). Additionally, study of non-native mountain goat impacts on alpine plant communities in areas where mountain goats were not present historically, such as in Olympic National Park, have documented significant damage to rare plant species through trampling, wallowing, and grazing in those fragile ecosystems similar to those of the Mount Peale RNA (e.g. Pfitsch 1981, Pike 1981, Pfitsch et al. 1983, Reid 1983, Carlquist 1990, Houston et al. 1994, Pfitsch and Bliss 1985, Schreiner and Woodward 1994, Schreiner et al. 1994, NPS 1995, Olympic Park Associates 1995). A full review of the literature has been conducted by Wild Utah Project (Jones et al. 2015).

Human and ungulate impacts in conjunction with short growing seasons, shallow soils, steep slopes, severe winds and extreme temperatures all contribute to the harsh conditions for high alpine plant communities and the consequent long-term recovery times that limit the potential for restoration; making any impacts to plant communities in these alpine ecosystems significant (USFS 2008). Importantly, the documented impacts of non-native mountain goat introductions on the rare plant communities in the La Sal Mountains (Wild Utah Project 2014) in concert with the ever increasing interest and requests for outdoor outfitter/guide permits and access in the Mount Peale Research Natural Area (RNA)

(USFS 2008), are currently matters for concern for conservation of the native special status plant communities.

Impacts of these types within the Mount Peale RNA are of particular concern as the management of Research Natural Areas is prescribed by 36 CFR 251.23: ‘Research Natural Areas will be retained in a virgin or unmodified condition except where measures are required to maintain a plant community which the area is intended to represent.’ The Forest Service’s Manual (FSM 4063.03) states, ‘Protection and management of any RNA must comply with the following standards: (1) To the extent practicable, protect Research Natural Areas against human activities that directly or indirectly modify the integrity of the ecological processes, (2) Establish a level of acceptable casual or incidental livestock use that can be tolerated and is consistent with the management prescription, and (3) “Remove exotic plants or animals to the extent practicable.’

The 2008 Mt. Peale Research Natural Area Alpine Vegetation Impact Assessment Final Report states:

Research natural areas are part of a national network of ecological areas designated in perpetuity for research and education and/or to maintain biological diversity on National Forest System lands. Research natural areas are for non-manipulative research, observation, and study. Forest Service objectives (FSM 4063) for these areas include protection against serious environmental disruptions and serving as baseline areas for measuring long-term ecological changes. The Mt. Peale RNA was established specifically to protect ecosystem structure and function in representative alpine and subalpine habitats.

The Manti-La Sal National Forest Land and Resource Management Plan (1986) requires management of the designated area with an emphasis on research, interpretation and protection against use that could jeopardize the diversity and pristine condition that led to original establishment of the RNA. It is important to maintain pristine conditions so that long-term changes can be monitored. Due to a lack of funding, permanent study sites have never been established in the Mt. Peale RNA. Information on current conditions would help in protection and management of the area (USFS 2008).

Due to limited staffing capacity and the very short flowering season on the La Sals, the USFS Moab Ranger District began a partnership with Wild Utah Project in 2014 to provide assistance with ground-truthing rare plant distribution prediction models in the high alpine plant communities, and surveying for goat impacts within the Mount Peale RNA (Wild Utah Project 2014). This report details the July 16th through 18th, 2015, study undertaken by Wild Utah Project and citizen scientist volunteers in cooperation with the Moab District of the Manti-La Sal NF. The primary research question of this 2015 survey effort is as follows: Is anthropogenic and/or ungulate foraging activity disturbing the alpine turf-rock vegetation? Can evidence of human and/or wildlife activity potentially impacting natural processes in the RNA be observed? A study assessing the current impacts to the La Sal Mountain alpine environment from human and ungulate activities was proposed by Wild Utah Project and the Moab Ranger District as a follow up to the 2008 and 2014 efforts by the Moab Ranger District of the Manti-La Sal National Forest (USFS 2008 and Wild Utah Project 2014), and funded by a National

Forest Foundation Grant. This study was conducted by Wild Utah Project, in cooperation with the Manti-La Sal National Forest as a continuation of collaborative efforts (Wild Utah Project 2014) to collect baseline information on special status plant occurrences and tracking impacts of humans and nonnative mountain goats in the La Sal Mountains.

