

Springs Monitoring Protocol Implementation Plan for parks in the Southern Colorado Plateau Networks

Standard Operating Procedure (SOP) #6

Site Condition and Repeat Photopoints

Version SCPN_Springs_SOP6_20180930

Revision History Log:

Previous Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

This SOP is adopted from the Northern Colorado Plateau Network's SOP #6 Site Condition and Repeat Photopoints, Version 1.00 (June 2016) in Weissinger, R., M. Moran, S. Monroe, and H. Thomas. 2017. Springs and seeps monitoring protocol for park units in the Northern Colorado Plateau Network, Version 1.00. Natural Resource Report NPS/NCPN/NRR—2017/1439. National Park Service, Fort Collins, Colorado.

Site condition is recorded and photo-points are taken during the initial site setup and once during the growing season in each subsequent sampling year. Site condition records the presence of target native and exotic plant and animal species, documents channel length, and estimates the percent of each geomorphic surface affected by different disturbances.

Site Condition

Target wildlife species

Conduct a timed search of 1 minute per 5-m² of surface water, up to 30 minutes total, looking for crayfish, amphibians, and fish. Record the species, if known, and life stages (i.e., egg, larvae, juvenile, adult) present. Also include descriptions of other wildlife species observed.

SCPN target wildlife species descriptions

Common Name	Scientific Name	Descriptive Characteristics
Bullfrog	<i>Rana catesbiana</i>	Smooth, wet-looking skin; very large frogs or tadpoles; eardrums larger than eyes
Leopard frog	<i>Rana pipiens</i>	Smooth, wet-looking skin; light-colored fold running from eye to hind leg; pale-bordered spots on back
Crayfish	<i>Orconectes</i> spp.	Mini lobsters

Bullfrog – Smooth, wet-looking skin; very large frogs or tadpoles; eardrums larger than eyes



Figure 1. Bullfrog, *Rana catesbiana*. Photo Wikipedia Creative Commons.

Northern leopard frog - Smooth, wet-looking skin; light-colored fold running from eye to hind leg; pale-bordered spots on back



Figure 2. Northern leopard frog, *Rana pipiens*. Photo Wikipedia Creative Commons.

Crayfish – Crustaceans that look like mini lobsters. All crayfish are exotic to SCPN.



Figure 3. Crayfish. Photo Wikipedia Creative Commons.

Target exotic plant species

Conduct a timed search of 1 minute per 5-m² of vegetated areas, up to 30 minutes total, looking for 1-10 target exotic species specified by park staff.

Channel Length

Record in meters (m) up to a maximum of 50m the length of the flowing channel (if it exists), along the channel thalweg, directly below the spring orifice.

Flow modification

If a flow modification is present, indicate which type, whether it is active or not, and estimate the percent of flow volume that is affected. Circle whether flow is slowed, stopped, or re-routed.

Soil erosion

Record the erosion categories present for each geomorphic surface (as determined by the site map) and record the percentage of the geomorphic surface affected by each type, using the classes defined below.

Erosion Category	Definition
Bank instability	Actively eroding, near vertical cut-banks along channels or pools
Rill/gully erosion	Removal of soil along drainage lines due to surface run-off
Pedestal development	Elevated surfaces within the spring perimeter that have lost connection to the groundwater level

Erosion Class	% Affected
1	>0 - 25%
2	25 - 50%
3	50 - 75%
4	75 - 100%

Other disturbances

While walking the spring perimeter and during sampling, observe signs of disturbance at the spring. Record all disturbances present for each geomorphic surface and **within 50 meters** of the site. If the site is located in terrain where portions of the 50-m search area are inaccessible due to terrain (e.g., cliff

walls), search the accessible portions only. Estimate the cover of each geomorphic surface affected by each disturbance using the cover classes below. Discrete disturbances can be plotted on the site map.

- If a significant disturbance not found on the list below is present, it should be recorded.
- If there is no disturbance to report, mark “none”.

Common disturbances at springs.

Disturbance Type	Description
Beaver activity	Indicated by the presence of dams, slides, and characteristically chewed woody plant species.
Recent flooding	Indicated by flattened vegetation, turbidity, and debris lines. Only record flooding that appears to have occurred in the previous several days.
Recent fire	Recent fire indicated by blackened vegetation or ground surfaces. Do not include old fire scars.
Road or track	Paved, dirt, or two-track. Note whether it is presently open or closed.
Trail	Livestock or human trail. Note whether it is maintained or social.
Recreation use	Denoted by campfire rings, water source, trampling.
Livestock trampling/grazing	Indicated by the presence of livestock or livestock scat. Record species if possible.
Wildlife trampling/grazing	Significant impacts due to native or feral ungulates. Record species if possible.
Insect infestation	Tent caterpillars, grasshoppers, etc.
Exotic plant removal	Indicated by cut stumps, debris piles, dead plants, etc.

