Appendix A - Inventory Field Sheets

Page _____ of _____ OBS_____

General

Spring Name_____ Springs Online ID#_____ [1]Spring Type _____

Country US State NM County_____ [2]Sensitivity _____

[3]Land Unit_____ Land Unit Detail_____

Quad_____ HUC_____

Site Description

Georef

[4]Georef Source_____ Device_____ Datum_____

UTM Zone_____ UTM East_____ UTM North_____

Lat_____Long_____ Elev_____ ft or m

EPE_____ ft or m Declination _____ Comment _____

Access Directions

SPF

Sunrise: D_____ J_____ N_____ F_____ O_____ M_____ S_____ A_____ A_____ M_____ J_____ J_____

Sunset: D_____ J_____ N_____ F_____ O_____ M_____ S_____ A_____ A_____ M_____ J_____ J_____

Latitude checked?

Survey

Date_____ Begin Time_____ End Time_____

Surveyors_____

_____Project New Mexico

Site Condition

Microhabitats

Description	Area (m^2)	[5]Surf Type	[6]Sub-Type	[7]Slope Var	Aspect T/M____	Slope Deg	[8]Soil moist	Water dpth(cm)	Water %	[9]Substrate % 1	2	3	4	5	6	7	8	Org	Oth	Prec %	Litter %	Wood %	Litter (cm)
A																							
B																							
C																							
D																							
E																							
F																							
G																							

Images

Whose Camera Used_____

Sketch Map Location_____

Photo #	Description (caption)

Entered in database by _____ Date_____ Checked by _____ Date _____

1 Discharge Sphere (Spring Type)
- Anthropogenic
- Cave
- Exposure
- Fountain
- Geyser
- Gushet
- Hanging Garden
- Helocrene
- Hillslope
- Hypocrene
- Limnocrene
- Mound-form
- Rheocrene

2 Sensitivity
- None
- Location
- Survey
- Both

3 Land Unit
- BLM
- DOE
- NPS
- Private
- State
- Tribal
- USFS
- Other

4 Georeference Source
- GPS
- Map
- Other

5 Surface Type
- BW Backwall
- C Cave/Tunnel
- CH Channel
- CS Colluvial slope
- HGC High Grad. Cienega
- LGC Low Grad Cienega
- Mad Madiculous Flow
- P Pool
- PM Pool Margin
- SB Sloping Bedrock
- SZ Spray Zone
- SM Spring Mound
- TE Terrace
- Oth Other/anthropogenic

6 Surface Subtype
- CH Riffle, Run, Margin, Eph
- CS Wet, Dry
- SB Wet, Dry
- TE LRZ, MRZ, URZ, HRZ UPL,LRZMRZ,LRZURZ, MRZURZ, HRZMRZ
- All Anthro (human influence)

7 Slope Variability
- Low, Medium, High

8 Soil Moisture
- 0 - Dry
- 1 - Dry-Moist
- 2- Moist-Dry
- 3 - Wet-Dry
- 4- Moist
- 5 - Saturated-Dry
- 6 - Wet
- 7 - Saturated-Moist
- 8 - Wet-Saturated
- 9 - Saturated
- 10 - Inundated

9 Substrate
- 1 clay
- 2 silt
- 3 sand (0.1-1mm)
- 4 fine (pea) gravel (1-10 mm)
- 5 coarse gravel (1-10 cm)
- 6 cobble /small boulders(10-100 cm)
- 7 large boulders (>1 m)
- 8 bedrock
- Organic Soil, including peat
- Other (usually anthropogenic)

10 Lifestage
- Adult
- Egg
- Exuviae
- Immature
- Larvae
- Mixed
- Other
- Pupae
- Shell

11 Habitat
- AQ - Aquatic
- T - Terrestrial

12 Method (Invertebrates)
- Spot
- Benthic

13 Detection Type (Vertebrates)
- Call
- Observed
- Sign
- Reported (by others)
- Other

14 Cover Codes
- GC Ground Cover
- SC Shrub Cover
- MC Midcanopy Cover
- TC Tall Canopy Cover
- AQ Aquatic Cover
- NV Nonvascular (moss, etc)
- BC Basal Cover

