



FIELD REPORT

Assessment: Eleven La Sal Mountain Springs, August 9-11, 2016

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Grand Canyon Trust

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Field Dates	August 9-11, 2016
Field Location	Manti-La Sal National Forest (MLSNF), Moab-Monticello Ranger District (MMRD), Bald Mesa and Dorry Allotments
Observers	Cerissa Hoglander, Dave Erley (Grand Canyon Trust)
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Field Sites and Map

- Bald Mesa Allotment

Currently/actively grazed

- North Hollow Aspen Spring #1
- North Hollow Aspen Spring #2
- South Hollow Road Spring
- South Hollow Pond Spring

- Dorry Canyon Allotment

Currently/actively grazed

- Unnamed Dorry Canyon Spring #1
- Unnamed Dorry Canyon Spring #2
- Unnamed Dorry Canyon Spring #3
- Unnamed Dorry Canyon Spring #4
- Unnamed Dorry Canyon Spring #5
- Unnamed Dorry Canyon Spring #6
- Unnamed Dorry Canyon Springs Complex #7

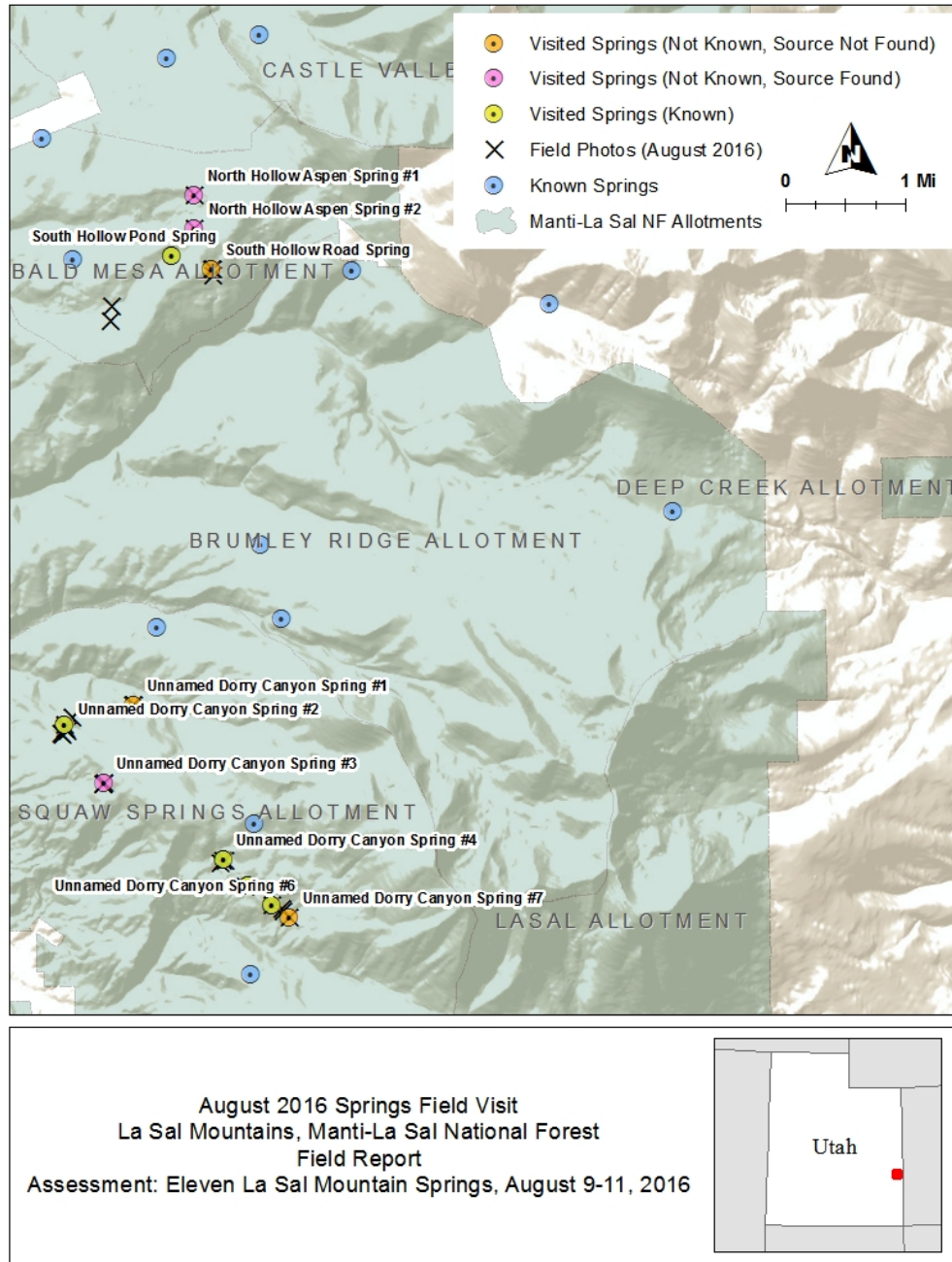


Figure 1 - Field map for La Sal Mountains springs assessment, August 2016. Blue circles indicate documented (known) springs locations as obtained from a merged springs shapefile created by Grand Canyon Trust (Stephanie Smith, GIS Program Director) from Geographic Naming Information System (GNIS), National Hydrography Dataset (NHD), United States Forest Service (USFS), and Springs Stewardship Institute (SSI; springsdata.org) data. Other circles indicate springs that were visited during the assessment, whether documented, not known with source located, or not known without source located (yellow, pink, and orange circles respectively). Black "X" symbols indicate visited springs with a georeferenced photograph.

