Grand Staircase-Escalante 2020 Summary Report
Springs Stewardship Institute
Volume 2 of 2

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1. Rock Spring, 9/24/20
Survey Summary Report, Site ID 109815
Submitted 12/09/20 by Springs Stewardship Institute

Location: The Rock Spring ecosystem is located in Kane County in the Paria Arizona, Utah 14070007 HUC, managed by the US Bureau of Land Management. The spring is located in the Grand Staircase Escalante NM, in the Slickrock Bench USGS Quad, at 37.48165, -111.99617 measured using a GPS (WGS84). The elevation is approximately 1712 meters. Andrea Hazelton and Brianna Mann surveyed the site on 9/24/20 for 01:35 hours, beginning at 17:10, and collected data in 9 of 10 categories. This survey was conducted under the Grand Staircase-Escalante 2020 project using the Stevens et al. Level 2 protocol.

Fig 1.1 Rock Spring: Upstream-facing view of Rock Spring Creek. The lower, flowing seep line runs along the stream bank to the photographer's left. Crew lead Andrea Hazelton records data at the left end of the precipitate-coated upper dry seep line just above the center of the photo.

Physical Description: Rock Spring is a hanging garden spring. Seepage emerges from a 30-meter-long seep line at the base of a cliff. The seepage drips down the cliff for 0.5 meters before landing in and contributing flow to Rock Springs Creek. The cliff and seep are on creek right. There is a second seep line immediately upstream, about 30 meters long and 4 meters above the level of the creek. This second seep is dry, but supports some riparian vegetation. The two seep lines are associated with different geological contacts. The microhabitats associated with the spring cover 54 sqm. The site has 2 microhabitats, including A -- a 40 sqm backwall, B -- a 14 sqm backwall. The geomorphic diversity is 0.25, based on the Shannon-Weiner diversity index.

Table 1.1 Rock Spring Microhabitat characteristics.

Code	**A**	**B**
Name	Upper Dry Seep Line	Lower Flowing Seep Line
Area sqm	40	14
Surface type	BW	BW
Slope variability	Med	Med
Aspect TN	181	121
Slope degrees	45	90
Moisture (scale 1-10)	0	9
Water depth cm	0	1
Area % open water	0	10
Substrate		
1 - Clay %	0	10
2 - Silt %	0	10
3 - Sand %	70	20
4 - Fine gravel %	0	0
5 - Coarse gravel %	0	0
6 - Cobble %	0	0
7 - Boulder %	0	0
8 - Bedrock %	30	0
Organic %	0	50
Other % (anthropogenic)	0	10
Precipitate %	70	20
Litter %	10	0
Wood %	0	0
Litter Depth (cm)	0.2	0

Geomorphology: Rock Spring emerges as a contact spring from a sedimentary, sandstone argillaceous rock layer. The emergence environment is subaerial, with a gravity flow force mechanism.

Access Directions: From the town of Cannonville, turn south onto Main Street. The turn is marked with a sign to the BLM Grand Staircase Visitor Center. Continue south on this road, which eventually becomes the Cottonwood Canyon Road. After 7.9 miles, turn right (west) on Route 410. Drive 1.5 miles until the road crosses a creek and then a cattle guard. Immediately after the cattle guard, turn right. Follow this road for about 0.5 mi as it winds its way along the creek and crosses the creek several times. Park and walk to the spring (less than 300 m).

Survey Notes: Rock Springs Creek is flowing, beginning about 400 meters upstream of this spring, and continues flowing down past this spring. The low seep line is contributing to the creek at a steady drip. The higher seep line is dry, coated with white precipitate, and supporting riparian vegetation. The precipitate layer along the dry seep line is about 2 centimeters deep. There is sparse wetland vegetation in and adjacent to the stream channel and some of it has been grazed.

Flow: This spring is perennial. Surveyors were unable to measure flow because the outflow was too diffuse to capture.

Water Quality: The surveyor dug out a hole beneath the lower flowing seep line and let the water settle for 5 minutes before measuring water quality. Location 1: in an excavated hole in standing water at 17:17.

Table 1.2 Rock Spring Water Quality Measurements.

Characteristic Measured	Value	Location Number	Device
Alkalinity, Total (mg/L)	160	1	LaMotte
Dissolved Solids (field) (ppt)	0.666	1	Hanna Multi 98194
pH (field)	7.25	1	Hanna Multi 98194
Specific conductance (field) (µS/cm)	1290	1	Hanna Multi 98194
Temperature, air C	25	1	Handheld therm
Temperature, water C	16.65	1	Hanna Multi 98194

Flora: Andrea Hazelton was the botanist. Surveyors identified 15 plant species at the site, with 0.2778 species/sqm. These included 13 native and 2 nonnative species.

Table 1.3 Rock Spring Cover Type.

Cover Type	Species Count	Wetland Species Count
Ground	10	7
Shrub	4	2
Mid-canopy	0	0
Tall canopy	0	0
Basal	0	0
Aquatic	0	0
Non-vascular	1	0

Table 1.4 Rock Spring Vegetation % Cover in Microhabitats.

Plant Species	Cover Code	Native Status	Wetland Status	Comments	A	B
Almutaster pauciflorus	GC	N	F		0	0.1
Astragalus lentiginosus	GC	N	R		2	0
Castilleja	GC	N	U		0	0.05
Chrysothamnus linifolius	SC	N	F	Lorandersonia linifolia	2	0
Cirsium arizonicum	GC	N	F		2	0.1
Epipactis gigantea	GC	N	W		0.5	0.1
Juncus balticus	GC	N	W		0	2
Melilotus officinalis	GC	I	WR		0.5	0
Muhlenbergia asperifolia	GC	N	WR		25	4
Rhus trilobata	SC	N	F		1	0
Salix exigua	SC	N	WR		0	1
Schoenoplectus americanus	GC	N	A		0	2
Tamarix	SC	I	WR		3	0
Typha	GC	N	A		0	0.25
unknown Bryophyte (moss, liverwort, hornwort)	NV	N?		moss	0	4

Fauna: Surveyors collected or observed 5 aquatic and 3 terrestrial invertebrate taxa and 6 vertebrate taxa.

Table 1.5 Rock Spring Invertebrates.

Species	Lifestage	Habitat	Method	Count	Species Detail
Araneae	Ad	T	Spot	1	
Coleoptera Dytiscidae	Ad	A	Collected spot	2	
Diptera Tipulidae	L	A	Collected spot	1	
Ephemeroptera Baetidae	L	A	Collected spot	3	
Hymenoptera Formicidae	Ad	T	Spot		
Odonata	Ad	T	Spot	1	Large and blue
Odonata Coenagrionidae Argia	L	A	Collected spot	3	
Zooplankton Ostracoda	Ad	A	Collected spot	2	

Table 1.6 Rock Spring Vertebrates.

Vertebrate Species Common Name	Count	Detection	Comments
Cliff Swallow	25	sign	Nests
Elk		sign	Many; track and scat
Common Raven	3	obs	
American Crow	1	call	
Chipmunk	1	call	
Domestic Cow		sign	Tracks and scat

Assessment: Assessment scores were compiled in 5 categories and 33 subcategories, with 9 null condition scores, and 9 null risk scores. Aquifer functionality and water quality are good with significant restoration potential (average condition score 4.3) and there is negligible risk (average risk score 1.8). Geomorphology condition is good with significant restoration potential (average condition score 4.2) and there is low risk (average risk score 2.2). Habitat condition is moderate with some restoration potential (average condition score 3.6) and there is low risk (average risk score 2.8). Biotic integrity is good with significant restoration potential (average condition score 4.6) and there is low risk (average risk score 2). Human influence of site is very good with excellent restoration potential (average condition score 5.1) and there is negligible risk (average risk score 1.3). Overall, the site condition is good with significant restoration potential and there is low risk.

Table 1.7 Rock Spring Assessment Scores. Condition scores range from 0 (extremely poor condition) to 6 (pristine condition) and risk scores range from 0 (no risk to the site) to 6 (extreme risk to the site).

Category	Condition	Risk
Aquifer Functionality & Water Quality	4.3	1.8
Geomorphology	4.2	2.2
Habitat	3.6	2.8
Biota	4.6	2
Human Influence	5.1	1.3
Overall Ecological Score	4.5	1.9

Management Recommendations: This site needs no management attention. Continue to rotate cattle so that trampling does not damage the stream habitat.