II. Study Area

The study area is within the Mount Peale Research Natural Area (RNA) of the Manti-La Sal National Forest, managed by the USDA Forest Service, Moab Ranger District in southeastern Utah (see Map 1). The Mount Peale RNA is part of a national network of ecological areas designated for education and research and/or maintenance of biological diversity on National Forest System lands. The specific intent of the Mount Peale RNA designation is protection of ecosystem structure and function in representative alpine and subalpine habitats unique to the La Sal Mountain Range (USFS 1986).

Elevations within the study area range from 10,600 feet in Gold Basin to 12,721 feet on Mount Peale (Map 2). Broad habitat types representative of the Mount Peale RNA include the alpine zone, and the forested subalpine zones. The RNA is dominated by talus and barren rock (2,020 acres) with a total of 360 acres of well-developed alpine turf-rock vegetation communities combined with more general herbaceous alpine vegetation areas (USFS 2008).

This study focused on impacts within the alpine turf-rock vegetation of the Mount Peale RNA. Of the 2,380 acres encompassed by the Mount Peale RNA, approximately 153 acres support alpine turf-rock vegetation. Mount Mellenthin, Mount Tukuhtnikivatz/Gold Basin and the crestline of the La Sal Peaks are the major locations of this vegetation type (Map 2).

III. Methods

The Moab-Monticello Ranger District provided 100 randomly-generated geographic information system (GIS) point locations, 73 of which occurred within potential habitat polygons for *Erigeron mancus* in the alpine turf-rock vegetation communities within accessible areas in and around the Mount Peale RNA (Map 2).

Thirty five of the original sites described in the ranger district's 2008 impact assessment report (USFS 2008) were included in the 73 sites surveyed in 2015. The 2008 USFS alpine vegetation impact assessment protocol and field forms were used in 2015 and adapted to include both human and ungulate impacts (Appendix 1).

Sites were not physically marked, but the UTM coordinates provided by USFS were used in the field to locate each randomly selected site with global positioning system (GPS) equipment. Those points then served as center points for the survey plots, and photo points were taken from the center location in each cardinal direction.

At the center point of each site location, a 37.2 m radius was used to establish a 0.1 acre area marked temporarily by pin flags. Within the 0.1 acre site, basic site data (slope, aspect, elevation, dominant vegetation, % bare ground, % vegetative cover) were collected. Photos were taken within each site to document the presence of wildlife/human impacts as well as the occurrence of USFS-sensitive plant species. Condition classes, as described by Rochefort and Swinney (2000), were used to rate the degree of impact at each site. The five condition classes ranged from pristine (0), with no signs of human and/or ungulate use to excessive change (4), meaning that 50% or more of the site has experienced permanent impacts. For more detailed information on condition classes see the example field form and impact assessment key (Appendix 1)

IV. Results

Vegetation cover varied greatly across sites, from 2 to 90% within the alpine vegetation communities visited. The majority of the surveyed sites supported one or more of the special status species included in the field form (Appendix 1). *Erigeron mancus* (observed in 43 sites) and *Androsace chamaejasme* (32 sites) were the most common special status species observed. Of the 73 sites surveyed in 2015, 34 sites were rated as 0 or 'pristine', 38 were rated as 1 or 'little change from pristine', and one site was rated as 2 or 'a significant change from pristine' (see Appendix 1 for more details on condition classes).

Of 35 sites originally surveyed in 2008 and revisited in 2015, 15 sites went from a 0 or 'pristine' rating to a 1 or 'change from pristine' in 2015. Of the total 49 sites surveyed in 2008, all were rated as pristine with the exception of four sites; which were rated as a 1 or 'change from pristine' (USFS 2008).

In 2015, the 38 sites rated as 1 or 'change from pristine' were primarily along 'Laurel Highway', a frequently-used approach to the peaks (e.g. Mount Mellenthin) for hikers and wildlife accessing the RNA from the northwest. The 'change from pristine' ratings were associated with evidence of human and game trails, trampling, general soil disturbance and, in some cases, grazing. If mountain goat wallows, and/or goat wool were evident at the survey site, the ungulate damage or grazing signs at that site were attributed to mountain goats.

The 2015 site rated as 2 or 'significant change from pristine' was at the top of Mount Mellenthin. The 'significant change from pristine' rating was primarily associated with evidence of goat wallowing and grazing impacts to soil and vegetation, including uniformly grazed *Oreoxis (Cymopterus) bakeri*. Most goat wallows and patches of wool were observed at sites in the Mount Mellenthin, Tuk Ridge (approaching Mount Tukuhnivatz from the east), and Crestline regions of the RNA (see Map 2 for locations and Appendix 2 for photographs).