Objective

1. Assess conditions of select springs ecosystem sites in the La Sal Mountains region of the Moab-Monticello Ranger District to:
 - a. Build foundational information of conditions of springs ecosystems in the Manti-La Sal National Forest, and
 - b. Provide documentation to support management decision-making for the conservation of public lands, particularly related to springs protection and restoration needs.

Description

We visited eleven spring sites in the North Hollow, South Hollow, and Dorry Canyon areas of the Manti-La Sal National Forest. Spring sites in the North and South Hollow areas have little publicly-available information and are the focus of current/ongoing restoration efforts by the U.S. Forest Service. Spring sites in the Dorry Canyon area also have little publicly-available information and likely are not well-studied due to extremely difficult vehicle access.

We assessed each spring using a systematic qualitative assessment that included documentation of location, water presence, riparian vegetation presence, and infrastructure. Where possible, georeferenced photographs were taken at the spring site.

Field Notes

North Hollow Aspen Spring #1

Date: August 9, 2016

Allotment: MLSNF-MMRD, Bald Mesa Allotment

GPS coordinates (UTM NAD83 12N): 648188 E 4265533 N (presumed source)

Water presence: Surface water was present in small areas but no flow was detected. Trampling was present in the surface water areas.

Water infrastructure: Trough was present outside and south of enclosure. A pipeline to the trough was planned to be installed in future work.

Fence infrastructure: Source and some of the surrounding area had been recently fenced with an enclosure. Bottom wire of enclosure was barbed.

Grazing evidence: Cattle sign (tracks, scat) and elk sign (scat) were present both inside and outside enclosure. Browsing of shrubs (willow) was also evident.

Aspen recruitment/age structure/density/condition: Aspen (*Populus tremuloides*) was present (older age structure and heavily browsed). Aspen recruitment was present only where protected by native snowberry (*Symphoricarpos oreophilus*) thicket.

Willow species/age structure/density/condition: Geyer willow (*Salix geyeriana*) and yellow willow (*Salix lutea*) were present (older age structure, heavily browsed, and not recruiting).

Vegetation composition: Native plant species were dominant.

- Dominant native species: Aspen, analogue sedge (*Carex simulata*), fowl mannagrass (*Glyceria striata*), Geyer willow, small-wing sedge (*Carex microptera*), snowberry, wild rose (*Rosa woodsii*), yellow willow.
- Dominant non-native species: Kentucky bluegrass (*Poa pratensis*), timothy grass (*Phleum pratense*).
- SAFETY NOTE: Stinging nettle (*Urtica dioica*) was present.

Restoration recommendation:

- This site was the focus of ongoing restoration which aimed to protect the primary riparian area from trampling with a recently-built enclosure. This enclosure was intended to reduce trampling in the riparian area moving forward. It should also provide an opportunity for aspen and willow recruitment as it protects from cow and elk browsing, which seemed to be a factor in the lack of regeneration and recruitment at this site.
- The enclosure did not protect all of the willow shrubs at the spring site. We recommend that it be expanded to include additional willow protection.
- The bottom wire of the enclosure fence was barbed and was only a few inches from the ground in some areas. We recommend that this bottom wire be raised and changed to smooth wire to reduce access challenges for wildlife.
- Non-native grasses were also present at the site and should be a focus for managers into the future. We encourage managers to research and apply site-appropriate methods where possible.



Photograph Set 1 (August 9, 2016) –Trampling was present in wettest portion of exclosed area at North Hollow Aspen Spring #1.



Photograph 2 (August 9, 2016) – Presumed source of North Hollow Aspen Spring #1. Photograph is georeferenced and indicated in the field map (Figure 1).

North Hollow Aspen Spring #2

Date: August 9, 2016

Allotment: MLSNF-MMRD, Bald Mesa Allotment

GPS Coordinates (UTM NAD83 12N): 648197 E 4265084 N (presumed source)

Water presence: Surface water was present as low flow down a narrow (6-inch wide) drainage.

Water infrastructure: No water infrastructure was present. A trough and pipeline were planned to be installed in future work.

Fence infrastructure: Spring source and a portion of surrounding riparian area had been recently fenced with an enclosure.

Grazing evidence: Cattle sign (tracks) were noted outside but not inside enclosure.

Aspen recruitment/age structure/density/condition: Aspen (*Populus tremuloides*) was present (older age structure). Some aspen recruitment was present on steep banks but not on lower-gradient areas.