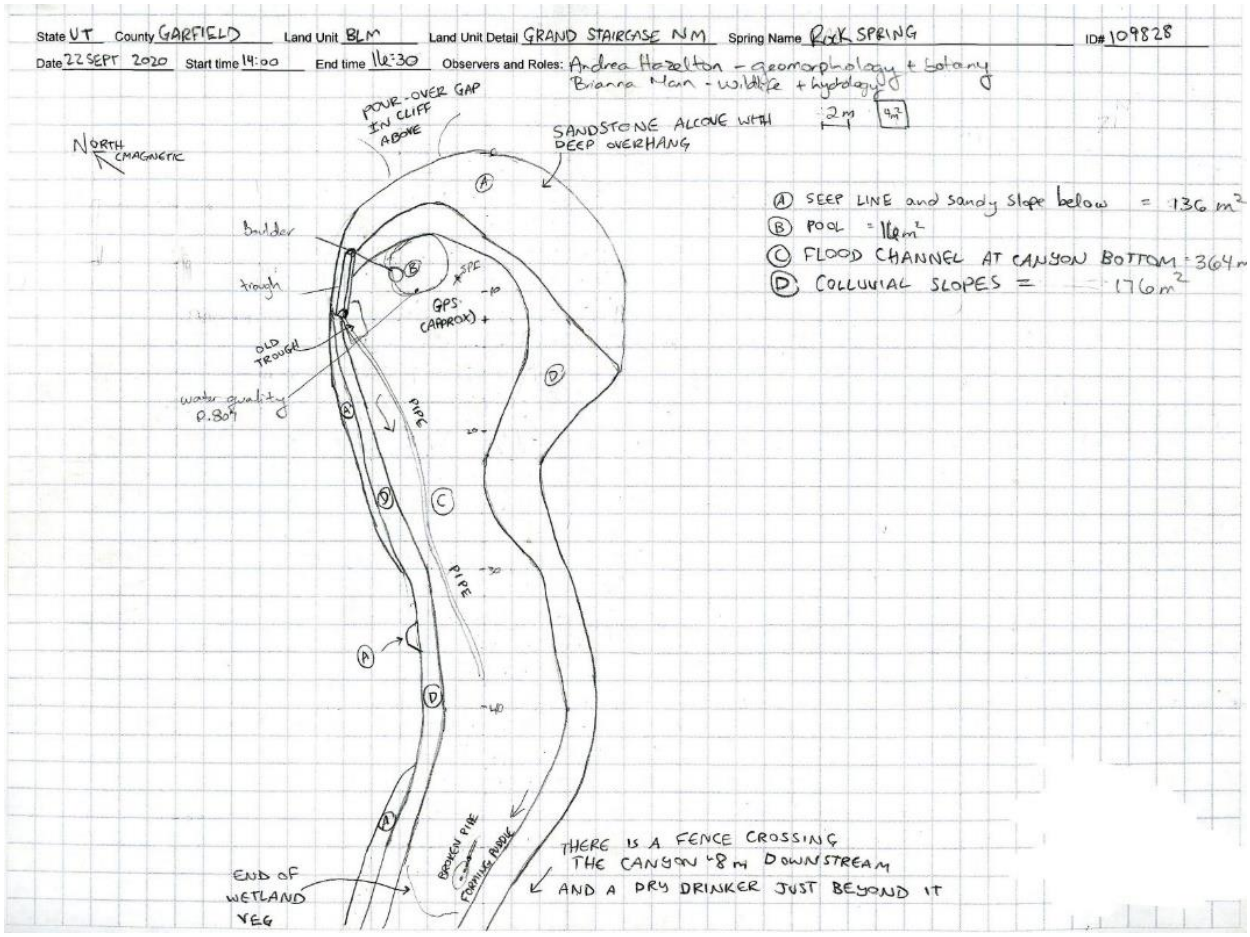

Fig 1.2 Rock Spring Sketchmap.

Fig 1.3 Rock Spring: A downstream-facing view of Rock Spring Creek. The lower, flowing seep line runs along the right bank of the stream, 0.5 m above the stream bed (in shadows).

2. Round Valley Seep, 9/25/20
Survey Summary Report, Site ID 109889
Submitted 12/09/20 by Springs Stewardship Institute

Location: The Round Valley Seep ecosystem is located in Kane County in the Paria Arizona, Utah 14070007 HUC, managed by the US Bureau of Land Management. The spring is located in the Grand Staircase Escalante NM, in the Slickrock Bench USGS Quad, at 37.45385, -111.90164 measured using a GPS (WGS84). The elevation is approximately 1881 meters. Andrea Hazelton, Brianna Mann, and Raven Chavez surveyed the site on 9/25/20 for 01:15 hours, beginning at 11:45, and collected data in 8 of 10 categories. This survey was conducted under the Grand Staircase-Escalante 2020 project using the Stevens et al. Level 2 protocol.

Fig 2.1 Round Valley Seep: The patch of herbaceous wetland vegetation that is supported by this spring. There is no flow, but the soil is moist in some places. The photographer is standing on the uphill edge of the springs habitat.

Physical Description: Round Valley Seep is a hypocrene spring. This spring consists of a patch of herbaceous wetland vegetation growing in soil that ranges from dry to moist. The site is fenced and there is a survey monument identifying the site as Round Valley Draw Spring. There is a standing PVC pipe, about 10 centimeters in diameter, with holes drilled into it that is driven into the ground at the uphill end of the site. At the downhill end of the site, there is a standard 4-centimeter PVC standpipe with a broken 90-degree fitting attached, where there might have once been a tap. There is a dry creek bed about 30 meters downslope of the spring, which is vegetated with willows. The site is adjacent to a dirt road and about 400 meters from a trailhead. The microhabitat associated with the spring covers 36 sqm. The site has 1 microhabitat, A -- a 36 sqm low gradient cienega.

Table 2.1 Round Valley Seep Microhabitat characteristics.

Code	**A**
Name	Dry Cienega
Area sqm	36
Surface type	LGC
Slope variability	Low
Slope degrees	3
Moisture (scale 1-10)	2
Water depth cm	0
Area % open water	0
Substrate	
1 - Clay %	0
2 - Silt %	0
3 - Sand %	98
4 - Fine gravel %	0
5 - Coarse gravel %	0
6 - Cobble %	2
7 - Boulder %	0
8 - Bedrock %	0
Organic %	0
Other % (anthropogenic)	0
Precipitate %	0
Litter %	20
Wood %	1
Litter Depth (cm)	0.2

Geomorphology: Round Valley Seep emerges from a sedimentary, sandstone rock layer.

Access Directions: From the town of Cannonville, drive south on the Cottonwood Canyon Road for 14 miles. Turn right (southwest) onto BLM Rte. 422, following signs to Round Valley Draw Trailhead. Drive 1.6 miles and park at the trailhead. Walk south along the dirt road for another 400 meters to the spring, which is immediately uphill (west) of the road.

Survey Notes: This spring is dry. There are patches of moist soil but no surface water. There is no evidence of recent cattle use in this area and there is well-developed cryptobiotic soil crust at and surrounding the spring. The fence protecting the site is old and the wire is loose. If there were cattle using this area, the fence would not effectively exclude them from the springs habitat.

Flow: There is moist soil, but no open or flowing water. This spring is ephemeral. Surveyors were unable to measure flow because the spring was dry at the time of the survey.

Flora: Andrea Hazelton was the botanist. Surveyors identified 14 plant species at the site, with 0.3889 species/sqm. These included 13 native and 1 nonnative species.

Table 2.2 Round Valley Seep Cover Type.

Cover Type	Species Count	Wetland Species Count
Ground	9	4
Shrub	4	2
Mid-canopy	0	0
Tall canopy	0	0
Basal	0	0
Aquatic	0	0
Non-vascular	1	0

Table 2.3 Round Valley Seep Vegetation % Cover in Microhabitats.

Plant Species	Cover Code	Native Status	Wetland Status	Comments	A
Castilleja	GC	N	U		0.5
Gutierrezia microcephala	SC	N	F		0.5
Juncus balticus	GC	N	W		40
Juncus longistylis	GC	N	W		0.5
Melilotus indicus	GC	I	F		0.5
Muhlenbergia asperifolia	GC	N	WR		10
Poa pratensis	GC	NI	F		5
Rhus trilobata	SC	N	F		1
Salix	SC	N	WR		8
Salix lasiandra var. caudata	SC	N	R		2
Solidago canadensis	GC	N	WR		5
Symphyotrichum	GC	N			0.5
Taraxacum officinale	GC	NI	F		0.5
unknown Bryophyte (moss, liverwort, hornwort)	NV	N?		moss	10

Fauna: The temperature at the time of the survey was 28 degrees Celsius. Surveyors collected or observed 2 terrestrial invertebrate taxa and 2 vertebrate taxa.

Table 2.4 Round Valley Seep Invertebrates.

Species	Lifestage	Habitat	Method	Species Detail
Diptera	Ad	T	Spot	
Hymenoptera Formicidae	Ad	T	Spot	Mounds nearby

Table 2.5 Round Valley Seep Vertebrates.

Vertebrate Species Common Name	Count	Detection	Comments
Western Scrub-jay	1	call	
Brush Rabbit		sign	scat

Assessment: Assessment scores were compiled in 5 categories and 32 subcategories, with 10 null condition scores, and 10 null risk scores. Aquifer functionality and water quality are very poor with very limited restoration potential (average condition score 1.5) and there is high risk (average risk score 4.3). Geomorphology condition is moderate with some restoration potential (average condition score 3.5) and there is low risk (average risk score 2.3). Habitat condition is moderate with some restoration potential (average condition score 3.6) and there is high risk (average risk score 4). Biotic integrity is good with significant restoration potential (average condition score 4.3) and there is low risk (average risk score 1.9). Human influence of site is good with significant restoration potential (average condition score 4.4) and there is moderate risk (average risk score 3). Overall, the site condition is moderate with some restoration potential and there is moderate risk.

Table 2.6 Round Valley Seep Assessment Scores. Condition scores range from 0 (extremely poor condition) to 6 (pristine condition) and risk scores range from 0 (no risk to the site) to 6 (extreme risk to the site).

Category	Condition	Risk
Aquifer Functionality & Water Quality	1.5	4.3
Geomorphology	3.5	2.3
Habitat	3.6	4
Biota	4.3	1.9
Human Influence	4.4	3
Overall Ecological Score	3.6	3

Management Recommendations: This spring has clearly been the object of management attention as there is a fence around it, a survey marker identifying it, and even a new-looking stand pipe whose purpose the surveyors were unable to determine. There are not currently cattle using the area, but if they are returned to this area in the future, we recommend repairing the fence as the barbed wire is loose and would not effectively exclude cattle. Though there is no water at this spring, there is a patch of wetland vegetation which would be quickly eaten by cattle.