The majority of the observed human impacts were trails, with some minimal plant trampling and rock or soil turnover/disturbance. The majority of the observed goat impacts were trampling or grazing. Heavy human impacts such as camping, fire rings, waste, and litter were not observed in the surveyed areas.

V. Discussion

No evidence of camping or anthropogenic alterations to sites other than hiking trail use was observed. Rock displacement where loose talus slopes occurred in trail paths was the most recognizable sign of human disturbance. However, 2-3 year follow-up surveys around a new designated Forest system trail approaching Tukuñnikivatz and 'Tuk Ridge' (which was in the process of being established by USFS crews during the 2015 survey period) could provide valuable information to trail managers and botanists with respect to impacts on vegetation communities as human access increases in these areas.

The majority of the sites sampled were rated as 1, or 'change from pristine,' with one site rated as 2, or 'significant change from pristine.' The main sources of site departure from pristine were trails where special status plants and soils had been displaced, turned over, trampled, and in some cases grazed.

According to the recent Utah Division of Wildlife Resources (UDWR) radio and iridium collar data, mountain goats have been present in and around the Mount Peale RNA in May and as recently as June 2015, with some individuals spending approximately 90% of their time within the RNA (UDWR 2015). Goat wallows as well as grazing of special status plants were observed on Mount Mellenthin. Given the logistical challenges of approaching Mount Mellenthin and similar ridge tops and peaks where mountain goats are known to occur in the RNA, some of the randomly generated survey points on the peaks and high ridges not surveyed in 2015 are likely to have incurred similar levels of departure from pristine conditions in high alpine vegetation communities. Moreover, with the widespread site locations within the RNA where site condition was rated as a 'change from pristine,' it is likely mountain goat presence is negatively impacting special status plant species and potentially the overall alpine vegetation communities in adjacent areas in and around the RNA that have yet to be surveyed.

The local Moab District Office of the MLSNF plans to revisit these sites (and potentially more locations) over the next 2-3 years to continue to monitor these rare vegetation communities and assess their condition. The sites established in 2008 and 2015 can be relocated, photographed and monitored in future years in order to draw relative comparisons of site conditions at different time intervals and under different management practices.

The information in this survey report can be used by the Forest Service as an assessment of both human recreation use and ungulate impacts in the Mount Peale RNA. These data will be used in conjunction with ongoing USFS efforts to monitor target alpine plant species occurrences to inform management of the Mount Peale RNA.