Willow species/age structure/density/condition: Yellow willow (*Salix lutea*) was present (older age structure and heavily browsed, but with some recruitment).

Vegetation composition: Native plant species were dominant except for grass types.

- Dominant native species: Aspen, small-wing sedge (*Carex microptera*), yellow willow.
- Dominant non-native species: Kentucky bluegrass (*Poa pratensis*), orchard grass (*Dactylis glomerata*), timothy grass (*Phleum pratense*).

Restoration recommendation:

- Similar to North Hollow Aspen Spring #1, this site was the focus of ongoing restoration which aimed to protect the primary riparian area from trampling with a recently-built enclosure. This enclosure was intended to reduce trampling in the riparian area moving forward. It should also provide an opportunity for aspen and willow recruitment as it protects from cow and elk browsing, which seemed to be a factor in the lack of regeneration and recruitment at this site.
- The bottom wire of the enclosure fence was barbed and was only a few inches from the ground in some areas. We recommend that the bottom wire be raised and changed to smooth wire to reduce hazardous access for wildlife.
- Non-native grasses were present at the site and should be a focus for managers into the future. We encourage managers to research and apply site-appropriate methods where possible.



Photograph 3 (August 9, 2016) - Presumed source (bottom left, beyond branches) of North Hollow Aspen Spring #2. Photograph is georeferenced and indicated in the field map below (Figure 1).

Unnamed Dorry Canyon Spring #1

Date: August 10, 2016

Allotment: MLSNF-MMRD, Dorry Allotment

GPS Coordinate (UTM NAD83 12N): 647378 E 4258697 N (at trough, source not located)

Water presence: Water was present as both surface water on access road and as a steady moderate flow out of a pipeline into a trough. Some overflow from the trough was present and creates additional surface water, although much trampling was present in these wet areas around the trough.

Water infrastructure: A culvert, trough, and pipeline were present and functioning below/downslope of the road. Spring source was likely above/upslope of the road. The trough lacked a functional wildlife escape ramp.

Fence infrastructure: None.

Grazing evidence: Horse and cow sign (scat) were noted. Grazing of grasses was evident.

Aspen recruitment/age structure/density/condition: None.

Willow species/age structure/density/condition: None.

Vegetation composition: Native plant species were dominant except for grass types.

- Dominant native species: Baltic rush (*Juncus balticus*), Gambel oak (*Quercus gambelii*), Wood's rose.
- Dominant non-native species: Intermediate wheatgrass (*Thinopyrum intermedium*), Kentucky bluegrass (*Poa pratensis*).
- Several other sedges present, species not identified.

Restoration recommendation:

- While we were unable to locate the spring source and assess wildlife water access there, the only wildlife-accessible surface water that we did document was runoff on the access road. While the full trough could be accessed by larger animals, access for smaller wildlife – including small mammals - is inhibited by the height and design of the tank.

- While the tethered tree branch might encourage some wildlife access, a lack of a submerged escape ramp created a hazard for wildlife. A dead ground squirrel was found floating in the trough (see photograph below) and was evidence of the need for an adequate wildlife escape ramp. The tree branch tethered to trough (in photograph below) could be a wildlife access ramp if modified to be partially submerged in the trough, touch the bottom of the tank, and have a portion of the ramp flush with the inside of the tank (as many stranded animals will swim the perimeter of a tank in search of escape and may go under an existing ramp if a portion of it is not flush with the inside wall of the tank). We recommend following the guidelines outlined in *Water for Wildlife Handbook for Ranchers and Range Managers*¹ for wildlife friendly cattle tanks and troughs.
- The pipeline and trough should be managed to control for overflow which encouraged erosion downslope of the trough. The pipeline and trough could be in use only seasonally when cattle are in the pasture and water could be left at the spring source during the off-season.

¹ Taylor, D. A. R, and M. D. Tuttle. 2007. *Water for Wildlife Handbook for Ranchers and Range Managers*. Bat Conservation International, USA.



Photograph Set 4 (August 10, 2016) - Spring water ran and pooled across road at Unnamed Dorry Canyon Spring #1 (left). Pipeline and trough at Unnamed Dorry Canyon Spring #1 (right). Trough was lacking adequate wildlife escape ramp, likely resulting in animal mortality (see small mammal mortality circled in red). Photographs are georeferenced and indicated in the field map (Figure 1).

Unnamed Dorry Canyon Spring #2

Date: August 10, 2016

Allotment: MLSNF-MMRD, Dorry Allotment

GPS Coordinate (UTM NAD83 12N): 646462 E 4258389 N (presumed source)

Water presence: Surface water was present as a steady flow down a drainage that ran across the access road. This flow joined another outflow likely from another spring source. The drainage continued above the fenced source along a wet meadow. Trampling was present throughout drainage and substantial trampling had occurred in the source runoff just outside of the enclosure fence.