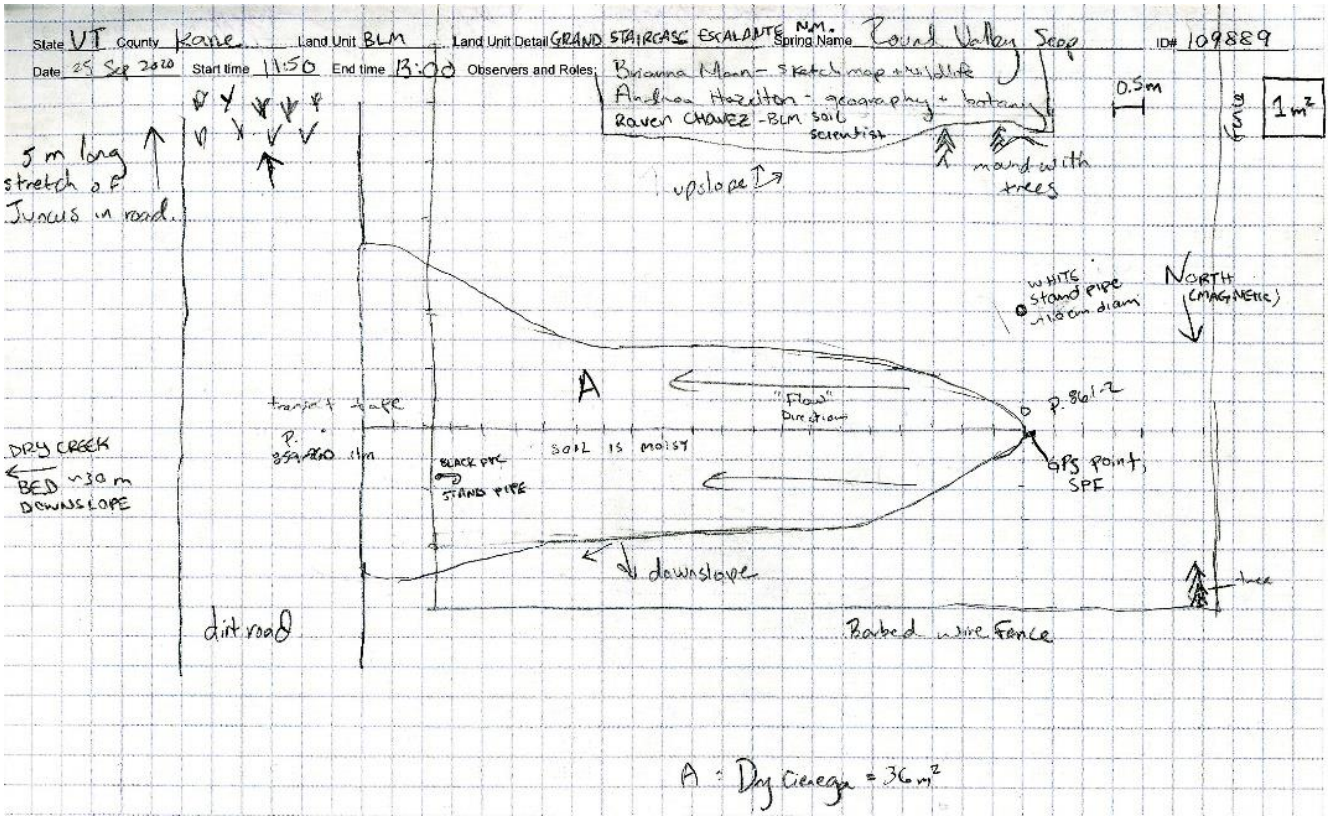

Fig 2.2 Round Valley Seep Sketchmap.

Fig 2.3 Round Valley Seep: The white pvc pipe sticking out of the ground at the uphill end of the site. There are regularly-placed holes drilled into this pipe (visible on the right side).

Fig 2.4 Round Valley Seep: The standing black pipe at the downhill end of the site, which may have once been a tap.

3. Sand Spring, 9/24/20
Survey Summary Report, Site ID 109938
Submitted 12/09/20 by Springs Stewardship Institute

Location: The Sand Spring ecosystem is located in Kane County in the Paria Arizona, Utah 14070007 HUC, managed by the US Bureau of Land Management. The spring is located in the Grand Staircase Escalante NM, in the Deer Spring Point USGS Quad, at 37.27978, -112.18849 measured using a GPS (WGS84, estimated position error 3 meters). The elevation is approximately 1804 meters. Jeri Ledbetter and Larry Stevens surveyed the site on 9/24/20 for 02:00 hours, beginning at 16:50, and collected data in 10 of 10 categories. This survey was conducted under the Grand Staircase-Escalante 2020 project using the Stevens et al. Level 2 protocol.

Fig 3.1 Sand Spring: A well-trodden cattle trail through the sand leads to the downstream end of this wet meadow. Note the cut banks in the middle and downstream end of the wet meadow. The trough in the foreground is non-functional; rather, water from this spring is piped off-site to a large enclosed black tank (> 50 m downstream).

Physical Description: Sand Spring is a helocrene spring. Flow emerges from a large, wet, northeast-facing meadow that is extensively developed and shows a legacy of livestock grazing and trampling. Seepage pours off of two large cut banks within the wet meadow, then combines into a channel and flows downstream, although much of the water is diverted through pipes to a large tank and troughs. There is a black tank or well sunk into the in the middle of the wet meadow. The pipes from that tank deliver water to a large metal tank about 100 meters downhill of the spring. A fence surrounds the wet meadow. The microhabitats associated with the spring cover 3225 sqm. The site has 2 microhabitats, including A -- a 1316 sqm low gradient cienega, B -- a 1909 sqm low gradient cienega. The geomorphic diversity is 0.29, based on the Shannon-Weiner diversity index.

Table 3.1 Sand Spring Microhabitat characteristics.

Code	**A**	**B**
Name	Low Gradient Cienega	Margin
Area sqm	1316	1909
Surface type	LGC	LGC
Slope variability	Med	Med
Aspect TN	66	66
Slope degrees	9	8
Moisture (scale 1-10)	8	1
Water depth cm	6	0
Area % open water	1	0
Substrate		
1 - Clay %	0	0
2 - Silt %	0	20
3 - Sand %	0	75
4 - Fine gravel %	0	0
5 - Coarse gravel %	0	0
6 - Cobble %	0.5	0
7 - Boulder %	0	0
8 - Bedrock %	0	0
Organic %	99	0
Other % (anthropogenic)	0.5	5
Precipitate %	0	0
Litter %	95	95
Wood %	0.5	0.5
Litter Depth (cm)	2	2

Geomorphology: Sand Spring emerges as a seepage or filtration spring from a sedimentary, sandstone rock layer. The emergence environment is subaerial, with a gravity flow force mechanism.

Access Directions: From the town of Glendale, drive east on Scenic Backway (Rte 600/ Glendale Bench Rd/ Rte 136). After 12 miles, turn east onto the Skutumpah Rd (Rte 500). Drive 10 miles and turn south on Rte 555 (Sand Rd). Drive south on Sand Road for about 4 miles; the road follows Deer Spring Wash for much of this distance. After about 4 miles, the road bends to the west and climbs out of the wash. Do not follow the main road out of the wash. Instead, continue driving southeast down the wash for another 1.45 miles. Park and hike about 250 meters up a side drainage to the west.

Survey Notes: The fence that surrounds this wet meadow is recently constructed. Past trampling and trails formed by livestock have significantly altered the wet meadow, forming the large cut-banks. The upper section of the meadow is currently dry. Seepage emerges all along the upper cut bank and the lower section of the wet meadow has areas of standing water. What flow is not captured in the pipes collects into an outflow channel. There is much old piping, fencing, barbed wire, and French drain pipes scattered about. Concrete sacks are lying around, likely leftover from the installation of the tank that is sunk into the ground in the middle of the wet meadow. This tank appears recently installed. The small metal trough just downstream of the wet meadow is dry, but the enclosed large metal tank about 100 meters downhill of the spring is full.

Flow: Surveyors measured a flow of 0.17 liters/second, using a timed flow volume capture method. Flow was adjusted for an estimate of 40% of site flow capture. Surveyors measured flow where the outflow channelizes, about 3.5 m above the fence (37.27999, -112.18829). Surveyors suspect an unknown amount of flow is being diverted. The percent of flow they captured is roughly estimated. This spring is perennial.

Water Quality: The surveyor measured water quality at two locations. Sample site 1 is located upstream of the infrastructure, where there is very little seepage. The second sample was collected from the French drain, just below the first cutbank. Location 1: at the spring source in flowing water at 17:17. Location 2: down-gradient from the spring source in flowing water at 17:17.

Table 3.2 Sand Spring Water Quality Measurements.

Characteristic Measured	Value	Location Number	Device
Dissolved Solids (field) (ppt)	0.116	2	Hanna Multi 98194
pH (field)	6.1	2	Hanna Multi 98194
Specific conductance (field) (µS/cm)	233	2	Hanna Multi 98194
Temperature, air C	32	1	Handheld therm
Temperature, water C	15.22	2	Hanna Multi 98194

Flora: Larry Stevens was the botanist. Surveyors identified 38 plant species at the site, with 0.0118 species/sqm. These included 30 native and 8 nonnative species.

Table 3.3 Sand Spring Cover Type.

Cover Type	Species Count	Wetland Species Count
Ground	30	16
Shrub	6	1
Mid-canopy	0	0
Tall canopy	0	0
Basal	0	0
Aquatic	0	0
Non-vascular	2	1

Table 3.4 Sand Spring Vegetation % Cover in Microhabitats.

Plant Species	Cover Code	Native Status	Wetland Status	Comments	A	B
algae	NV	N?	A		0.3	0
Ambrosia acanthicarpa	GC	N	F		0	0.2
Artemisia tridentata	SC	N	U		0	20
Bromus tectorum	GC	I	U		0	10
Carex nebrascensis	GC	N	W		65	0
Castilleja	GC	N	U		0	0.1
Cirsium arizonicum	GC	N	F		1	0.3
Conyza canadensis	GC	N	R		1	15
Elaeagnus angustifolia	SC	I	F		0	0.1
Eleocharis quinqueflora	GC	N	W		2	0
Elymus elymoides	GC	N	F		0	0.1
Epilobium ciliatum	GC	N	W		2	0.5
Equisetum laevigatum	GC	N	WR		0	0.01
Ericameria nauseosa	SC	N	F		0	8
Erigeron flagellaris	GC	N	U		0.01	0.1
Juncus balticus	GC	N	W		8	2
Juncus bufonius	GC	N	W		1	0
Juncus ensifolius	GC	N	W		2	0
Juncus longistylis	GC	N	W		4	0.1
Juniperus osteosperma	SC	N	U		0.1	0.2
Medicago sativa	GC	I	WR		0.4	2
Melilotus albus	GC	I	WR		0.4	0.2
Melilotus officinalis	GC	I	WR		0.1	0
Mimulus floribundus	GC	N	WR		0.1	0
Oenothera pallida	GC	N	U		0	0.2
Packera	GC	N	F		0	0.3
Poa pratensis	GC	NI	F		8	40
Polypogon monspeliensis	GC	I	WR		0.3	0.1
Pseudognaphalium stramineum	GC	N			1	18
Ranunculus	GC	N	WR		0.1	0
Rhus trilobata	SC	N	F		1	0
Rumex crispus	GC	I	F		0.1	0
Salix gooddingii	SC	N	R		0	2
Sisyrinchium	GC	N	WR		1	0
Symphyotrichum spathulatum	GC	N			0.1	0.1
Taraxacum officinale	GC	NI	F		0.1	0
unknown Bryophyte (moss, liverwort, hornwort)	NV	N?		moss	0.4	0
Verbascum thapsus	GC	I	U		0.1	2

Fauna: Surveyors collected or observed 2 terrestrial invertebrate taxa and 14 vertebrate taxa.

