

Kicking the Alpine Plants Out Mountain Goat Wallows In Mount Peale Research Natural Area (La Sal Mountains, Utah)

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Mountain goats are digging up alpine plants and “kicking” them out of the La Sal Mountains, a spectacular and rare alpine ecosystem high above the red-rock canyons of southeastern Utah. In 2013 & 2014 the Utah Division of Wildlife Resources introduced 35 non-native mountain goats to these mountains. The population of goats has since doubled to more than 70, and these animals are causing significant damage to the soil and alpine plants in the Mount Peale Research Natural Area, which, by Forest Service regulations for Research Natural Areas (RNAs), is to remain in a “virgin or unmodified” condition.

Wallows are an obvious, significant impact caused by mountain goats. Wallows are where goats have removed all plants and dug into the soil in order to roll in loose dirt, giving themselves dust baths. These wallows cause losses of alpine plants and erosion of fragile alpine soil in this high elevation setting where wind and water are forceful and the growing season short. The locations of wallows observed within the Mount Peale RNA by the Grand Canyon Trust during numerous field trips in 2017 are shown in Fig. 1. The following pages include more information about the impacts of goat wallows, as well as georeferenced photos of numerous wallows we observed in the Mount Peale RNA. A separate, larger report presents results of our 2017 monitoring of mountain goat impacts and changes at 45 Mount Peale RNA sites first assessed by Wild Utah Project in 2015.

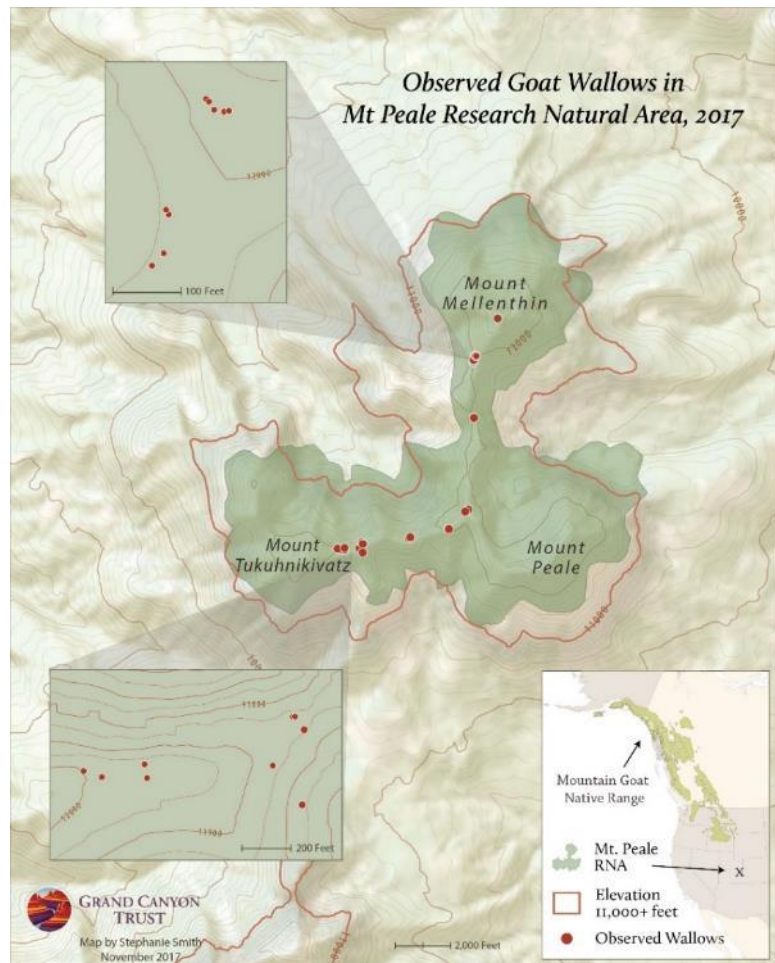


Fig. 1. Map of goat wallows observed in the Mount Peale Research Natural Area, in the La Sal Mountains of southeast Utah in 2017.