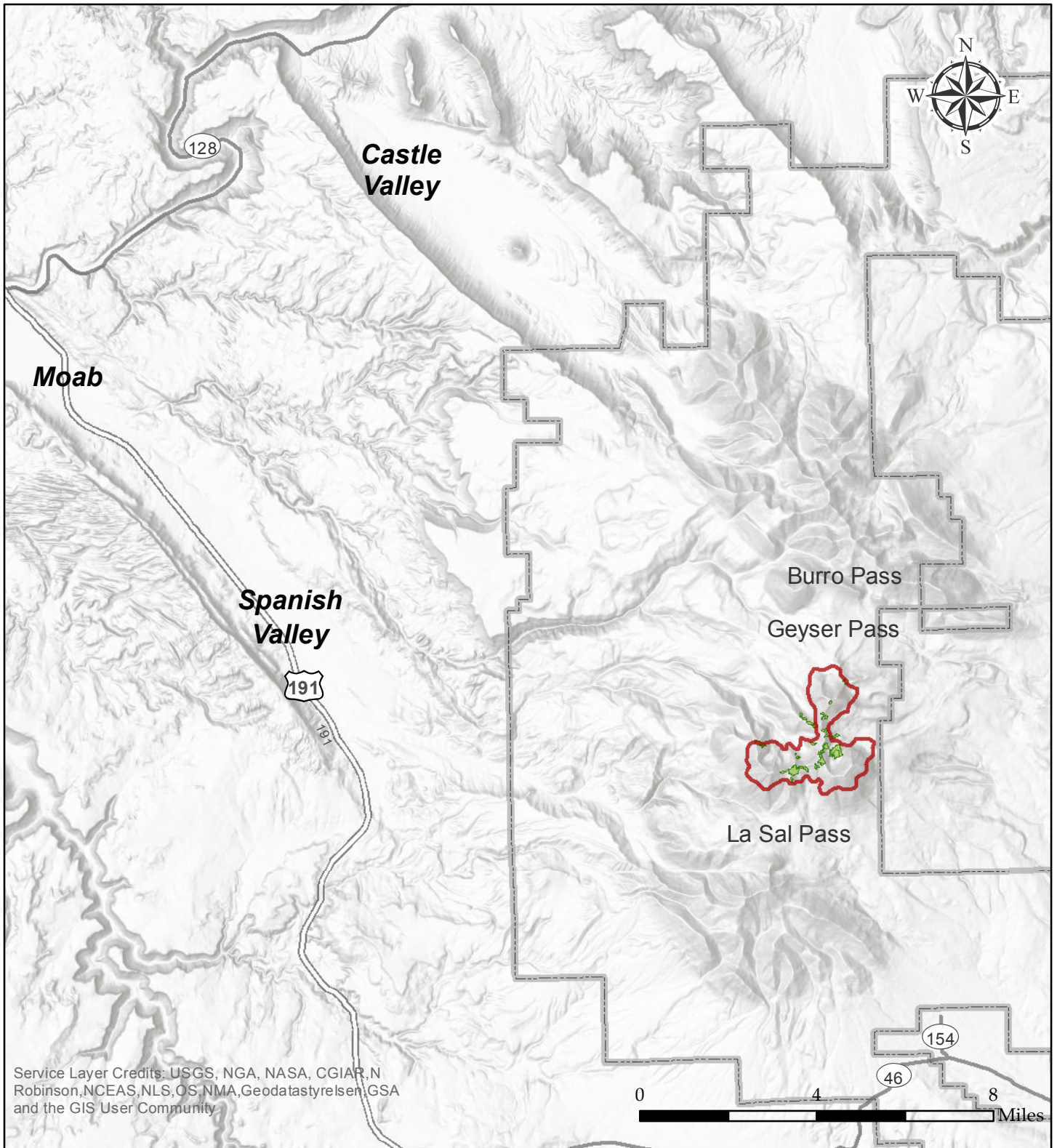
VI. Acknowledgments

This survey effort was funded by a National Forest Foundation grant; and made possible through collaboration with Barb Smith, Manti-La Sal National Forest biologist, and the Moab-Monticello Ranger District as well as knowledgeable volunteers who attended survey training and carefully gathered data in the field.

VI. References

- Carlquist, B. 1990. An effective management plan for the exotic mountain goats in Olympic National Park. *Natural Areas Journal* 10:12-18.
- Hartley, E. 2000. *Thirty-year monitoring of subalpine meadow vegetation following a 1967 trampling experiment at Logan Pass, Glacier National Park, Montana*. In: Cole, D.N.; McCool S.F.; Borrie, W.T.; O'Loughlin, J., comps. *Wilderness science in a time of change conference – Vol. 5: Wilderness ecosystems, threats and management*. Proceedings RMRS-P-15-Vol 5. USDA Forest Service, Rocky Mountain Research Station.
- Jones, A., B. Hansen and M. Moyano. 2015. Impacts of non-native mountain goats in introduction areas of the West: a review of the literature. Special publication, Wild Utah Project 2015. <http://wildutahproject.org/files/images/Goat%20Lit%20Review%20summary%20Nov%202015.pdf>
- NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
- National Park Service, U.S. Department of the Interior (NPS). 1995. Goats in Olympic National Park Draft Environmental Impact Statement for Mountain Goat Management. Olympic National Park, Port Angeles, WA
- Olympic Park Associates. 1995. An analysis of the Mountain goat issue in Olympic National Park. <http://www.halcyon.com/rdpayne/opa-mtngoat.html>.
- Pfitsch, W. A. 1981. The effects of mountain goats on the subalpine plant communities of Klahhane Ridge, Olympic National Park, Washington. M.S. Thesis, University of Washington, Seattle. 103 pp.
- Pfitsch, W. A., R. S. Reid, J. Harter, D. K. Pike, and L. C. Bliss. 1983. Effects of mountain goats on soils, plant communities and select species in Olympic National Park. Final report to Olympic National Park. College of Forest Resources, University of Washington, Seattle, Wash. 105 pp.
- Pfitsch, W. A. and L.C Bliss. 1985. Seasonal Forage availability and potential vegetation limitations to a mountain goat population, Olympic National Park. *American Midland Naturalist* 113: 109-121.
- Pike, D.K. 1981. Effects of mountain goats on three plant species unique to the Olympic Mountains, Washington. M.S. Thesis, University of Washington, Seattle. 188 pp.
- Reid, R.S. 1983. Patterns of juvenile mortality and life histories in response to mountain goat disturbance, Olympic National Park, M.S. Thesis, University of Washington, Seattle.