Table 3.5 Sand Spring Invertebrates.

Species	Lifestage	Habitat	Method	Count
Coleoptera Tenebrionidae Eleodes obscura	Ad	T	Collected spot	1
Hymenoptera Apidae Apis mellifera	Ad	T	Spot	

Table 3.6 Sand Spring Vertebrates.

Vertebrate Species Common Name	Count	Detection	Comments
Acorn Woodpecker		obs	
Steller's Jay		obs	
Western Bluebird		obs	
Domestic Cow		sign	
Deer		sign	
Coyote		sign	Scat
Pinyon Jay	8	call	
House Finch	3	obs	
Clark's Nutcracker	1	sign	Feathers
Western Scrub-jay	1	call	
Pocket Gopher		sign	Burrows
Pine Siskin	1	obs	
Common Raven	1	obs	
Mountain Chickadee	1	call	

Assessment: Assessment scores were compiled in 5 categories and 33 subcategories, with 9 null condition scores, and 9 null risk scores. Aquifer functionality and water quality are moderate with some restoration potential (average condition score 3.8) and there is low risk (average risk score 2.2). Geomorphology condition is moderate with some restoration potential (average condition score 3.8) and there is low risk (average risk score 2.8). Habitat condition is good with significant restoration potential (average condition score 4.8) and there is low risk (average risk score 2.6). Biotic integrity is very good with excellent restoration potential (average condition score 4.9) and there is low risk (average risk score 2.6). Human influence of site is very good with excellent restoration potential (average condition score 4.9) and there is low risk (average risk score 2.6). Overall, the site condition is good with significant restoration potential and there is low risk.

Table 3.7 Sand Spring Assessment Scores. Condition scores range from 0 (extremely poor condition) to 6 (pristine condition) and risk scores range from 0 (no risk to the site) to 6 (extreme risk to the site).

Category	Condition	Risk
Aquifer Functionality & Water Quality	3.8	2.2
Geomorphology	3.8	2.8
Habitat	4.8	2.6
Biota	4.9	2.6
Human Influence	4.9	2.6
Overall Ecological Score	4.5	2.5

Management Recommendations: The site has been very well protected with a recently constructed fence and provides abundant, easily accessed water for livestock well away from the low gradient cienega source. Surveyors recommend cleaning up the garbage and old wire and removing the nonnative thistles and Russian olive. This site will benefit from occasional monitoring to ensure the integrity of the fence, piping, and water available to livestock.

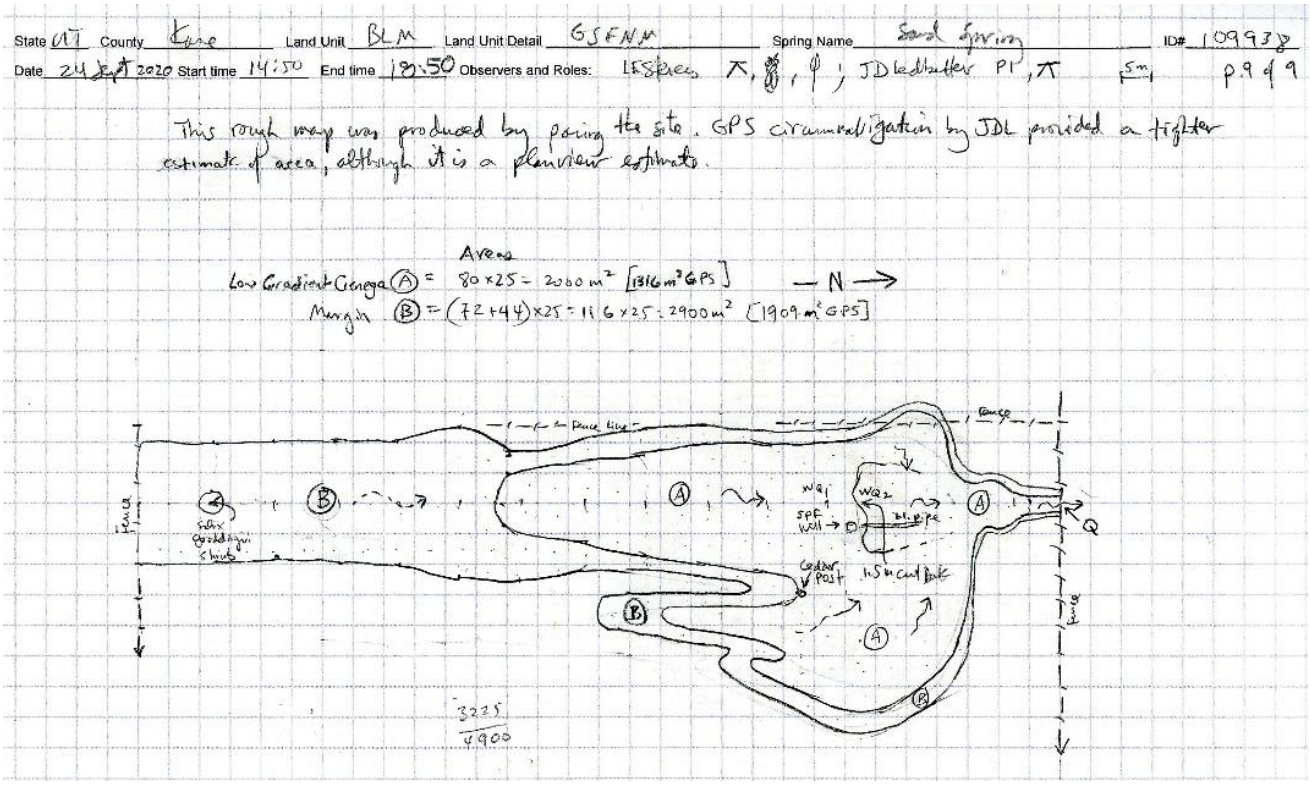

Fig 3.2 Sand Spring Sketchmap.

Fig 3.3 Sand Spring: The flow measurement location at the downstream end of the wet meadow, where flow channelizes about 3.5 m uphill of the fence line.

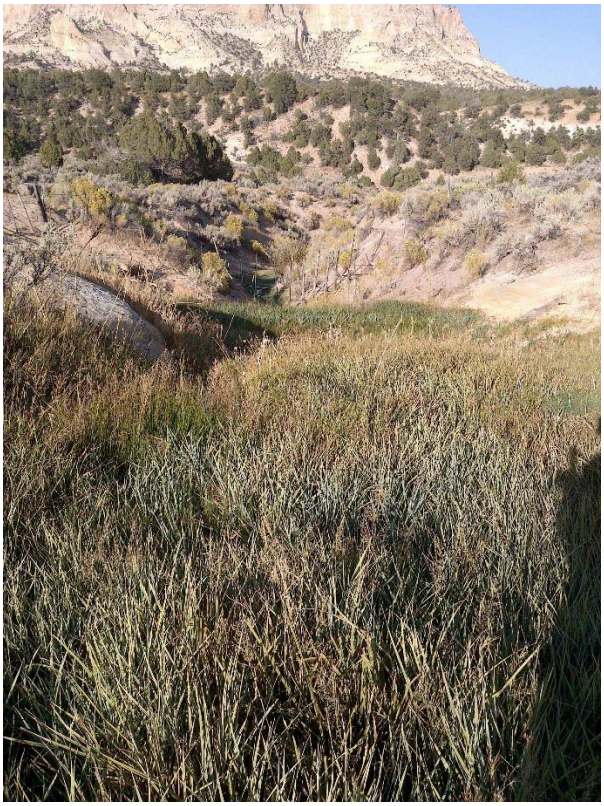

Fig 3.4 Sand Spring: The lower end of the wet meadow, with the downstream fence line visible at the far end. The photographer is standing just downhill of a major cut-bank.

4. Seaman Spring, 9/22/20
Survey Summary Report, Site ID 106222
Submitted 12/09/20 by Springs Stewardship Institute

Location: The Seaman Spring ecosystem is located in Kane County in the Kanab Arizona, Utah 15010003 HUC, managed by the US Bureau of Land Management. The spring is located in the Grand Staircase Escalante NM, in the Petrified Hollow USGS Quad, at 37.11925, -112.24381 measured using a GPS (WGS84). The elevation is approximately 1846 meters. Larry Stevens surveyed the site on 9/22/20 for 00:20 hours, beginning at 11:50, and collected data in 5 of 10 categories. This survey was conducted under the Grand Staircase-Escalante 2020 project using the Stevens et al. Level 2 protocol.

Fig 4.1 Seaman Spring: The plunge pool at bottom left of the photograph beneath the overhanging cliff and the densely vegetated channel.

Physical Description: Seaman Spring is a rheocrene spring. Seaman Spring is located in the southwest corner of Grand Staircase-Escalante National Monument. The spring emerges from the floor of a small, structurally controlled canyon in the pinyon pine-juniper zone. The first emergence of flow is into a plunge pool beneath an overhanging cliff. The parent rock is Mesozoic sandstone and siltstone and the surrounding landscape is dominated by cliffs and terraces. Seaman Spring is discussed in a chapter called "An Undisturbed Spring and Adjacent Habitats" written by Larry Stevens and Bianca Perla in the book "Aridland Springs in North America". The microhabitats associated with the spring cover 255 sqm. The site has 3 microhabitats, including B -- a 200 sqm channel, C -- a 40 sqm sloping bedrock. The geomorphic diversity is 0.28, based on the Shannon-Weiner diversity index.

Table 4.1 Seaman Spring Microhabitat characteristics.

Code	A	B	C
Name	Spring Source Site	Channel	Seeping Sidewalls
Area sqm	15	200	40
Surface type	P	CH	SB
Slope variability	Low	Med	Low
Aspect TN	11	281	11
Moisture (scale 1-10)		0	0

Geomorphology: Seaman Spring emerges as a seepage or filtration spring from a sedimentary, sandstone rock layer. The emergence environment is subaqueous-lotic freshwater, with a gravity flow force mechanism.