Background

Over the objection of the Forest Service, mountain goats were transported by the Utah State Division of Wildlife Resources (UDWR) from the Tushar Range to a patch of State land on a south slope of La Sal Mountains in 2013 and 2014. The goats soon moved up to the high elevation alpine area, their preferred habitat, which includes the Mount Peale Research Natural Area (RNA). RNAs, notes the Forest Service, “are permanently protected and maintained in natural conditions, for the purposes of conserving biological diversity, conducting non-manipulative research and monitoring, and fostering education” ([Forest Service RNA web page](#)).



Fig. 2. Goats in the Mount Peale RNA of the La Sal Mountains (photo by Marc Coles-Ritchie, August 18, 2107).

The 2,380-acre Mount Peale RNA was designated in 1988 and ranges in elevation from 10,450 feet up to the rugged peak of Mount Peale at 12,721 feet). It is one of a very few alpine areas in southern Utah and the Colorado Plateau. Many uncommon and endemic plant species live in this RNA where the management emphasis is on “research and protection of pristine conditions and biological diversity” ([Forest Service rare plants web page](#)).

Exotic mountain goat occupation of the Mount Peale RNA conflicts with the Forest Service requirement that RNAs be maintained “in a virgin or unmodified condition” (36 C.F.R. § 251.23).

Mountain Goat Wallows

Wallows are created where mountain goats remove the alpine vegetation (grasses, sedges, wildflowers, mosses, and lichens) as they dig into the soil. We observed some wallows with much loose soil; goats return to such wallows to roll and kick dirt onto themselves (Fig 3). In other cases it appears that the loose soil has been eroded away, and what remains is a depression of compacted bare soil that is ringed by sheared turf.

Goat wallows were observed throughout the Mount Peale RNA, generally at elevations of 11,500 to 12,000 feet on the ridges and saddles below peaks. Those low-gradient settings have vegetation that goats can graze and soil that goats can dig to create wallows. We also observed wallows, or possibly bedding sites, on somewhat steeper slopes where there is soil that can be dug into, but not on the steep talus slopes. The wallows usually were surrounded by numerous additional impacts from mountain goats (photos in Appendices A and B), including:

- Damage to plants from grazing, trampling and digging
- Hoof-sheared alpine turf and uprooted plants
- Goat droppings and fur
- Bare ground, where soil has been eroded
- Trails

The creation and use of wallows by mountain goats results in much bare ground and loose soil that is highly susceptible to erosion from wind and water. Soil loss associated with goat wallows has been observed in other places where mountain goats have been introduced, including Yellowstone National Park (Houston et al. 1994) and Olympic National Park (National Park Service 2017).



Fig. 3. Goat in wallow, kicking dirt onto itself. The dashed line-arrow points to the enlarged image of the goat kicking up dirt (photo by Marc Coles-Ritchie).

Alpine plants are significantly impacted by the wallowing of goats. In Olympic National Park, it was determined that “Wallowing by mountain goats has impacted plant species within the park as a result of soil disturbance and subsequent creation of mineral substrates for colonization by disturbance-oriented plant species” (National Park Service 2017). Additionally, the Park Service noted that “mountain goats affected and killed individual rare plants by grazing, wallowing, and trampling, but our preliminary studies could not determine trends in rare plant populations subjected to goat herbivory” (National Park Service 2017).

In the La Sal Mountains goats are eating and kicking up sensitive plants, including the endemic La Sal daisy (*Erigeron mancus*) which only grows in the La Sal Mountains. Other sensitive plants that goat wallows are damaging, based on our observations, are Baker's alpineparsley (*Oreoxis bakeri*), dwarf mountain ragwort (*Senecio fremontii*), spotted saxifrage (*Saxifraga bronchialis*) and sweetflower rockjasmine (*Androsace chamaejasme*).

With increases in goat numbers in this alpine area (the UDWR goal is 200 mountain goats), the number of wallows will increase, which will lead to more loss of alpine plants and increased bare soil.