Disturbance Class	% Affected
1	< 1%
2	1-4%
3	5-9%
4	10-24%
5	25-49%
6	50- 74%
7	75-100%

Notes

Use this section to record any other notes or observations made while at the site. Record any other notes that may assist in interpreting results for the spring or describe interesting features of the spring, such as management activities noted, archeological sites, etc.

Photopoints

Photopoints are established at one or more locations at each spring. These points are revisited to document the change that occurs over time, so it is very important that their locations are described in detail so that they can be relocated in the future. It is recommended that if possible, at least one photo should be taken at a site from above that overlooks the spring, perhaps from a nearby vantage point or accessible canyon rim. Once established, use the site map, descriptions, photos, and UTM's to accurately relocate photopoints. See Appendix A for an example packet of reference and monitoring photos.

Photopoint Establishment:

1. Write down the **Camera name, Model, and ID number**.
2. Note the name of the photographer.

3. Note the **weather conditions**, including cloud cover and wind, that could affect photo interpretation and matching.
4. Select a location to **Establish a photo point** that will be easy to find again (e.g. has permanent distinctive features and offers good views of spring features). When choosing points, think about whether vegetation is likely to grow that would obscure the view. You may establish several photopoint locations (numbered 1,2,3,etc.), from which one or more photos (views) can be taken. **Describe the location** (Location Description) in the space provided.
5. **Record the UTM**s of the photopoint using a GPS unit, if possible.
6. For the **Description** of photopoint, please be as detailed as possible, keeping in mind to include key site characteristics that are of a long-term nature (e.g. rocks, large trees). Be VERY detailed if you cannot get a GPS reading – note any major features that may help you mark the point location on the map.
7. Mark the name and location of each photopoint on the **sketch map**, if possible.
8. Use the potential solar radiation at a site and observations during the field visit to **recommend times** to take photos, preferably when the entire spring is in shade or in full sun.
9. Record the **Photo file number** (typically starts with 100-), and **Time** for each photo taken on the field form.
10. Take one or more photos with a person or an object at the photopoint to help **relocate** it. Try to include distinctive features such as the cliffline or large boulders. These are the reference photos. It is often helpful to take one or more contextual photos for the general location and a close-up photo to relocate the precise location.
11. From each photopoint, take photographs of the spring. Several views (i.e. bearings) may be taken from the same photopoint. These are repeat monitoring photos.
12. Set the appropriate declination on the compass according to the topographic map so that 0° on the compass points to true north. Facing the same direction as each photo is taken, determine and record the **bearing** of the photo in degrees. If the photo is angled up or down more than 5°, record the **angle** using a clinometer.

Repeating Photos:

1. Plan to take repeat photographs at the same time of year and, if possible, during the recommended time or at the same time of day as the original photographs.
2. Use the site map, descriptions, photos, and UTM's to accurately relocate photopoints.
3. Write down the **Camera name, Model, and ID number**.
4. Note the name of the photographer.
5. Record the **Start and End Times** bracketing when photos are taken.
6. Record the **Photo file number** (typically starts with 100-), and time for each photo taken on the field form.

Tips for taking high quality photos:

Good default camera settings are Aperture Priority mode with an F-stop of 11, ISO 400, and automatic white balance. These settings should be sufficient for well-lit areas with bright or diffuse light. In contrasting light situations (bright sun and shade), review the photo to make sure that the spring area has the correct exposure, and adjust the exposure if needed. This may result in an over exposed sky area, but it is most important to capture the spring area well. In alcoves and deeply shaded areas, if the shutter speed is slower than 1/125th of a second, the photo is likely to be blurry. You can increase the shutter speed by increasing the ISO. With the Canon EOS 7D, ISOs up to 3200 maintain acceptable photo quality. Alternately, a tripod can be used to obtain sharp photos with a slower shutter speed.