Access Directions: From the Great Western Trail North Staging area off Highway 89, east of Kanab, turn north onto BLM Rd 575. Follow this road as it bends west and eventually south. After about 7 miles, turn right (north) onto BLM Rd 563 and drive about 3 miles. At some point this road becomes BLM Rd 562, though that location is not signed. Continue on Rd 562 up Seaman Wash for about 1.75 miles; the road quickly deteriorates. Where the road bends to the west to climb out of the wash, park and walk east. Ascend the slope on creek right into the uplands and scramble about 700 m upstream (east) to where you can descend to the creek bottom on the upstream side of the spring. Walk downstream to the plunge pool lip and either find a way around the drop off or bring a rope and descend 7 meters to the pool. This site might be more accessible from the downstream side after an intensive flooding event. As of 2020, the wash bed downstream of the spring was too thickly vegetated to navigate.

Survey Notes: The surveyor was not able to safely access the site; all of the data associated with this survey was observed from a vantage overlooking the site. This spring source is well protected from anthropogenic disturbance, being virtually inaccessible from both the downstream and upstream ends, or from descent from the sides in this steep, narrow, very brushy canyon. In 2004-05 the springbrook flowed all the way down to BLM Rd 562, but at the time of this visit, the entire drainage was dry, except for the 50 square meters of the plunge pool area and the very small Lower Seaman Spring (Site ID: 251354) located 400 meters downstream. There was no outflow from the plunge pool. There was no sign of recent, substantial flooding or livestock grazing in the vicinity of Seaman Spring.

Flora: Surveyors identified 6 plant species at the site, with 0.0235 species/sqm. These included 6 native and 0 nonnative species.

Table 4.2 Seaman Spring Cover Type.

Cover Type	Species Count	Wetland Species Count
Ground	1	1
Shrub	3	3
Mid-canopy	2	2
Tall canopy	1	1
Basal	0	0
Aquatic	0	0
Non-vascular	1	1

Table 4.3 Seaman Spring Vegetation % Cover in Microhabitats.

Plant Species	Cover Code	Native Status	Wetland Status	B	C
algae	NV	N?	A	0	30
Populus fremontii	MC	N	R	0	0
Populus fremontii	TC	N	R	0	0
Salix	SC	N	WR	10	5
Salix exigua	SC	N	WR	50	20
Salix gooddingii	MC	N	R	0	0
Salix gooddingii	SC	N	R	0	0
Typha latifolia	GC	N	A	10	2

Fauna: The surveyor did not record any invertebrate observations.

Table 4.4 Seaman Spring Vertebrates.

Vertebrate Species Common Name	Count	Detection
Pinyon Jay	5	call
Western Scrub-jay	1	call
Common Raven	1	call
Spotted Towhee	1	call
Northern Flicker	1	obs

Assessment: Assessment scores were compiled in 5 categories and 30 subcategories, with 12 null condition scores, and 9 null risk scores. Aquifer functionality and water quality are good with significant restoration potential (average condition score 4.2) and there is low risk (average risk score 2). Geomorphology condition is good with significant restoration potential (average condition score 4.4) and there is negligible risk (average risk score 1). Habitat condition is good with significant restoration potential (average condition score 4.5) and there is negligible risk (average risk score 1.2). Biotic integrity is good with significant restoration potential (average condition score 4.7) and there is low risk (average risk score 2.4). Human influence of site is very good with excellent restoration potential (average condition score 5.4) and there is negligible risk (average risk score 1.1). Overall, the site condition is good with significant restoration potential and there is negligible risk.

Table 4.5 Seaman Spring Assessment Scores. Condition scores range from 0 (extremely poor condition) to 6 (pristine condition) and risk scores range from 0 (no risk to the site) to 6 (extreme risk to the site).

Category	Condition	Risk
Aquifer Functionality & Water Quality	4.2	2
Geomorphology	4.4	1
Habitat	4.5	1.2
Biota	4.7	2.4
Human Influence	5.4	1.1
Overall Ecological Score	4.8	1.6

Management Recommendations: This survey was conducted by peering into the site from above, not from a direct on-site visit. Therefore, the SEAP scores should be regarded as provisional. This site is very difficult to access and it appears to be in near-pristine condition. The site should be more thoroughly inventoried, but technical climbing gear may be needed. If Seaman Wash floods vigorously, access may re-open from below.

5. Vespid Meadow Spring, 9/23/20
Survey Summary Report, Site ID 106229
Submitted 12/09/20 by Springs Stewardship Institute

Location: The Vespid Meadow Spring ecosystem is located in Kane County in the Kanab Arizona, Utah 15010003 HUC, managed by the US Bureau of Land Management. The spring is located in the Grand Staircase Escalante NM, in the Skutumpah Creek USGS Quad, at 37.27414, -112.30557 measured using a GPS (WGS84, estimated position error 3 meters). The elevation is approximately 1905 meters. Jeri Ledbetter and Larry Stevens surveyed the site on 9/23/20 for 01:35 hours, beginning at 15:40, and collected data in 9 of 10 categories. This survey was conducted under the Grand Staircase-Escalante 2020 project using the Stevens et al. Level 2 protocol.

Fig 5.1 Vespid Meadow Spring: Crew biologist Larry Stevens records data in the middle of the wet meadow. The muddy, trampled area in the foreground is the lower pool at this site, where water quality was measured. The vertical culvert pipe is just downstream of this pool, but is hidden by vegetation.

Physical Description: Vespid Meadow Spring is a helocrene spring. Seepage emerges from a wet meadow at the end of a rugged two-track road in a fenced exclosure. Within the wet meadow, standing water forms pools in two depressions that were created by ungulate trampling. The site was historically developed for livestock use, with fencing, troughs, and pipes. Downstream of the lower pool, a section of culvert pipe is installed vertically in concrete, presumably to serve as a wildlife drinker. There is a large drinker made from a tractor tire outside of the exclosure fence, about 100 meters downstream of the spring. The microhabitats associated with the spring cover 388 sqm. The site has 2 microhabitats, including A -- a 268 sqm low gradient cienega, B -- a 120 sqm terrace. The geomorphic diversity is 0.27, based on the Shannon-Weiner diversity index.

Table 5.1 Vespid Meadow Spring Microhabitat characteristics.

Code	**A**	**B**
Name	Low Gradient Cienega	Perimeter
Area sqm	268	120
Surface type	LGC	TE
Surface subtype		LRZ
Slope variability	Low	Low
Aspect TN	194	194
Slope degrees	2	2
Moisture (scale 1-10)	6	1
Water depth cm	5	0
Area % open water	2	0
Substrate		
1 - Clay %	0	0
2 - Silt %	18	10
3 - Sand %	40	40
4 - Fine gravel %	5	10
5 - Coarse gravel %	3	10
6 - Cobble %	3	10
7 - Boulder %	2	5
8 - Bedrock %	2	2
Organic %	20	12.5
Other % (anthropogenic)	7	0.5
Precipitate %	10	10
Litter %	40	30
Wood %	2	3
Litter Depth (cm)	3	2

Geomorphology: Vespid Meadow Spring emerges as a seepage or filtration spring from a sedimentary, sandstone rock layer. The emergence environment is subaerial, with a gravity flow force mechanism.

Access Directions: From the town of Glendale, turn east on Scenic Backway (AKA Rte 600, Glendale Bench Rd, or Rte 136). After 12 miles, turn east on the Skutumpah Rd (Rte 500). After approximately 3 miles, turn right (south) on Rte 502. Look for this turn just after crossing Skutumpah Creek and driving past a ranch. Drive south on Rte 502 for 0.5 miles and look for a two-track road to the left (east). Follow this two-track road for 1.6 mi until it ends near a corral and the spring. This road is narrow, bumpy, and appropriate for a UTV.

Survey Notes: The exclosure fence is relatively new and currently intact, but a history of heavy livestock use at this spring is apparent. The wet meadow is heavily trampled, particularly in the muddy areas where seepage pools in the hoof prints. The only standing water at this site is within the hoof prints and there is no outflow exiting the wet meadow. None of the springs development infrastructure appears functional. Two-inch plastic tubing is lying to the side, disconnected and no longer functioning. The vertical culvert pipe below the lower pool is dry and filled in with sediment. Another larger gray pipe is between the two pools, sunk into the ground and apparently nonfunctional. The large drinker downstream of the exclosure is dry. There are four game cameras installed within the exclosure, indicating significant recreation attention.

Water Quality: Surveyors measured water quality in the deepest hoof print. Location 1: at the spring source in standing water at 15:15.

Table 5.2 Vespid Meadow Spring Water Quality Measurements.

Characteristic Measured	Value	Location Number	Device
Dissolved Solids (field) (ppt)	1.784	1	Hanna Multi 98194
pH (field)	7.9	1	Hanna Multi 98194
Specific conductance (field) (µS/cm)	3564	1	Hanna Multi 98194
Temperature, water C	24.12	1	Hanna Multi 98194

Flora: Larry Stevens was the botanist. Surveyors identified 25 plant species at the site, with 0.0644 species/sqm. These included 13 native and 11 nonnative species; the native status of 1 species remains unknown.

Table 5.3 Vespid Meadow Spring Cover Type.

Cover Type	Species Count	Wetland Species Count
Ground	18	8
Shrub	6	1
Mid-canopy	0	0
Tall canopy	0	0
Basal	0	0
Aquatic	0	0
Non-vascular	1	1

Table 5.4 Vespid Meadow Spring Vegetation % Cover in Microhabitats.

Plant Species	Cover Code	Native Status	Wetland Status	A	B
Agropyron cristatum	GC	I	U	0.1	0.4
algae	NV	N?	A	0.1	0
Artemisia tridentata	SC	N	U	0	1
Bromus tectorum	GC	I	U	1	3
Carex praegracilis	GC	N	W	0.5	0
Conyza canadensis	GC	N	R	3	3
Elymus elymoides	GC	N	F	0.1	8
Juncus balticus	GC	N	W	75	8
Juniperus monosperma	SC	N	U	2	3
Juniperus osteosperma	SC	N	U	0	4
Lactuca serriola	GC	I	F	1	5
Melilotus albus	GC	I	WR	3	5
Melilotus officinalis	GC	I	WR	0	1
Muhlenbergia asperifolia	GC	N	WR	2	60
Pinus edulis	SC	N	U	0	0.1
Polygonum aviculare	GC	I	F	0.1	0
Rhus trilobata	SC	N	F	0	0.5
Sanguisorba minor	GC	I	F	0	0.1
Sisymbrium altissimum	GC	I	F	0.2	0.1
Sisyrinchium demissum	GC	N	W	2	2
Symphyotrichum ciliatum	GC	N	WR	0	0.1
Tamarix	SC	I	WR	7	15
Thinopyrum intermedium	GC	I	F	1	1
Tragopogon dubius	GC	I	F	0.2	0.1
unknown herb	GC			0.1	0

Fauna: Surveyors collected or observed 5 terrestrial invertebrate taxa and 9 vertebrate taxa.