Water infrastructure: A pipeline was present at the spring source, which was developed with a culvert; but, it was unclear where pipeline led, if anywhere. Two troughs, one dry and one with some water, were located south of the spring source, but it was unclear how they were connected to the spring source. No adequate wildlife escape ramps were present in the troughs.

Fence infrastructure: Spring source had an enclosure fence.

Grazing evidence: Willow browse was noted inside the enclosure fence.

Aspen recruitment/age structure/density/condition: None.

Willow species/age structure/density/condition: Coyote willow (*Salix exigua*) and Booth willow (*Salix boothii*) were present within enclosure. Some regeneration for both willow species was seen but no recruitment was detected.

Vegetation composition: Native plant species were dominant with rush and sedge types dominant.

- Dominant native species: Booth willow, coyote willow, lakeshore sedge (*Carex lenticularis*), Rocky Mountain iris (*Iris missouriensis*), small-wing sedge (*Carex microptera*).
- Non-native dominant species: Kentucky bluegrass (*Poa pratensis*).

Restoration recommendation:

- While the spring source was protected by an enclosure fence, the remainder of the wet meadow riparian area lacked protection. The enclosure fence could be expanded to include this unprotected area.
- Runoff from the source created a wet meadow area and erosion was substantial just outside of the enclosure fence (see photographs below). The enclosure fence could be expanded to include this protected area and/or the distance between the source and the cattle should be increased.

- The troughs present at this spring site were lacking adequate wildlife escape ramps. Although no mortalities were detected, we recommend following the guidelines in the *Water for Wildlife Handbook for Ranchers and Range Managers*² for wildlife friendly cattle tanks and troughs.
- Non-native grasses were present at the site and should be a focus for managers into the future. We encourage managers to research and apply site-appropriate methods where possible.



Photograph Set 1 (August 10, 2016) - Runoff area from source at Unnamed Dorry Canyon Springs #2 had been trampled causing substantial erosion just outside the enclosure fence (left). This erosion was present along the fence, just beyond the runoff point (right).

² Taylor, D. A. R, and M. D. Tuttle. 2007. *Water for Wildlife Handbook for Ranchers and Range Managers*. Bat Conservation International, USA.



Photograph Set 5 (August 10, 2016) – Culvert source (top left), enclosure fence and runoff (top right), primary outflow from source (bottom left), and confluence of two outflows suggesting second source (bottom right) at Unnamed Dorry Canyon Spring #2. Photographs are georeferenced and indicated in the field map (Figure 1)



Photograph Set 6 (August 10, 2016) – Two troughs (left, middle) and upland wet meadow (right) at Unnamed Dorry Canyon Spring #2. Photographs are georeferenced and indicated in the field map (Figure 1).

Unnamed Dorry Canyon Spring #3

Date: August 10, 2016

Allotment: MLSNF-MMRD, Dorry Allotment

GPS Coordinate (UTM NAD83 12N): 646967 E 4257643 N (presumed source)

Water presence: A wet meadow was present below a fenced spring source. Spring source was located on a steep slope, was developed with a culvert, and was damp, but no surface water was present.

Water infrastructure: A pipeline was present at the spring source, which was developed with a culvert; but, it was unclear to where the pipeline directed water, if anywhere.

Fence infrastructure: Spring source had an enclosure fence and was also present on a steep vegetated slope.

Grazing evidence: No grazing was detected at the spring source, likely due to enclosure fence and steep gradient. Grazing impacts were noted below the spring source.

Aspen recruitment/age structure/density/condition: None.

Willow species/age structure/density/condition: Yellow willow (*Salix lutea*) present (older age structure with no browse and some regeneration and recruitment detected). Booth willow (*Salix boothii*) was present downhill of spring and browse of this species was evident.

Vegetation composition: Native plant species were dominant with yellow willow dominant in mid-story.

- Dominant native species: Baltic rush (*Juncus balticus*), Rocky Mountain juniper (*Juniperus scopulorum*), Wood's rose (*Rosa woodsii*), yellow willow (*Salix lutea*).
- Non-native dominant species: Kentucky bluegrass (*Poa pratensis*).

Restoration recommendation:

- The utility of the pipeline and culvert infrastructure at this spring site should be identified. If this infrastructure is not in use, it should be removed.
- Non-native grasses were present at the site and should be a focus for managers into the future. We encourage managers to research and apply site-appropriate methods where possible.



Photograph Set 7 (August 10, 2016) - Damp culvert source (left) with dry surroundings (middle) and pipeline (right) at Unnamed Dorry Canyon Spring #3. Photographs are georeferenced and indicated in the field map (Figure 1).

Unnamed Dorry Canyon Spring #4

Date: August 10, 2016

Allotment: MLSNF-MMRD, Dorry Allotment

GPS Coordinate (UTM NAD83 12N): 648600 E 4256611 N (presumed source)

Water presence: Surface water was present as a steady moderate flow from the spring source through a dense aspen forest. Primary spring flow joined a second flow, suggesting a potential second source above (not located).