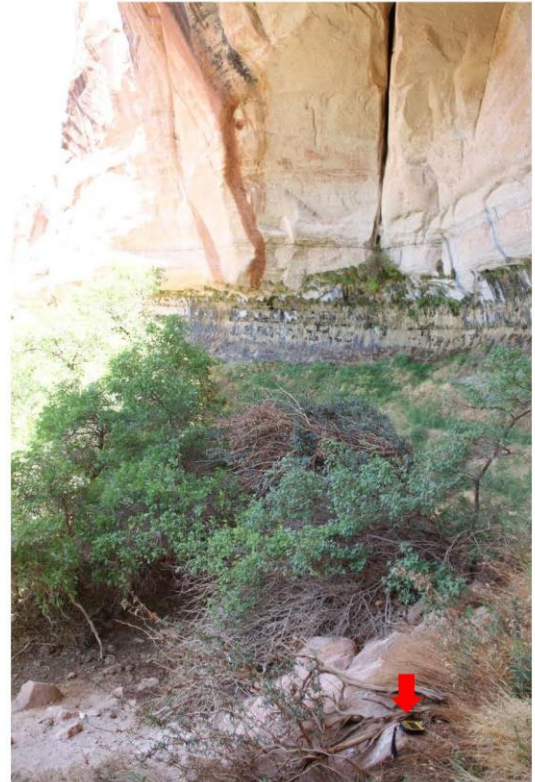
Appendix A. Example reference and repeat photo packet.

CorCan 3 PP1

On end of boulder/bedrock emerging from colluvial slope about 8m from eastern edge of seep near base of *Mahonia fremontii*



From eastern edge of colluvial slope looking west towards PP1 and cliff/backwall



PP1 - 258°, 14:20, before 11:00



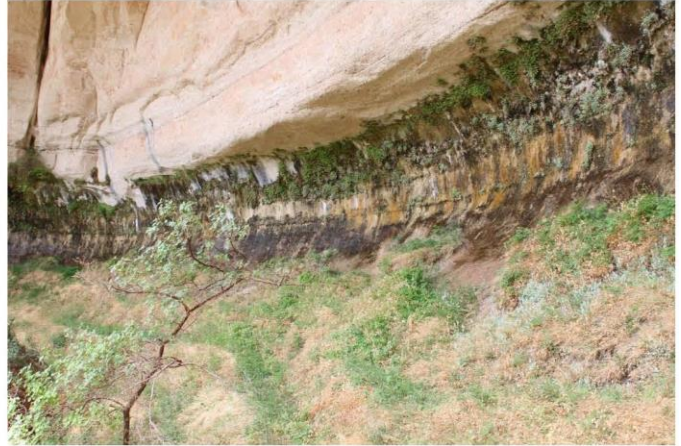
PP1 - 281°, 14:20 , before 11:00



PP1 - 290°, 14:20 , before 11:00



PP1 - 308°, 14:20 , before 11:00



PP1 - 114°, 11:00 , before 11:00



SCPN Springs Monitoring Site Condition Datasheet - v. 1.00

Site Name:	Park	Date	Observer
Wildlife and Exotic Plant Species			
Amphibians: Present Not Observed		Fish: Present Not Observed	
Species:		Species:	
Exotic Plants: Present Not Observed		Crayfish: Present Not Observed	
Species:			
Channel and Flow Modifications			
Flowing Channel Length (m) – up to 50m from orifice _____			
Flow Modification (<i>circle all appropriate</i>): none pipe diversion dam diversion open trough/tank pumping encasement excavation sealed cracks other			
Is Modification Active (<i>circle</i>) Y N % Flow Affected _____ Slowed Stopped Re-routed			
Geomorphic Surface			
Erosion			
Bank instability			
Rill/gully			
Pedestal creation			
Disturbance			
Beaver activity			
Recent flooding			
Recent fire			
Road or track			
Trail			
Recreation use			
Livestock trampling/grazing			
Wildlife trampling/grazing			
Insect infestation			
Exotic plant removal			
Other			

Notes:

Erosion Classes

- | | |
|---|-----------|
| 1 | >0 - 25% |
| 2 | 25 - 50% |
| 3 | 50 - 75% |
| 4 | 75 - 100% |

Disturbance Classes

- | | |
|---|-----------|
| 1 | < 1% |
| 2 | 1 - 4% |
| 3 | 5 - 9% |
| 4 | 10 - 24% |
| 5 | 25 - 49% |
| 6 | 50 - 74% |
| 7 | 75 - 100% |

Park**Site Name:****Date:****Site Condition and Disturbance - Within 50m of Spring** *(place an X near all appropriate):*

	Roads/OHV trails		Recent flooding
	Hiking trails		Recent Fire
	Recreation use (campfire rings, water source, trampling)		Livestock trampling/grazing (indicated by livestock or livestock fecal matter). Record species if possible.
	Contemporary human occupation/use (campsite, structure, ...)		Wildlife trampling/grazing (indicated by wildlife or wildlife fecal matter). Record species if possible.
	Historic human occupation/use		Insect disturbance (Tent caterpillars, grasshoppers, etc.)
	Pre-historic occupation/use		Exotic plant removal (Indicated by cut stumps, debris piles, dead plants, ...)
	None		Other (describe):