- Rochefort, R.M. and D.D. Swinney. 2000. *Human Impacts Surveys in Mount Rainer National Park: Past, Present and Future*. In: Cole, D.N.; McCool S.F.; Borrie, W.T.; O'Loughlin, J., comps. Wilderness science in a time of change conference –Vol. 5: Wilderness ecosystems, threats and management. Proceedings RMRS-P-15-Vol 5. USDA Forest Service, Rocky Mountain Research Station.
- Schreiner, E. G., Grasz, M.B., Kaye, T.N., Woodward, A. and N.M. Buckingham. 1994. Rare Plants. In: Mountain goats in Olympic National Park: biology and management of an introduced species. U.S. Dept of the Interior, NPS. Scientific Monograph NPS/NROLYM/NRSM-94/25.
- Schreiner, E. G., and Woodward, A. 1994. Study documents mountain goat impacts at Olympic National Park: Park Science, v. 14, Issue 2, p. 23-25.
- UDWR. 2015. Radio and iridium collar data tracking mountain goat movements in the La Sal Mountains. Utah Division of Wildlife Resources, Southern Region. Cedar City, Utah. June, 2015.
- USDA Forest Service. 1994. Forest Service Manual (FSM). Title 4000-Research. Section 4063-Research Natural Areas.
- USFS. 1986. Manti-La Sal National Forest Land and Resource Management Plan. http://www.fs.fed.us/r4/mantilasal/projects/forest_plan_1986/planindex.shtml accessed 2-23-2010
- USFS. 2013. Intermountain Region proposed, endangered, threatened, and sensitive species list, R4. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5370041.pdf accessed 10-29-2015
- USFS. 2008. Mt. Peale Research Natural Area Alpine Vegetation Impact Assessment Final Report. Barb Smith, Wildlife Biologist, Manti-La Sal National Forest. December, 1 2008.
- Whinam, J. and N.M. Chilcott. 2003. *Impacts after four years of experimental trampling on alpine/sub-alpine environments in western Tasmania*. Journal of Environmental Management 67:339-351.
- Wild Utah Project. 2014. Special Status Plant Occurrences and Mountain Goat Impacts: 2014 Survey Report. Prepared for Moab-Monticello Ranger District Manti-La Sal National Forest. November 22, 2014. Salt Lake City, Utah. <http://wildutahproject.org>
- Willard, B.E. and J.W. Marr. 1970. *Effects of human activities on alpine tundra ecosystems in Rocky Mountain National Park, Colorado*. Biological Conservation, Vol.2, No. 4, pgs. 257-265.