Water infrastructure: A culvert was present under the access road which was downslope of the spring source. No other infrastructure was noted.

Fence infrastructure: None.

Grazing evidence: Some animal trails were present (potentially from elk or deer), but no grazing sign was noted.

Aspen recruitment/age structure/density/condition: Aspen (*Populus tremuloides*) was present (high density and varied height/age structure from young recruitment to old downed trees).

Willow species/age structure/density/condition: None.

Vegetation composition: Native plant species are dominant with aspen dominant in overstory.

- Dominant native species: Alpine timothy (*Phleum alpinum*), aspen, small-wing sedge (*Carex microptera*), snowberry (*Symphoricarpos oreophilus*), Oregon grape (*Mahonia repens*), western monkshood (*Aconitum columbianum*), Wood's rose (*Rosa woodsii*).
- Non-native dominant species: Quackgrass (*Elymus repens*) abundant in drainage.

Restoration recommendation:

- This spring site represented a strong baseline for a relatively un-impacted spring site and a healthy, dense aspen forest.
- Non-native grasses were present at the site and should be a focus for managers into the future. We encourage managers to research and apply site-appropriate methods where possible.



Photograph 8 (August 10, 2016) - Site photograph of dense aspen forest at Unnamed Dorry Canyon #4.



Photograph Set 9 (August 10, 2016) - Spring source (left) and outflows (middle, right) at Unnamed Dorry Canyon Spring #4. Photographs are georeferenced and indicated in the field map (Figure 1).

Unnamed Dorry Canyon Spring #5

Date: August 10, 2016

Allotment: MLSNF-MMRD, Dorry Allotment

GPS Coordinate (UTM NAD83 12N): 648877 E 4256259 N (at midflow, source not located)

Water presence: Surface water was present as a steady moderate flow from source through a willow-dominated drainage. Some trampling was present near the spring source.

Water infrastructure: None.

Fence infrastructure: None.

Grazing evidence: Some cattle sign (scat) was noted near source.

Aspen recruitment/age structure/density/condition: None.

Willow species/age structure/density/condition: Booth willow (*Salix boothii*) was present (varied age structure with regeneration and recruitment present).

Vegetation composition: Native plant species were dominant with Booth willow dominant in mid-story.

- Dominant native species: Baltic rush (*Juncus balticus*), Booth willow, small-wing sedge (*Carex microptera*), Gambel oak (*Quercus gambelii*), possible wax currant? (*Ribes cereum*), possible Utah penstemon? (*Penstemon utahensis*), Wood's rose (*Rosa woodsii*).
- Non-native dominant species: Kentucky bluegrass (*Poa pratensis*), quackgrass (*Elymus repens*), timothy grass (*Phleum pratense*).
- SAFETY NOTE: Stinging nettle (*Urtica dioica*) was present.
- High diversity of other forbs and shrubs are present but not identified.

Restoration recommendation:

- This spring site represented a strong baseline for a relatively un-impacted spring site and a healthy willow-dominated riparian area.

- Non-native grasses were present at the site and should be a focus for managers into the future. We encourage managers to research and apply site-appropriate methods where possible.



Photograph 10 (August 10, 2016) - Midflow at Unnamed Dorry Canyon Spring #5. Photograph is georeferenced and indicated in the field map (Figure 1).

Unnamed Dorry Canyon Spring #6

Date: August 10, 2016

Allotment: MLSNF-MMRD, Dorry Allotment

GPS Coordinate (UTM NAD83 12N): 649236 E 4256019 N (presumed source)

Water presence: Surface water was present as a steady moderate flow from the source down drainage.

Water infrastructure: None.

Fence infrastructure: None.

Grazing evidence: Some cattle sign (older scat) was noted, however grazing impacts seemed minimal.

Aspen recruitment/age/structure/density/condition: None.

Willow species/age structure/density/condition: Booth willow (*Salix boothii*) and yellow willow (*Salix lutea*) individuals were present with some regeneration but also some browsing noted.

Vegetation composition: Non-native plant species were dominant.

- Dominant native species: Western yarrow (*Achillea millefolium*), nodding brome (*Bromus anomalus*), small-wing sedge (*Carex microptera*), black sedge (*Carex nova*), horsetail (*Equisetum arvense*), Rocky Mountain juniper (*Juniperus scopulorum*), Gambel oak (*Quercus gambelii*), Wood's rose (*Rosa woodsii*).
- Non-native dominant species: Kentucky bluegrass (*Poa pratensis*), quackgrass (*Elymus repens*), timothy grass (*Phleum pratense*).
- SAFETY NOTE: Stinging nettle (*Urtica dioica*) present.

Restoration recommendation:

- Grazing impacts seemed to be minimal at this spring site, but ongoing monitoring should occur to determine if future work (e.g., exclosure) is needed.
- Non-native grasses were present at the site and should be a focus for managers into the future. We encourage managers to research and apply site-appropriate methods where possible.