While wallows are a highly visible disturbance caused by mountain goats, additional types of goat disturbance are summarized in Appendices A and B and are described in the full report of Trust 2017 field work in the Mount Peale RNA.

Mountain goat wallows are a significant modification of the Mount Peale RNA, which is intended to be a natural area, and to provide reference conditions for the rare alpine ecosystems of the Colorado Plateau.

Photographs of Wallows

Below are photographs of wallows that mountain goats have created in the Mount Peale Research Natural Area. These photos were taken in 2017 by the Grand Canyon Trust (Marc Coles-Ritchie and volunteers). There are certainly more wallows than those shown; these are just those we observed incidental to our 2017 alpine field work. The photos below are presented in order from north to south within Mount Peale Research Natural Area.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.



Fig. 11.



Fig. 12.



Fig. 13.



Fig. 14.

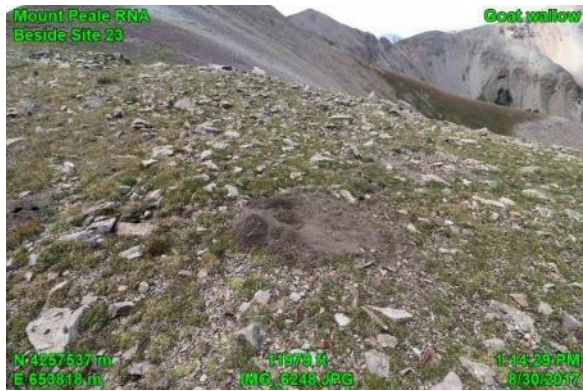


Fig. 15.



Fig. 16.



Fig. 17.



Fig. 18.



Fig. 19.



Fig. 20.



Fig. 21.



Fig. 22.



Fig. 23.



Fig. 24.

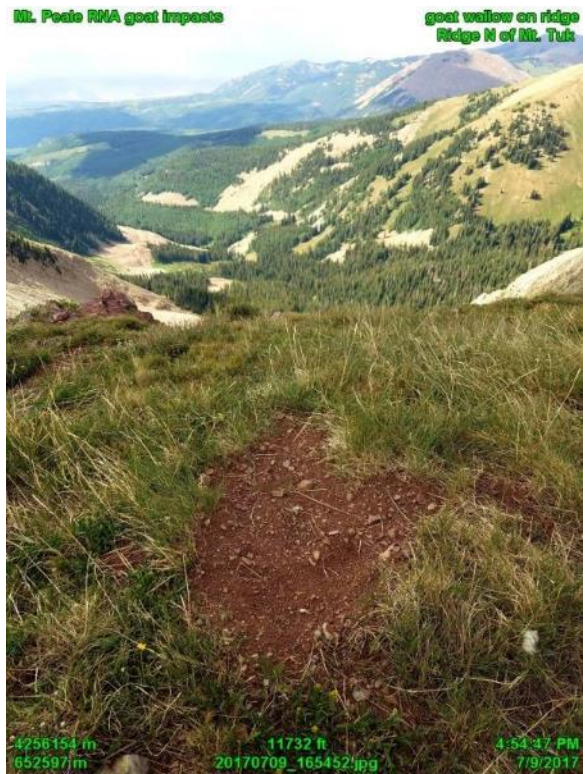


Fig. 25.



Fig. 26.



Fig. 27.



Fig. 28.



Fig. 29.



Fig. 30.

Table 1. Goat wallow locations (UTM coordinates, NAD83) in the La Sal Mountains for the photos presented above. Wallow photos listed in this table are presented in order from north to south.