Map 1: Regional reference



== Highway

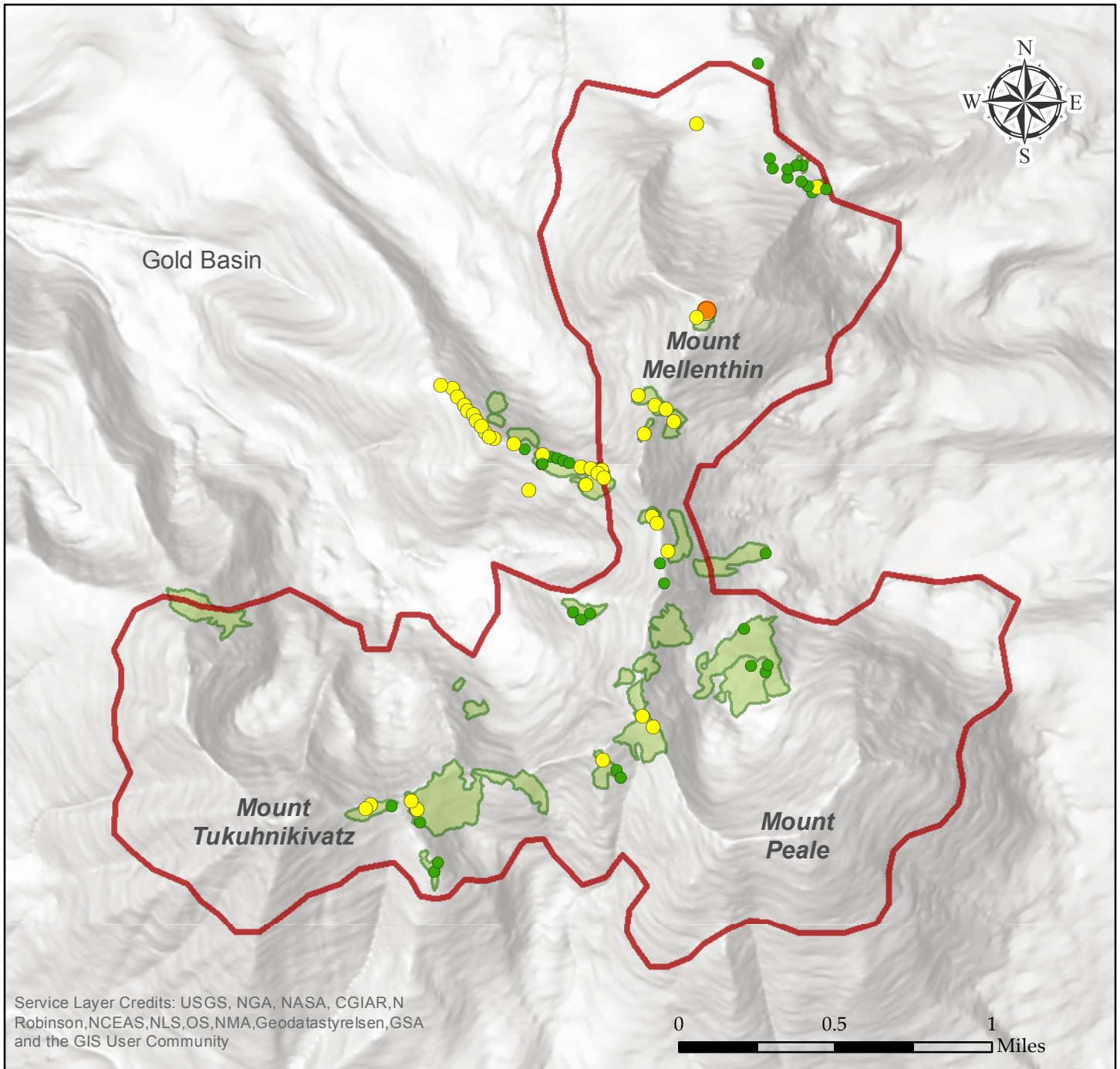
— Major Road

— Local Road

□ Mount Peale RNA

■ Alpine Vegetation

□ Manti-La Sal National Forest Boundary



Map 2: Alpine vegetation impact assessment results



Surveyed sites by site condition

- Pristine
- Little change
- Significant change

- Mount Peale RNA
- Alpine Vegetation

Condition Class Descriptions:

Pristine: no signs of human or ungulate use of the area; Little change: small and temporary indications of use caused by people or animals, such as litter, trampled vegetation, scuffed soil, foot/hooftprints, light grazing but no lasting damage such as plant loss, erosion or broken stems; Significant change: human impacts easily recognizable but limited in severity or distribution; examples include uprooted plants, clearing of forest litter creating a trail or campsite, clearing of pebbles or rocks in fellfields, compacted soil, but not erosion; impacts from animals include digging and goat wallows, area of individual impacts should be small (< 1 ft in diameter) and covering a small portion of the sample area (<10-15%).