15 Emergence Environ/Detail
- Cave
- Subaerial
- Subglacial
- Subaqueous-lentic freshwater
- Subaqueous-lotic freshwater
- Subaqueous-estuarine
- Subaqueous-marine

16 Source Geomorphology
- Contact Spring
- Fracture Spring
- Seepage or filtration
- Tubular Spring

17 Flow Force Mechanism
- Anthropogenic
- Artesian
- Geothermal
- Gravity
- Other

18/19 Parent Rock Type/Subtype
- Igneous
  - andesite
  - basalt
  - dacite
  - diorite
  - gabbro
  - grandodiorite
  - granite
  - peridotite
  - rhyolite
- Metamorphic
  - gneiss
  - marble
  - quartzite
  - slate
  - schist
- Sedimentary
  - coal
  - conglomerate
  - dolomite
  - evaporates
  - limestone
  - mudstone
  - sandstone
  - shale
  - siltstone
  - Unconsolidated

20 Channel Dynamics
- Mixed runoff/spring dominated
- Runoff dominated
- Spring dominated
- Subaqueous

21 Flow Consistency
- Dry intermittent
- Erratic intermittent
- Perennial
- Regular intermittent

22 Measurement Technique
- Current meter
- Weir
- Flume
- Other

Spring Name_____ Page _____ of _____ OBS_____

Invertebrates

Species Name	Qty	[10]Stage	[11]Hab-itat	[12]Meth-od	Rep #	Comments

Benthic Rep

Rep #	Location	Velocity m/sec	Depth cm	Substrate	Area Sq M	Time Sec	Comments

Entered in database by _____ Date_____ Checked by _____ Date _____

Spring Name__________________________ Page ______ of _________ OBS____________

Vertebrates

Species Name	No. Ind	[13]Detection Type	Comments

Entered in database by ________________ Date__________ Checked by _________________ Date __________

Spring Name_____ Page _____ of _____ OBS_____

Flora

Flora notes

Species Name	^{14}Str	A	B	C	D	E	F	G	H	Comments	Verified?

Entered in database by _____ Date_____ Checked by _____ Date _____

Spring Name_____ Page _____ of _____ OBS_____

Flora

Flora notes

Species Name	^{14}Str	A	B	C	D	E	F	G	H	Comments	Verified?

Entered in database by _____ Date_____ Checked by _____ Date _____

Spring Name_____ Page _____ of _____ OBS_____

Geomorphology

[15]Emerg Env_____ [17]Mechanism_____ Geologic Layer_____

[15]Detail_____ [18]Rock Type_____ [20]Channel Dynamics_____

[16]Source Geomorphology_____ [19]Rock Subtype_____

Polygon	[1]Discharge Sphere	[1]Secondary Discharge	Comments

Flow

[21]Flow Consistency_____ [22]Measurement Technique_____ Flow Rate (Mean)_____

Location of Measurements_____Total Site % Captured_____

Discharge Comments_____

Reason if flow not measured (circle) diffuse outflow little outflow no outflow hazard spring is dry hazard other _____

Current Meter l/s m/s other_____

Cell	Distance	Width	Depth	Reading

Flume l/s m/s other_____

Point	Flume Size	Measurements					Avg Stage	% Flow

Volume

Container Size/Units_____

Point	Seconds	Liters	% Flow

Weir l/s m/s other_____

Point	Weir Size	Measurements				% Flow

Entered in database by _____ Date_____ Checked by _____ Date _____

Spring Name_____ Page _____ of _____ OBS_____

Water Quality

Device 1 _____ Date Last Calibrated_____

Device 2 _____ Date Last Calibrated_____

Device 3 _____ Date Last Calibrated_____

Weather

Air Temp _____C or F

Select one

___No current/recent precipitation
___Rain during survey
___Recent rain
___Snow on ground
___Snow, hail, or sleet during survey

Sampling Locations (circle) (circle)