Table 5.5 Vespid Meadow Spring Invertebrates.

Species	Lifestage	Habitat	Method	Count
Hymenoptera Apidae Apis mellifera	Ad	T	Collected spot	3
Hymenoptera Vespidae Vespula pensylvanica	Ad	T	Collected spot	500
Lepidoptera Nymphalidae Adelpha eulalia	Ad	T	Spot	1
Odonata Aeshnidae	Ad	T	Spot	1
Orthoptera Acrididae Melanoplus femurrubrum	Ad	T	Collected spot	1

Table 5.6 Vespid Meadow Spring Vertebrates.

Vertebrate Species Common Name	Count	Detection	Comments
Domestic Cow		sign	Old scat
Deer		sign	
Gopher		sign	
Chipping Sparrow	1	obs	
Turkey Vulture	1	sign	feather
Red-breasted Nuthatch	1	obs	
Red-tailed Hawk	1	sign	1 juvenile feather
Great Horned Owl	1	sign	1 breast feather
Finch	4	obs	

Assessment: Assessment scores were compiled in 5 categories and 33 subcategories, with 9 null condition scores, and 9 null risk scores. Aquifer functionality and water quality are moderate with some restoration potential (average condition score 3.8) and there is low risk (average risk score 2.2). Geomorphology condition is moderate with some restoration potential (average condition score 3) and there is moderate risk (average risk score 3.6). Habitat condition is good with significant restoration potential (average condition score 4.2) and there is low risk (average risk score 2.6). Biotic integrity is good with significant restoration potential (average condition score 4.6) and there is low risk (average risk score 2). Human influence of site is good with significant restoration potential (average condition score 3.9) and there is low risk (average risk score 2.7). Overall, the site condition is good with significant restoration potential and there is low risk.

Table 5.7 Vespid Meadow Spring Assessment Scores. Condition scores range from 0 (extremely poor condition) to 6 (pristine condition) and risk scores range from 0 (no risk to the site) to 6 (extreme risk to the site).

Category	Condition	Risk
Aquifer Functionality & Water Quality	3.8	2.2
Geomorphology	3	3.6
Habitat	4.2	2.6
Biota	4.6	2
Human Influence	3.9	2.7
Overall Ecological Score	4	2.5

Management Recommendations: The site is currently well and appropriately fenced, allowing deer and smaller animals easy passage. Surveyors recommend continuing to maintain the fence and monitoring occasionally to determine whether the flow is perennial. Land managers can remove the used infrastructure (broken piping) that does not contribute to the site functionality.

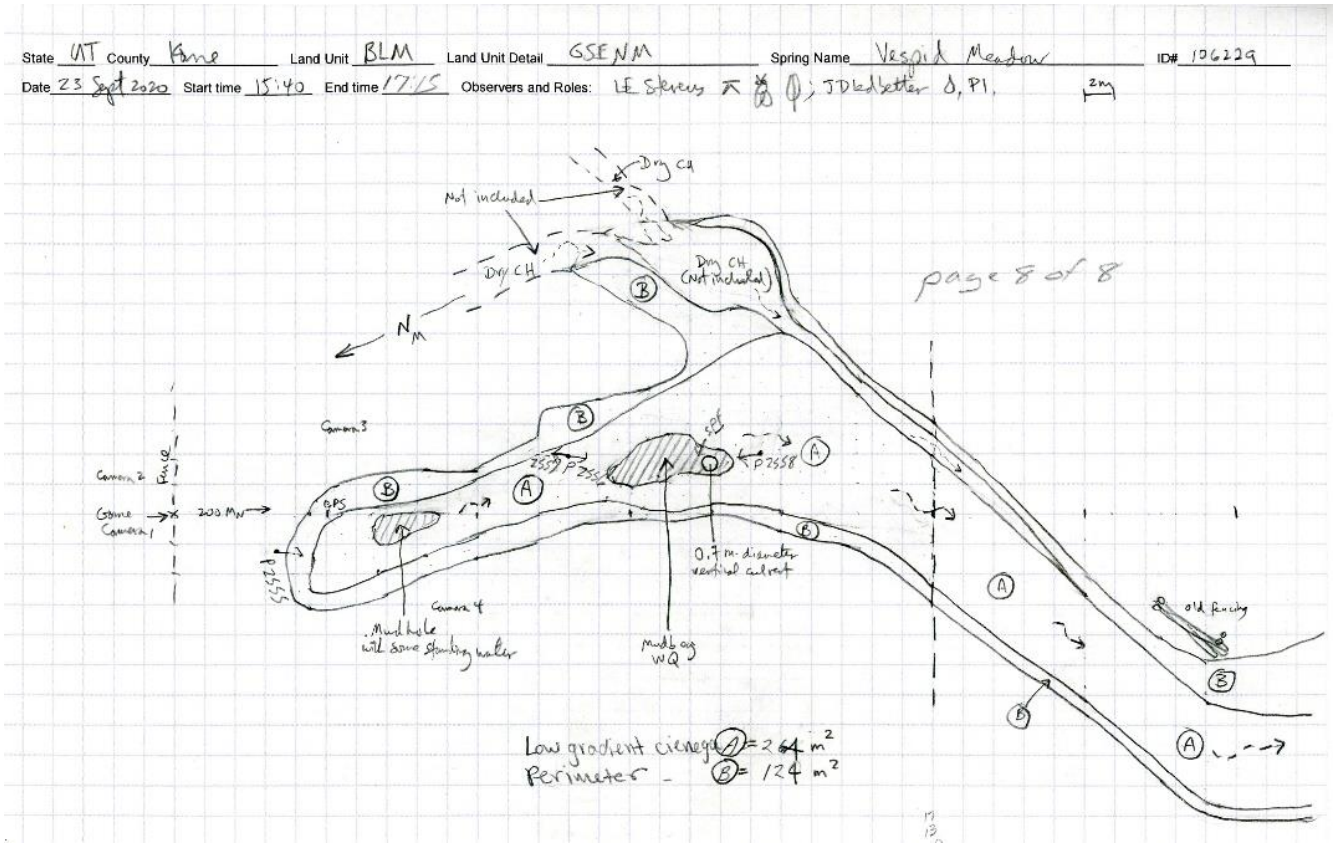

Fig 5.2 Vespid Meadow Spring Sketchmap.

Fig 5.3 Vespid Meadow Spring: The first muddy pool in this wet meadow. The photographer is standing at the upstream edge of the springs habitat.

Fig 5.4 Vespid Meadow Spring: Dry drinker made of a tractor tire, located 100 m downslope of the spring, outside the exclosure.

6. White House Spring, 9/25/20
Survey Summary Report, Site ID 110625
Submitted 12/09/20 by Springs Stewardship Institute

Location: The White House Spring ecosystem is located in Kane County in the Paria Arizona, Utah 14070007 HUC, managed by the US Bureau of Land Management. The spring is located in the Grand Staircase Escalante NM, in the West Clark Bench USGS Quad, at 37.07418, -111.89366 measured using a GPS (WGS84, estimated position error 5 meters). The elevation is approximately 1321 meters. Andrea Hazelton and Brianna Mann surveyed the site on 9/25/20 for 01:50 hours, beginning at 16:30, and collected data in 10 of 10 categories. This survey was conducted under the Grand Staircase-Escalante 2020 project using the Stevens et al. Level 2 protocol.

Fig 6.1 White House Spring: The seep line, which wraps around the north-facing head of a canyon.

Physical Description: White House Spring is a hanging garden spring. Seepage emerges from a seep line wrapping around the back of a north-facing sandstone alcove at the head of White House Canyon. The flow collects in a channel in the sand below the seep line, flows to a point at the back of the alcove and then down the steep vegetated slope below the seep line to the canyon bottom. At the east end of the seep, there is a pipe tapping the seep line with the other end buried in the sand below the seep line. There are empty pipes running from this canyon toward Paria Canyon, downstream. The microhabitats associated with the spring cover 238 sqm. The site has 3 microhabitats, including A -- a 35 sqm backwall, B -- a 37 sqm channel, C -- a 166 sqm terrace. The geomorphic diversity is 0.36, based on the Shannon-Weiner diversity index.

Table 6.1 White House Spring Microhabitat characteristics.

Code	**A**	**B**	**C**
Name	Seep Line	Outflow Channel	Vegetated Slope
Area sqm	35	37	166
Surface type	BW	CH	TE
Slope variability	Med	High	Low
Aspect TN	31	31	31
Slope degrees	95	20	40
Moisture (scale 1-10)	9	9	0
Water depth cm	0	4	0
Area % open water	0	40	0
Substrate			
1 - Clay %	0	0	0
2 - Silt %	0	0	0
3 - Sand %	0	80	80
4 - Fine gravel %	0	17.9	20
5 - Coarse gravel %	0	1	0
6 - Cobble %	0	1	0
7 - Boulder %	0	0	0
8 - Bedrock %	79.90	0	0
Organic %	20	0	0
Other % (anthropogenic)	0.1	0.1	0
Precipitate %	5	0	0
Litter %	0	2	50
Wood %	0	0.1	30
Litter Depth (cm)	0	0.2	0.5

Geomorphology: White House Spring emerges as a contact spring from a sedimentary, sandstone rock layer. The emergence environment is subaerial, with a gravity flow force mechanism.

Access Directions: Park at White House Trailhead, off Highway 89, 15 miles west of Big Water, UT. Hike the trail south along the Paria River. After less than 0.5 km, walk west up White House Canyon to the spring.

Survey Notes: The pipe tapping the seep line has a leaky valve; as a result, much of the water entering the pipe is immediately returned to the seep outflow channel. The steep slope below the seep line is densely vegetated with Clematis vines and birchleaf buckthorn bushes. Despite the nearby hiking trail and campground, there is no evidence of recreational visitation to this spring. There are cattle nearby in Paria Canyon, but no signs that they are accessing this site.

Flow: Surveyors measured a flow of 0.071 liters/second, using a timed flow volume capture method. Flow was adjusted for an estimate of 30% of site flow capture. The surveyor measured flow where the water was leaking from the pipe. The remaining flow was too diffuse to capture.