Photograph 11 (August 10, 2016) - Presumed spring source at Unnamed Dorry Canyon Spring #6. Photograph is georeferenced and indicated in the field map (Figure 1).

Unnamed Dorry Canyon Springs Complex #7

Date: August 10, 2016

Allotment: MLSNF-MMRD, Dorry Allotment

GPS Coordinate (UTM NAD83 12N): 649384 E 4255937 N (midflow, source not located)

Water presence: Surface water was present as steady low-strong flows from multiple sources. One flow ran across access road as a strong, creek-like flow. Spring sources were not found within the large springs complex.

Water infrastructure: Piece of pipeline was found at second outflow, but no other infrastructure was detected.

Fence infrastructure: None.

Grazing evidence: Cattle sign (scat, tracks) was noted and cattle were heard below spring.

Aspen recruitment/age structure/density/condition: Aspen (*Populus tremuloides*) was present (diverse age structure, and regeneration and recruitment were noted).

Willow species/age structure/density/condition: Mountain willow (*Salix monticola*) was present in dense stands. Geyer willow (*Salix geyeriana*) individual was noted with some browsing.

Vegetation composition: Native plant species were dominant, with aspen dominant in overstory.

- Dominant native species: Western yarrow (*Achillea millefolium*), western monkshood (*Aconitum columbianum*), Utah serviceberry (*Amelanchier utahensis*), snowberry (*Symphoricarpos oreophilus*), meadowrue (*Thalictrum fendleri*).
- Non-native dominant species: Quackgrass (*Elymus repens*), timothy grass (*Phleum pratense*).
- Additional conifer was present but not dominant, species not identified.

Restoration recommendation:

- The utility of the pipeline should be identified and, if not in use, it should be removed.
- Non-native grasses were present at the site and should be a focus for managers into the future. We encourage managers to research and apply site-appropriate methods where possible.



Photograph Set 12 (August 10, 2016) – Central (left), northern-most (middle), and southern-most (right) outflow points documented at Unnamed Dorry Canyon Spring #7.

South Hollow Road Spring

Date: August 11, 2016

Allotment: MLSNF-MMRD, Bald Mesa Allotment

GPS Coordinate (UTM NAD83 12N): 648434 E 4264540 N (at drainage, source not located).

United States 2013 topographic map indicates potential spring source 570 ft W NW (likely up the drainage) from this GPS location.

Water presence: Multiple upper drainages were present on a hillside from what were likely multiple spring sources or points of runoff. Some of the drainages were damp or had little surface water. Culvert under road directed runoff to lower drainage, which was fenced. Trampling was present in all un-fenced wet areas and substantial channeling in both drainages suggested multiple years of impact.

Water infrastructure: Culvert was present under road connecting upper drainage and lower drainage. A pipeline was present below enclosure, may have led to a downstream trough (although trough not located). Piece of pipeline was found at second outflow. No other infrastructure was found.

Fence infrastructure: Lower drainage had wooden railing enclosure which was in need of repair.

Grazing evidence: Trampling and trailing were noted across site, particularly above and around exclosure fence.

Aspen recruitment/age structure/density/condition: None.

Willow species/age structure/density/condition: Only one mountain willow (*Salix monticola*) was noted in upper drainage (very young).

Vegetation composition: Native plant species were dominant in drainage and upland.

- Dominant native species in drainage: Baltic rush (*Juncus balticus*), small-wing sedge (*Carex microptera*), snowberry (*Symphoricarpos oreophilus*).
- Dominant native species in upland: Gambel oak (*Quercus gambelii*), sagebrush (*Artemisia tridentata*),
- Non-native dominant species: Kentucky bluegrass (*Poa pratensis*), orchard grass (*Dactylis glomerata*), timothy grass (*Phleum pratense*).

Restoration recommendation:

- This site was the focus of ongoing restoration. The existing exclosure of the downstream drainage should be repaired where needed and a similar exclosure for the upstream drainage should be considered given the extensive erosion and trampling here. To address the channeling and erosion in the drainages, resources such as the United States Forest Service's Guidance for Stream Restoration and Rehabilitation³ are available and include recommendations specific to incised channels.
- Non-native grasses are present at the site and should be a focus for managers into the future. We encourage managers to research and apply site-appropriate methods where possible.

³ United States Forest Service. 2016. *Guidance for Stream Restoration and Rehabilitation*. United States Department of Agriculture, United States Forest Service, Fort Collins, CO. Available at: <http://www.fs.fed.us/biology/nsaec/assets/yochumusfs-nsaec-tn102-2gudncstrmrstrtrnrhbltn.pdf>. Accessed September 2016.



Photograph Set 13 – Upper (left) and lower (middle) drainage, connected by culvert at road (right) at South Hollow Road Spring. Photos are georeferenced and indicated in the field map (Fig. 1).

South Hollow Pond Spring

Date: August 11, 2016

Allotment: MLSNF-MMRD, Bald Mesa Allotment

GPS Coordinate (UTM NAD83 12N): 647066 E 4263843 N (at wet meadow, source not located). United States 2013 topographic map indicates potential spring source 3,280 ft W NW (likely up the drainage) from the midflow GPS location.