1	source down-gradient stream exiting wetland pool hole well other _____	standing water flowing water
	comments	
2	source down-gradient stream exiting wetland pool hole well other _____	standing water flowing water
	comments	
3	source down-gradient stream exiting wetland pool hole well other _____	standing water flowing water
	comments	

Field Measurements

Location #	pH	EC	SC	Water Temp (°C)	Turbidity ntu	Dissolved O^2 %	mg/L	Alkalinity mg/L	Salinity ppt	Other	Device

Collected for Analysis

Sample Type	Sample Taken?	DuplicateTaken?	Container	Filtered (Y/N)	Treatment	
Anions						
Cations						
Nutrients						
^{2}H and ^{18}O Isotopes						

Entered in database by _____ Date_____ Checked by _____ Date _____

Spring Name_____ Page _____ of _____ OBS_____

Scale - 1 square = ____ meters Date _____

Appendix B - Assessment Field Sheets

SiteName_____ID_____ Observer_____

Impact	Stressor Checklist	1 Absent	2 Minor	3 Moder-ate	4 Intense
	Flow regulation or hydrological alteration				
	Surface water diverted away (ditch, pipe, etc)				
	Springbox, springhouse, or cap (enclosed in concrete, metal, rock, etc)				
	Upgradient pre-emergence groundwater flow capture (e.g. pipe)				
	Downgradient capture of surface flow (into tank, trough, etc)				
	Flow regulated by impoundment or dam (e.g., berm, concrete structure)				
	Source excavated to create open water (e.g., tank)				
	Non-point source surface water pollution (e.g., road, agricultural, mining)				
	Point source surface water pollution (e.g., sewage leakage, ungulate feces)				
	Groundwater contamination (evidenced by dead animals, vegetation, odor)				
	Nearby wells (groundwater extraction - consider size and proximity)				
	Prolonged drought (Palmer's index, moderate=2, severe=3, extreme=4)				
	Other hydrologic disturbance _____				
	Flow regulation, hydrologic alteration (max=48)				
	Soil or geomorphic alteration				
	Erosion - overall landscape, general, human influenced				
	Erosion - on-site human influenced (e.g., channel, gully, cutbank)				
	Excavation (e.g., pond creation, springbox and installation)				
	Soil compaction (e.g., livestock trampling, vehicle use)				
	Deposition, debris flow, spoil pile, or land fill				
	Pedestals or hummocks due to livestock or wildlife				
	Ruts (from vehicles)				
	Soil removal (e.g., gravel or other mining, road construction)				
	Soil contamination (e.g., oil, salt licks, refuse)				
	Trails (human or animals)				
	Other soil disturbance _____				
	Soil or geomorphic alteration (max=44)				
	Animal impacts				
	Habitat alteration by aquatic species (e.g., beaver, muskrat, nutria)				
	Habitat alteration by terrestrial species (e.g., gopher, squirrel burrows)				
	Wildlife grazing, browsing, defecating, or trampling (e.g., elk, deer)				
	Livestock grazing, browsing, defecating, or trampling				
	Non-native predators (e.g., crayfish, introduced fish, domestic animals)				
	Other animal effects_____				
	Animal impacts (max=24)				