Water Quality: The surveyor measured water chemistry at the top of the outflow channel in a small pool. The pool was being fed by water dripping from a pipe and seepage from the backwall. Location 1: at the spring source in flowing water at 17:17.

Table 6.2 White House Spring Water Quality Measurements.

Characteristic Measured	Value	Location Number	Device
Alkalinity, Total (mg/L)	60	1	LaMotte
Dissolved oxygen (field) (mg/L)	6	1	CHEMets DO kit
Dissolved Solids (field) (ppt)	0.148	1	Hanna Multi 98194
pH (field)	7.86	1	Hanna Multi 98194
Specific conductance (field) (µS/cm)	296	1	Hanna Multi 98194
Temperature, air C	26	1	Handheld therm
Temperature, water C	16.23	1	Hanna Multi 98194

Flora: Andrea Hazelton was the botanist. Surveyors identified 5 plant species at the site, with 0.021 species/sqm. These included 5 native and 0 nonnative species.

Table 6.3 White House Spring Cover Type.

Cover Type	Species Count	Wetland Species Count
Ground	1	1
Shrub	3	2
Mid-canopy	0	0
Tall canopy	0	0
Basal	0	0
Aquatic	0	0
Non-vascular	1	0

Table 6.4 White House Spring Vegetation % Cover in Microhabitats.

Plant Species	Cover Code	Native Status	Wetland Status	Comments	A	B	C
Acer grandidentatum	SC	N	F		0	0	10
Apocynum cannabinum	SC	N	WR		0.5	1	5
Clematis ligusticifolia	GC	N	R		0.5	1	50
Rhamnus betulifolia	SC	N	WR		1	5	35
unknown Bryophyte (moss, liverwort, hornwort)	NV	N?		moss	35	20	0

Fauna: There are birds at the site, but in thick vegetation; the surveyor could not identify the species. There are feathers in the pools near the source. Surveyors collected or observed 4 aquatic and 4 terrestrial invertebrate taxa and 5 vertebrate taxa.

Table 6.5 White House Spring Invertebrates.

Species	Lifestage	Habitat	Method	Count	Species Detail
Araneae	Ad	T	Spot	1	web over cliffhang
Coleoptera Scarabaeidae	Ad	T	Spot	1	
Diptera Nematocera	L	A	Collected spot	1	
Hemiptera Veliidae Microvelia	M	A	Collected spot	2	adult and larva
Hymenoptera Apidae Apis mellifera	Ad	T	Spot	6	drinking from seeping wall
Hymenoptera Formicidae	Ad	T	Spot		many
Odonata	L	A	Spot	5	
Odonata Coenagrionidae	L	A	Collected spot	2	

Table 6.6 White House Spring Vertebrates.

Vertebrate Species Common Name	Count	Detection	Comments
Coyote		sign	Scat and tracks
Fox		sign	Tracks
Domestic Cow		sign	Scat and tracks
Woodrats		sign	Nest
Desert Spiny Lizard	1	obs	yellow head

Assessment: Assessment scores were compiled in 5 categories and 33 subcategories, with 9 null condition scores, and 9 null risk scores. Aquifer functionality and water quality are good with significant restoration potential (average condition score 4.3) and there is low risk (average risk score 2). Geomorphology condition is good with significant restoration potential (average condition score 4.6) and there is negligible risk (average risk score 1.4). Habitat condition is good with significant restoration potential (average condition score 4.4) and there is negligible risk (average risk score 1.6). Biotic integrity is very good with excellent restoration potential (average condition score 5.1) and there is negligible risk (average risk score 1.4). Human influence of site is very good with excellent restoration potential (average condition score 5.4) and there is negligible risk (average risk score 1.6). Overall, the site condition is very good with excellent restoration potential and there is negligible risk.

Table 6.7 White House Spring Assessment Scores. Condition scores range from 0 (extremely poor condition) to 6 (pristine condition) and risk scores range from 0 (no risk to the site) to 6 (extreme risk to the site).

Category	Condition	Risk
Aquifer Functionality & Water Quality	4.3	2
Geomorphology	4.6	1.4
Habitat	4.4	1.6
Biota	5.1	1.4
Human Influence	5.4	1.6
Overall Ecological Score	4.9	1.6

Management Recommendations: This spring is developed with a pipe driven into the seep line and there is quite a bit of water leaking out of the pipe into the springs outflow channel. It is not clear whether the pipe is functional enough that any water is actually being diverted away from this spring and, if so, it is not clear whether the water is actually being used. The visible pipes leading away from this canyon were empty. We recommend determining whether the water is being diverted and whether it is being used. If water is indeed being diverted elsewhere but not used, we recommend removing the pipe or capping it at the source and allowing the water to remain within the springs ecosystem to support native plants and wildlife.

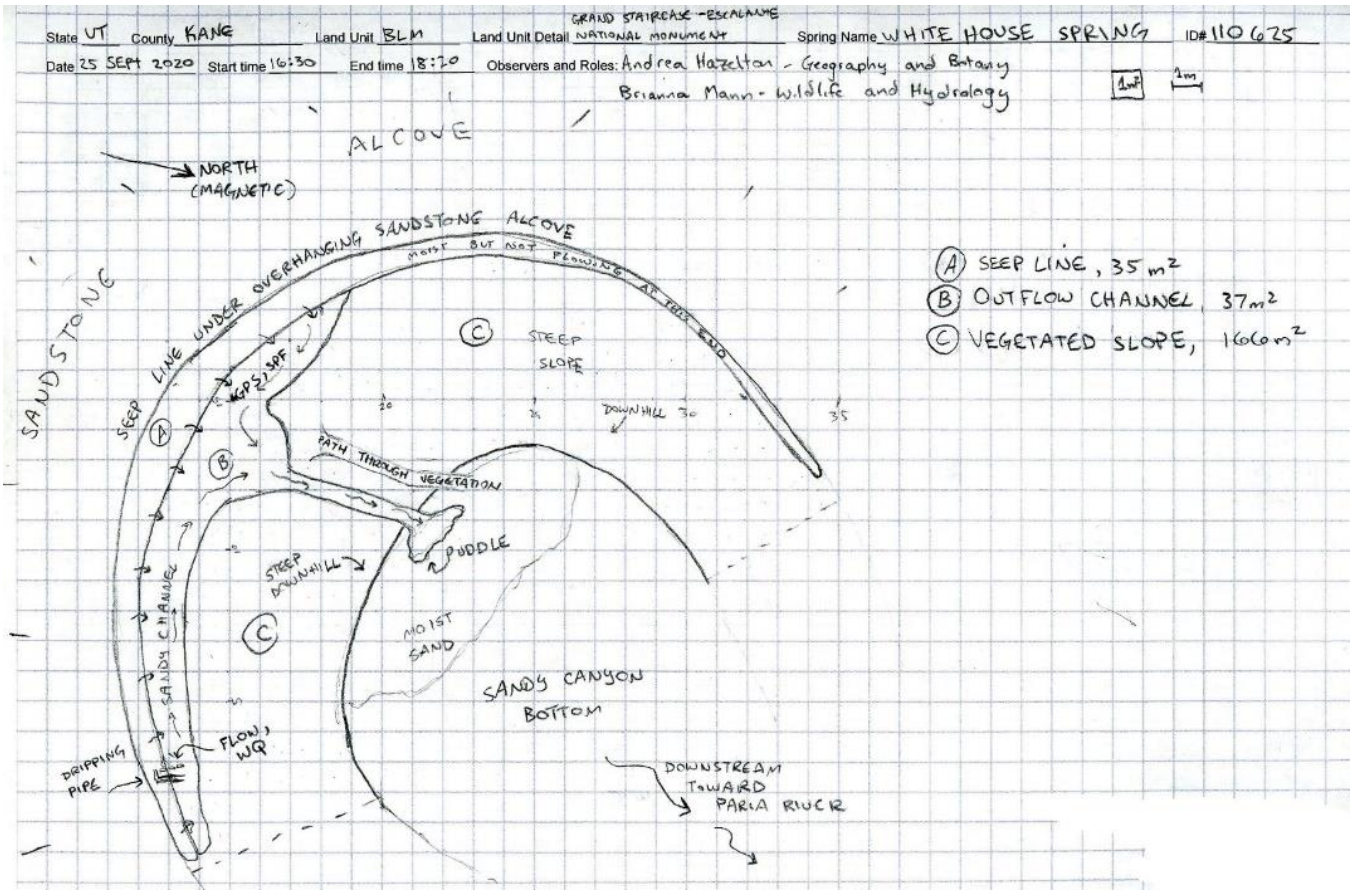

Fig 6.2 White House Spring Sketchmap.

Fig 6.3 White House Spring: The alcove and seep are at the head of the canyon, just behind this large felled cottonwood tree.

Fig 6.4 White House Spring: A white plastic pvc pipe with a leaky valve that is tapping into the east end of the seep line. The majority of the water is being immediately returned to the outflow channel.

7. Wildcat Spring, 9/25/20
Survey Summary Report, Site ID 110670
Submitted 12/09/20 by Springs Stewardship Institute

Location: The Wildcat Spring ecosystem is located in Kane County in the Paria Arizona, Utah 14070007 HUC, managed by the US Bureau of Land Management. The spring is located in the Grand Staircase Escalante NM, in the Nephi Point USGS Quad, at 37.24716, -112.16542 measured using a GPS (WGS84, estimated position error 2 meters). The elevation is approximately 1602 meters. Jeri Ledbetter and Larry Stevens surveyed the site on 9/25/20 for 01:10 hours, beginning at 10:45, and collected data in 8 of 10 categories. This survey was conducted under the Grand Staircase-Escalante 2020 project using the Stevens et al. Level 2 protocol.

Fig 7.1 Wildcat Spring: The dry low gradient cienega, vegetated with young coyote willow and dried grasses. Crew botanist Larry Stevens records data immediately downstream of the cienega. The broken concrete springbox is on the left side of the cienega.