Appendix 1

Site #: _____	Observers: _____
Transect: _____	_____

Date: _____	UTMs (NAD 83): _____

Elevation: _____ ft.
 Slope: _____% (optional)
 Aspect: _____° (optional)

Dominant Vegetation Type (circle):

- Herbaceous alpine turf
- Alpine turf –rock
- Talus/barren rock
- Subalpine rocky
- Spruce-fir

Circle Special Status Plant(s) observed (see plant guide):

Erigeron mancus, *Androsace chamaejasme*,
Besseyia alpine, *Erigeron melanocephalus*, *Draba abajoensis*, *Cymopterus bakeri*, *Podistera eastwoodiae*, *Saxifraga bronchialis*, and/or *Senecio fremontii*, other species of note:

Visual estimate within 0.1 ac plot:

% bare ground _____
 % vegetation cover _____

Site Condition Class (see key and circle one):

- 0 pristine
- 1 little change
- 2 significant change
- 3 severe change
- 4 excessive change;

Optional note regarding selection:

Comments:

Include notes on plant species observed, types of impact observed (e.g. social trail [human], ungulate sign [grazing, scat, wallow, trail], number or percent of plants grazed and species):

Point (GPS)/Photo/Description for each point:

- Point id# _____ Photo id# _____
Description: _____
- Point id# _____ Photo id# _____
Description: _____
- Point id# _____ Photo id# _____
Description: _____
- Point id# _____ Photo id# _____
Description: _____

Useful Descriptions include: plant name, goat wallow, goat

scat, goat print, grazed plant, human impact, unknown ungulate scat, print, and/or hair etc.

- Point id# _____ Photo id# _____
Description _____
- Point id# _____ Photo id# _____
Description: _____
- Point id# _____ Photo id# _____
Description: _____
- Point id# _____ Photo id# _____
Description: _____

Dominant Vegetation types

- Alpine turf= Mix of graminoids and forbs, typical plant species include – sedges, alpine timothy, alpine bluebell, alpine bistort
- Alpine turf-rock= Substantial number of rocks on surface sandwort, La Sal daisy, graylocks, thickleaf clover, slender wheatgrass, purple reedgrass
- Alpine rocky= Barren or nearly barren rocky habitat with scattered plants skypilot, mountain rock-parsley, Payson’s daisy, slender wheatgrass, brittle fern, wax currant
- Subalpine rocky= Steep rocky slopes with subalpine shrubs and forbs gooseberry currant, black twinberry, Colorado columbine, tall bluebell
- Spruce-fir= stringers and pockets with tree overstory

Site Condition Class (Rochefort and Swinney 2000)

0 – pristine= No signs of human or ungulate use of the area

1 – little change= Small and temporary indications of use caused by people or animals, such as litter, trampled vegetation, scuffed soil, foot/hoofprints, light grazing but no lasting damage such as plant loss, erosion or broken stems

2 – significant change= Human impacts easily recognizable but limited in severity or distribution; examples include uprooted plants, clearing of forest litter creating a trail or campsite, clearing of pebbles or rocks in fellfields, compacted soil, but not erosion; impacts from animals include digging and goat wallows, area of individual impacts should be small (< 1 ft in diameter) and covering a small portion of the sample area (<10-15%)

3 – severe change= Few severe impacts or many moderate impacts with an extensive distribution so that the sample area is fragmented; severe impacts include construction of rock walls, eroded social trails (greater than 1” deep), very large compacted sites; extensive, moderate impacts could cover up to 50% of the sample area

4 – excessive change= This level of impact is reached when 50% or more of the site is covered by permanent impacts such as plant or soil loss or erosion

Points/Photos/ Description for each point:

Please be sure to include the GPS point id#/letter code that you enter into your GPS on your written form along with the photo id# that your particular camera assigns(a time stamp or random photo number that appears in the corner of each photo on your camera display is fine). Additionally, a succinct description for the point and associated photo is very helpful (e.g. plant name, type of goat sign, unknown ungulate sign, human sign, grazed plant, goat wallow etc.)

Example: *If I am the recorder for my group and we notice a goat wallow near one of the rare plant species in our guide; using my GPS, I will enter in my initials and the number 1 for my first point, and where I noticed my first photo’s time stamp on the camera display is 12:55:53PM.*

- **Point id#** MP1 **Photo id#** 12:55:53PM
Description: goat wallow near Erigeron mancus

Appendix 2

This appendix includes sample photos from the Mount Mellenthin area indicative of a level 2 rating, or ‘a significant change from pristine’ (each photograph was georeferenced and associated with a dated survey site form [see Appendix 1 for more details on condition classes]).



Goat wool adjacent to edge of wallow



Goat wool next to *Androsace chamaejasme* and turned over soil



Wallow site and goat wool in the midst of special status plants *Androsace chamaejasme* and *Cymopterus bakeri*



Uniformly grazed special status plant *Cymopterus bakeri* (note yellow flower next to pen) and *Androsace chamaejasme* adjacent to grazed plant