Water presence: Little surface water was present within a fenced wet meadow, but a runoff creek or spring outflow above the pond had low flow that meandered through the upland valley and feeds the human-made pond below.

Water infrastructure: A human-made pond and earthen dam were downstream of the runoff creek/spring outflow outside of the fenced wet meadow.

Fence infrastructure: A newly constructed wood and wire fence was present around the wet meadow.

Grazing evidence: Cattle sign (older scat) and elk sign (scat) were present inside of enclosure. Cattle were present outside of enclosure all around spring site. Trampling was present around human-made pond and in lower portion of the runoff creek/spring outflow. Creek was a

substantially incised channel near pond, suggesting multiple years of impact, although this channeling improved with the distance away from pond.

Aspen recruitment/age structure/density/condition: No aspen (*Populus tremuloides*) were noted in immediate vicinity. Aspen stand was noted in distance well below pond, although this stand was not visited or assessed for age structure, density, or condition.

Willow species/age structure/density/condition: Coyote willow (*Salix exigua*) was present at headcut along creek, where the channel becomes incised. Some regeneration was present but heavy browse noted closer to pond.

Vegetation composition: Native plant species were dominant.

- Dominant native species in wet meadow: Baltic rush (*Juncus balticus*), foxtail barley (*Hordeum jubatum*), Rocky Mountain iris (*Iris missouriensis*), snowberry (*Symphoricarpos oreophilus*), unknown aster (not sampled), water sedge (*Carex aquatilis*), western sedge (*Carex occidentalis*), western yarrow (*Achillea millefolium*).
- Dominant native species in creek/drainage: Similar vegetation to wet meadow plus golden banner (*Thermopsis montana*), horsetail (*Equisetum arvense*), Wood's rose (*Rosa woodsii*), and unknown golden banner-like forb (sampled, opposite leaves, no inflorescence). Prairie junegrass (*Koeleria macrantha*) and squirreltail grass (*Elymus elymoides*) also noted, but not dominant.
- Non-native dominant species: Jointed goatgrass (*Aegilops cylindrica*), Kentucky bluegrass (*Poa pratensis*), unknown clover (not sampled or identified) in wet meadow. Some cheatgrass (*Bromus tectorum*) patches noted along creek, but not dominant.

Restoration recommendation:

- While the wet meadow was well-protected from livestock trampling, the lower portion of the runoff channel/spring outflow was substantially incised, likely from trampling-induced erosion. We recommend following the guidance for incised channel restoration that is

present in the United States Forest Service's Guidance for Stream Restoration and Rehabilitation⁴.

- Non-native grasses were also present at the site and should be a focus for managers into the future. We encourage managers to research and apply site-appropriate methods where possible.



Photograph Set 14 (August 11, 2016) – Recently fenced wet meadow (left) and human-made cattle pond (right) at South Hollow Pond Spring. Substantial erosion and channeling were occurring at the lower part of the drainage where it meets the pond (right).

⁴ United States Forest Service. 2016. *Guidance for Stream Restoration and Rehabilitation*. United States Department of Agriculture, United States Forest Service, Fort Collins, CO. Available at: <http://www.fs.fed.us/biology/nsaec/assets/yochumusfs-nsaec-tn102-2gudncstrmrstrtrnrhbltn.pdf>. Accessed September 2016.



Photograph 15 (August 11, 2016) – Wettest portion of wet meadow (left) was likely a source at South Hollow Pond Spring. A side creek flowed down a drainage north of the wet meadow and had a diversity of riparian plants including willow (right). This drainage flowed into a human-made cattle pond. Source of spring was likely northwest of the right photograph further up the drainage; a United States topographic map from 2013 indicates a spring source approximately 3,280 feet up the drainage. Photographs are georeferenced and indicated in the field (Figure 1)

Recommendations

Summary of springs conditions:

Four of the eleven springs we visited in Dorry Canyon seemed to have experienced relatively low impacts from livestock grazing or other public land uses (Unnamed Dorry Canyon Springs #4, #5, #6, #7). These springs have the potential to provide important baselines for healthy spring conditions as the vegetation was dominated by native plants with diverse age structures, spring flows were steady, and little to no human development was present.

At Unnamed Dorry Canyon Spring #2 substantial erosion was noted outside of the enclosure fence. The drainage between the upland wet meadow and downstream trough has the potential to become an incised channel over time if not monitored and managed.

At the North Hollow Aspen Springs, native vegetation was also dominant with potential for a diverse age structure. Substantial trampling was noted in the wettest riparian areas but the

recently constructed enclosure fence is anticipated to reduce this impact and promote the regeneration and recruitment of willow and aspen currently limited by browsing.

At South Hollow Springs, native vegetation was dominant but substantially incised channels were likely reflective of multi-year impacts to the site.

Assessment and monitoring recommendations:

Formal condition assessments of all springs visited during this trip are recommended.