Figure (shown above)	File Name	Elevation (feet)	Northing (NAD83)	Easting (NAD83)
4	IMG_7237_tag.JPG	12,603	4258628 m	654079 m
5	IMG_7238_tag.JPG	12,602	4258626 m	654077 m
6	IMG_7170_tag.JPG	11,962	4258221 m	653831 m
7	IMG_7171_tag.JPG	11,963	4258220 m	653832 m
8	IMG_7172_tag.JPG	11,962	4258217 m	653835 m
9	IMG_7173_tag.JPG	11,966	4258216 m	653839 m
10	IMG_7174_tag.JPG	11,967	4258216 m	653841 m
11	IMG_7153_tag.JPG	11,902	4258172 m	653813 m
12	IMG_7152_tag.JPG	11,903	4258170 m	653815 m
13	20170909_133502_tag.jpg	11,949	4258153 m	653812 m
14	20170909_133300_tag.jpg	11,946	4258147 m	653807 m
15	IMG_6248_tag.JPG	11,979	4257537 m	653818 m
16	IMG_5210_tag.jpg	12,158	4256530 m	653750 m
17	IMG_5262_tag.jpg	12,152	4256509 m	653720 m
18	IMG_5288_tag.jpg	12,088	4256318 m	653534 m
19	IMG_5290_tag.jpg	12,081	4256317 m	653543 m
20	IMG_5117_tag.jpg	11,752	4256228 m	653119 m
21	IMG_5112_tag.jpg	11,773	4256216 m	653101 m
22	IMG_4663_tag.JPG	11,865	4256170 m	652586 m
23	IMG_5093_tag.jpg	11,945	4256111 m	652397 m
24	20170709_165333_tag.jpg	11,801	4256170 m	652583 m
25	20170709_165452_tag.jpg	11,732	4256154 m	652597 m
26	IMG_4914_tag.jpg	11,870	4256109 m	652558 m
27	IMG_5091_tag.jpg	11,956	4256102 m	652320 m
28	IMG_5048_tag.jpg	11,959	4256095 m	652343 m
29	IMG_5037_tag.jpg	11,946	4256093 m	652400 m
30	IMG_5883_tag.JPG	11,753	4256060 m	652595 m

References

- Department of Interior, National Park Service. 2017. Draft Mountain Goat Management Plan / Environmental Impact Statement.
<https://parkplanning.nps.gov/document.cfm?parkID=329&projectID=49246&documentID=77644>
- Houston, Douglas B., E. G. Schreiner, B. B. Moorhead. 1994. Mountain Goats in Olympic National Park: Biology and Management of an Introduced Species. National Park Service, Olympic National Park, 600 E. Park Avenue, Port Angeles, Washington 98362, Scientific Monograph NPS/NROLYM/NRSM-94/25 United States Department of the Interior National Park Service.
- U.S. Forest Service RNA website. <https://www.fs.fed.us/rmrs/research-natural-areas>
- U.S. Forest Service Rare Plants website.
https://www.fs.fed.us/wildflowers/Rare_Plants/conservation/success/LaSals_studies.shtml

Appendix A. Various impacts from mountain goats in the Mount Peale Research Natural Area.



Figure A1. Mountain goat scat, ground disturbance and grazed alpine plants.



Figure A2. Mountain goat-sheared alpine turf and ground disturbance.



Figure A3. Trampled and grazed plants in area with endemic La Sal daisy (yellow flowers).



Figure A4. Mountain goat scat, ground disturbance and sheared alpine turf.



Figure A5. Mountain goat fur (white cotton-like material caught in plants) and ground disturbance.



Figure A6. Uprooted plants and ground disturbance, presumably by mountain goats.

Appendix B. Endemic and sensitive plants of the La Sal Mountain alpine area and mountain goat impacts.

“Endemic” plants are only found in a certain geographical area, in this case the La Sal Mountains, and nowhere else in the world. A “sensitive” plant is a designation by the US Forest Service, Region 4 in this case, for plants whose population viability is of concern.



Figure B1. The endemic La Sal daisy (*Erigeron mancus*) in bloom (yellow flowers in left photo) and surrounded by ground disturbance from mountain goats presumably (right photo).



Figure B2. Baker's alpineparsley (*Oreoxis bakeri*) in bloom (yellow flowers in left photo) and surrounded by mountain goat scat and ground disturbance (right photo). La Sal daisy (*tan, senesced flowers*) is also present in right photo.



Figure B34. Sweetflower rockjasmine (*Androsace chamaejasme*) in bloom (left photo) and surrounded by ground disturbance by mountain goats (right photo).