Notes:

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NCPN Springs Monitoring Site Condition Datasheet - v. 1.00

Park <u>ARCH</u>		Site Name: <u>Clo Lamb</u>		Date: <u>7 May 2014</u>	
Wildlife and Exotic Plant Species					
Amphibians: Present <u>Not Observed</u>		Fish: Present <u>Not Observed</u>			
Species:		Species:			
Exotic Plants: Present <u>Not Observed</u>		Crayfish: Present <u>Not Observed</u>			
Species:					
Channel and Flow Modifications					
Flowing Channel Length (m) – up to 50m from orifice <u>0</u>					
Flow Modification (circle all appropriate): <u>none</u> pipe diversion dam diversion open trough/tank pumping encasement excavation sealed cracks other					
Is Modification Active (circle) Y N % Flow Affected Slowed Stopped Re-routed					
		Geomorphic Surface			
Erosion		BW	ALL 2	CS	ALL 2
Bank instability				1	
Rill/gully					
Pedestal creation				1	
Disturbance					
Beaver activity					
Recent flooding					
Recent fire					
Road or track					
Trail					
Recreation use					
Livestock trampling/grazing <u>old</u>			7	5	7
Wildlife trampling/grazing					
Insect infestation					
Exotic plant removal					
Other					

Notes:

no new disturbances noted but extensive
trampling from livestock through 1980s

Erosion Classes

1	>0-25%
2	25-50%
3	50-75%
4	75-100%

Disturbance Classes

1	<1%
2	1-4%
3	5-9%
4	10-24%
5	25-49%
6	50-74%
7	75-100%

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Park ARCHSite Name: Clo Can 6Date: 7 May 2014**Site Condition and Disturbance - Within 50m of Spring** (place an X near all appropriate):

	Roads/OHV trails		Recent flooding
	Hiking trails		Recent Fire
	Recreation use (campfire rings, water source, trampling)	X	Livestock trampling/grazing (indicated by livestock or livestock fecal matter). Record species if possible. <u>dd</u>
	Contemporary human occupation/use (campsite, structure, ...)		Wildlife trampling/grazing (indicated by wildlife or wildlife fecal matter). Record species if possible.
	Historic human occupation/use		Insect disturbance (Tent caterpillars, grasshoppers, etc.)
X	Pre-Historic occupation/use		Exotic plant removal (Indicated by cut stumps, debris piles, dead plants, ...)
	None		Other (describe):

Notes:

lots of flakes in alcove

NCPN Springs Monitoring Photo Datasheet - v. 1.00

Park Code:	Site Name:	Date:
Camera Name, Model, and ID:	Compass Setting (indicate by circling setting and writing degrees if appropriate)	Weather and Notes:
Photographer:	_____ Degrees Declination Magnetic North	

PhotoPoint ID	UTM - Northing	UTM - Easting	Photopoint Description	Recommended Time

[illegible]

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NCPN Springs Monitoring Photo Datasheet - v. 1.00

Park Code: ARCH Site Name: BH1

Date: 4 June 2015

Camera Name, Model, and ID: <u>Canon EOS 7D w/ 20 mm lens</u>		Compass Setting (indicate by circling setting and writing degrees if appropriate) <u>10°E</u> Degrees Declination Magnetic North		Weather and Notes: <u>warm, breezy, clear, 5% cloud cover</u>	
Photographer: <u>R. Weissinger</u>					

PhotoPoint ID	UTM - Northing	UTM - Easting	Photopoint Description		Recommended Time
PP1			on bedrock near Fra and 1 step down to next ledge, 12-m from base of BW		early morning or late afternoon
PP2			on bedrock ledge downslope of ledge at base of BW, 15-m from base of BW		"

PhotoPoint ID	Time	File Number	Bearing (degrees)	Angle (degrees)	Photo Description
PP1		1872			looking N towards PP1 + end of seep, Fra and
		1873			looking W towards PP1 + seep
		1874			close-up
PP1	9:25	1875	-240°		pano W → E
		1876	261°		
		1877	299°		
		1878	329°		
		1879	350°		
		1880	14°		
PP2		1881			looking W to PP2
		1882			close-up
		1883			looking E + PP2
		1884			looking W to PP2, cliffline, edge of seep
PP2	9:30	1885	258°		pano W → E
		1886	278°		
		1887	320°		
		1888	349°		
	9:35	1889	20°		