Locating the spring sources, particularly at Unnamed Dorry Canyon #1 and the South Hollow Springs, could provide additional information for restoration and protection opportunities. The Dorry Canyon springs visited during this assessment are especially difficult to access as the primary road is extremely rugged and fit for an ATV at best. Although successful navigation did happen in a specialized 4WD off-roading truck, the road was still daunting. Truck use is not recommended. However, formal condition assessments of these springs could provide the documentation and data needed for comparison to other spring sites as well as for tracking with respect to other environmental changes, such as shifts in rainfall and water availability associated with global warming.

Formal condition assessments of the North and South Hollow areas are also recommended. As both were the focus of ongoing restoration action, assessment would provide data indicators (e.g., flow, presence of channeling, native biodiversity) that could be the basis for comparison to see if restoration actions are successful at improving site health long term.

General restoration recommendations:

Our primary restoration recommendations for the eleven springs visited in the La Sal Mountains are focused on managing the erosion and incised channeling at riparian areas, improving the wildlife compatibility of existing infrastructure, and managing non-native invasive species.

In areas with several drainages or wet meadows, livestock grazing should be managed so as to protect the source and natural flow of the water. This includes fencing of wet meadows and sources but also protection of the drainage areas to avoid substantial erosion and channeling. Limiting the duration of livestock grazing in a particular area or pasture would also aid in reducing impacts.

We encourage restoration action where erosion and incised channeling are already occurring, namely at South Hollow Pond Spring and South Hollow Road Spring. Approaches to the restoration of incised channels include constructing natural fascines or building a shallower flow pattern within the channel. These restoration actions are detailed in the United States Forest Service's recently released Guidance for Stream Restoration and Rehabilitation, referenced above.

Some runoff or trough overflow can be managed into natural drainages with check dams, but only where ungulate trampling does not pose a risk to the utility of the check dams themselves.

At five of the eleven springs trampling or erosion was noted and at three of these springs there were also enclosure fences to protect the spring sources. This is a good first step. We encourage managers to expand on these protections where possible, particularly at Unnamed Dorry Canyon Spring #2 and South Hollow Road Spring.

Fences should be checked for wildlife compatibility. For example, bottom barbed wires that are close to the ground can snag smaller wildlife that attempt to crawl under fences. These wires can be easily replaced with smooth raised wires. Many guides for creating wildlife friendly fences exist and include height, wire, and design recommendations (for example, the Natural Resources Conservation Service Wildlife Friendly Fencing guide⁵ or the Colorado Parks and Wildlife Fencing with Wildlife in Mind guide⁶).

Wildlife compatibility must also be considered for other spring infrastructure, namely tanks and troughs, especially where these provide the only source of water at a fully developed site. The

⁵ Natural Resources Conservation Service. 2013. *Animal Enhancement Activity ANM27 Wildlife Friendly Fencing*. United States Department of Agriculture, Natural Resources Conservation Service, Salt Lake City, UT. Available at: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1118679.pdf. Accessed September 2016.

⁶ Hanophy, W. 2009. *Fencing with Wildlife in Mind*. Colorado Parks and Wildlife, Denver, CO. Available at: <https://cpw.state.co.us/Documents/LandWater/PrivateLandPrograms/FencingWithWildlifeInMind.pdf>. Accessed September 2016.

two troughs that were visited as part of this assessment (Unnamed Dorry Canyon #1 and #2) had tethered tree branches outside of the trough. However, these are not adequate access or exit opportunities for smaller wildlife – including small mammals, birds, and insects – unless they are partially submerged in the water. Troughs have steep sides with narrow edges, limiting safe access and increasing mortality risk for smaller wildlife. The tree branches present at these sites could be improved if they are partially submerged in the water, touch the bottom of the trough, and have a portion of the ramp flush with the inside of the tank (as many stranded animals will swim the perimeter of a tank in search of escape and may go under an existing ramp if a portion of it is not flush with the inside). These and other guidelines are detailed in *Water for Wildlife Handbook for Ranchers and Range Managers*⁷ for wildlife friendly cattle tanks and troughs, referenced above.

Some non-native forbs and grasses were detected at all spring sites. Kentucky bluegrass, orchard grass, and timothy grass were the most prevalent non-native grasses and are also some of the most difficult to manage. Some approaches, such as selective hand-pulling, may be ineffective for persistent patches or may even encourage the spread of the species. We encourage managers to research and apply site-appropriate methods where possible. As these non-native grasses did not dominate the native plants at any site (with the exception of North Hollow Aspen Spring #2), restoration addressing invasive plants may be a lower priority compared to the other restoration actions recommended here. However, the ratio of native to non-native grasses should be monitored over time and, most importantly, non-native invasive grasses should not be considered for restoration or forage purposes in the future.

⁷ Taylor, D. A. R, and M. D. Tuttle. 2007. *Water for Wildlife Handbook for Ranchers and Range Managers*. Bat Conservation International, USA.