Physical Description: Wildcat Spring is a rheocrene spring. When this spring flows, the seepage emerges into the bed of a steep, otherwise dry channel that drains into Deer Spring Wash. The seepage forms a patch of low gradient cienega habitat, which narrows into a boulder/bedrock- dominated channel at the downstream end of the springs habitat. The site has been extensively developed. A fence surrounds the source cienega and upper portion of the channel. There are two constructed rock dams within the cienega, one in the middle and the other crossing the downstream end, where it narrows into bedrock channel. The dams may have been installed to prevent further erosion and head cuts in the channel. Upstream of the spring, there are three additional check dams in the channel. On the creek-left side of the cienega, there is a broken concrete springbox with old piping leading downstream. About 30 meters downstream of the spring, there is a fenced corral with two water troughs. The old corral, tanks, fencing, and rock shelter indicate a legacy of flow manipulation and construction impacts and a likely long history of grazing, a legacy that likely still influences site geomorphology, soils, and vegetation. The microhabitats associated with the spring cover 272 sqm. The site has 4 microhabitats, including A -- a 163 sqm low gradient cienega, B -- a 56 sqm sloping bedrock, C -- a 28 sqm terrace, D -- a 25 sqm channel. The geomorphic diversity is 0.47, based on the Shannon-Weiner diversity index.

Table 7.1 Wildcat Spring Microhabitat characteristics.

Code	**A**	**B**	**C**	**D**
Name	Low Gradient Cienega	Sloping Bedrock Terrace	Right Terrace	Channel-bedrock
Area sqm	163	56	28	25
Surface type	LGC	SB	TE	CH
Surface subtype			LRZ	eph
Slope variability	Low	Med	Low	Med
Aspect TN	44	136	316	44
Slope degrees	8	70	10	17
Moisture (scale 1-10)	2	1	1	1
Water depth cm	0	0	0	0
Area % open water	0	0	0	0
Substrate				
1 - Clay %	5	0	0	5
2 - Silt %	10	5	15	5
3 - Sand %	34	5	25	20
4 - Fine gravel %	5	5	15	10
5 - Coarse gravel %	10	5	15	10
6 - Cobble %	15	0	15	10
7 - Boulder %	10	0	0	15
8 - Bedrock %	0	78	15	24
Organic %	10	0	0	0
Other % (anthropogenic)	1	02	0	1
Precipitate %	0	0	0	0
Litter %	90	0.1	10	50
Wood %	1	0	0.5	1
Litter Depth (cm)	3	0.5	1	3

Geomorphology: Wildcat Spring emerges as a seepage or filtration spring from the Navajo Sandstone, a sedimentary, sandstone rock layer. The emergence environment is subaerial, with a gravity flow force mechanism. The site receives approximately 95% of available solar radiation, with 6600 Mj annually.

Access Directions: From the town of Glendale, drive east on Scenic Backway (Rte 600/ Glendale Bench Rd/ Rte 136). After 12 miles, turn east onto the Skutumpah Road (Rte 500). Drive 10 miles and turn south on Rte 555 (Sand Road). Drive south on Sand Road for about 7 miles. Turn left (east) onto Rte 581 and drive about 2.3 miles. Park and hike 250 meters to the spring. This spring can also be accessed from the south and east, via Kitchen Corral Road.

Survey Notes: Although there is some wetland vegetation, this site is dry with no moist soil. The springbox is broken and the pipes are not functional. The fence appears new and is intact. The corral downstream of the spring is in disrepair and the troughs within the corral are dry.

Flow: There was no standing or flowing water and no moist soil. This spring is ephemeral. Surveyors were unable to measure flow because the spring was dry at the time of the survey.

Flora: Larry Stevens was the botanist. Surveyors identified 17 plant species at the site, with 0.0625 species/sqm. These included 14 native and 3 nonnative species.

Table 7.2 Wildcat Spring Cover Type.

Cover Type	Species Count	Wetland Species Count
Ground	11	4
Shrub	6	1
Mid-canopy	0	0
Tall canopy	0	0
Basal	0	0
Aquatic	0	0
Non-vascular	0	0

Table 7.3 Wildcat Spring Vegetation % Cover in Microhabitats.

Plant Species	Cover Code	Native Status	Wetland Status	A	B	C	D
Artemisia tridentata	SC	N	U	4	10	3	2
Bromus tectorum	GC	I	U	0.2	3	3	5
Carex	GC	N	W	20	0	0	8
Castilleja	GC	N	U	0.1	0.1	0.1	0.1
Conyza canadensis	GC	N	R	0	0	0	0.1
Elymus elymoides	GC	N	F	0.2	0	0	2
Gutierrezia sarothrae	SC	N	U	0	0	0.5	0.5
Heterotheca villosa	SC	N	F	0.2	15	0	0
Juncus balticus	GC	N	W	15	1	15	0.1
Juncus longistylis	GC	N	W	5	0	0	0.3
Pinus edulis	SC	N	U	0	1	0	0
Poa pratensis	GC	NI	F	55	5	3	20
Rhus trilobata	SC	N	F	1	3	0	50
Salix exigua	SC	N	WR	4	1	0.3	0
Taraxacum officinale	GC	NI	F	0	0	0	0.1
Thinopyrum intermedium	GC	I	F	0	0	0	0.1
Tragopogon dubius	GC	I	F	0.01	0	0	0

Fauna: The surveyor recorded the air temperature at 27 degrees Celsius. Surveyors collected or observed 3 terrestrial invertebrate taxa and 4 vertebrate taxa.

Table 7.4 Wildcat Spring Invertebrates.

Species	Lifestage	Habitat	Method	Count
Diptera Stratiomyidae	Ad	T	Collected spot	1
Hymenoptera Vespidae Polistes	Ad	T	Spot	1
Lepidoptera Nymphalidae Adelpha eulalia	Ad	T	Spot	1

Table 7.5 Wildcat Spring Vertebrates.

Vertebrate Species Common Name	Detection	Comments
Pinyon Jay	call	
Deer	sign	Scat
Coyote	sign	Tracks
Cottontail Rabbit	sign	Scat

Assessment: Assessment scores were compiled in 5 categories and 31 subcategories, with 11 null condition scores, and 9 null risk scores. Aquifer functionality and water quality are poor with limited restoration potential (average condition score 2.8) and there is low risk (average risk score 2.5). Geomorphology condition is good with significant restoration potential (average condition score 4) and there is low risk (average risk score 2). Habitat condition is moderate with some restoration potential (average condition score 3.6) and there is low risk (average risk score 2.6). Biotic integrity is good with significant restoration potential (average condition score 4.4) and there is low risk (average risk score 2.8). Human influence of site is very good with excellent restoration potential (average condition score 4.9) and there is low risk (average risk score 2.6). Overall, the site condition is good with significant restoration potential and there is low risk.

Table 7.6 Wildcat Spring Assessment Scores. Condition scores range from 0 (extremely poor condition) to 6 (pristine condition) and risk scores range from 0 (no risk to the site) to 6 (extreme risk to the site).

Category	Condition	Risk
Aquifer Functionality & Water Quality	2.8	2.5
Geomorphology	4	2
Habitat	3.6	2.6
Biota	4.4	2.8
Human Influence	4.9	2.6
Overall Ecological Score	4.1	2.5

Management Recommendations: This site is at least ephemeral, if not dewatered, but is well protected by fencing. Therefore, it does not appear to require management attention other than monitoring (preferably after a normal or wet winter) to determine whether the flow is perennial. Land managers should also continue to maintain the fence and may consider removing the broken infrastructure.

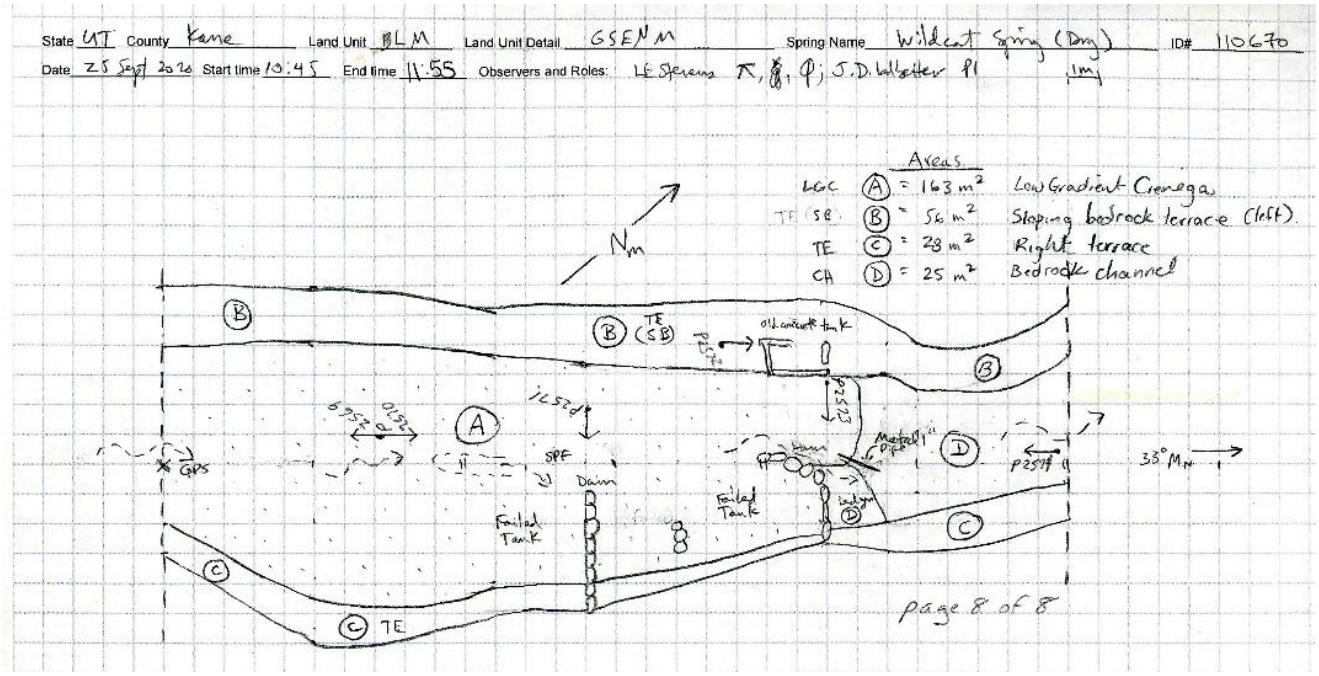

Fig 7.2 Wildcat Spring Sketchmap.

Fig 7.3 Wildcat Spring: The rock dam located at the downstream edge of the low gradient cienega.

Fig 7.4 Wildcat Spring: The upper end of the steep, dry bedrock and boulder channel, with the dry low gradient cienega visible above and behind the sandstone outcrop.