SiteName_____ID_____Observer_____

Impact	Stressor Checklist	1 Absent	2 Minor	3 Moder-ate	4 Intense
	Recreation impacts				
	Camp sites (e.g., fire rings, refuse, site leveling, compaction)				
	Tracks or trails by recreational motorized vehicles (dirt bikes, ATV, UTV)				
	Tracks or trails from hiking, mountain biking				
	Tracks or trails from pack animals				
	Hunting/fishing (e.g., game cameras, salt licks, carcasses, lures/line)				
	Target practice (e.g., shotgun shells, gunshot damage)				
	Urban parklands, sports fields, swimming pools				
	Passive recreation (e.g., birdwatching, photography, hot spring)				
	Refuse or other waste disposal (e.g., toilet paper, cans, bottles)				
	Excessive human visitation				
	Human modification (e.g., hot springs dams, structures, climb/cave gear)				
	Other recreation disturbance _____				
	Recreation impacts (max=48)				
	Structures or development impacts				
	Abandoned infrastructure (non-functioning piping, springboxes, or tanks)				
	Utility corridors or power lines				
	Residential development				
	Industrial or commercial development, mining structures				
	Light or noise pollution				
	Erosion control structure (e.g., gabeons, grade controls)				
	Wildlife entrapment risk (e.g., missing springbox lid, open tank no escapement)				
	Fence - geomorphically inappropriate and/or nonfunctioning				
	Oil or gas well				
	Pipeline external to site (e.g., oil, gas, water)				
	Other structural disturbance _____				
	Structures or development impacts (max=44)				
	Land use impacts				
	Fire regime				
	Crop production (current or past)				
	Ranch use (current or past)				
	Road, incl. construction or maint. (paving type, use intensity, and proximity)				
	Restoration, rehabilitation, or remediation actions				
	Sensitive species protection efforts (e.g., fish translocation)				
	Biological resource extraction (e.g., aquaculture, fisheries, plant collecting)				
	Physical resource extraction (e.g., mining, quarrying)				
	Forest management (e.g., thinning, timber harvest, planting)				
	Scientific activities, including sentinel site monitoring				
	Education activities (e.g., environmental education, tourism, youth camp)				
	Other land use effects_____				
	Land use impacts (max=48)				

SiteName_____ID_____ Observer_____

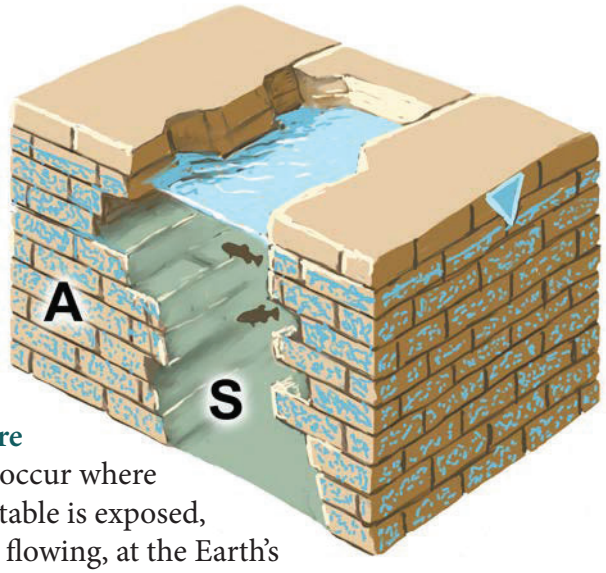
Spring Type Dichotomous Key

No.	Alternative	Springs Type
1	Groundwater expression of flow emerges or emerged within a cave (a water passage through basalt or other volcanic rock, or limestone), before flowing or emerging into the atmosphere	Cave
	Groundwater expression of flow emerges or emerged in a subaerial setting (direct contact with the atmosphere), including within a sandstone alcove, or subaqueously (beneath a body of water).	2
2	Groundwater is not expressed at the time of visit (the springs ecosystem is dry, though soil may be moist)	3
	Groundwater is expressed at the time of visit – seepage or flow is actively expressed (water or saturated soil is evident)	5
3	Evidence of prehistoric groundwater presence and/or flow exists (e.g., paleotravertine, paleosols, fossil springs-dependent species, etc.), but no evidence of contemporary flow or aquatic, wetland, or riparian vegetation	Paleospring
	Not as above	4
4	Soil may be moist but is not saturated by groundwater. The presence of groundwater is evidenced by wetland or obligate riparian vegetation	Hypocrene
	Groundwater is expressed through saturated soil, or as standing or flowing water	5
5	Groundwater is evident, but discharge is primarily lentic (standing or slow-moving), and flow downstream from the spring's ecosystem may be absent or very limited	6
	The majority of groundwater discharge flows actively within and/or from the site, and is primarily lotic (fast-moving)	10
6	Groundwater is expressed as a low gradient (<16°) patch of shallow standing water or saturated sediment or soil, typically strongly dominated by emergent wetland vegetation	Helocrene
	Subaqueous discharge creates an open body of water which lacks emergent wetland vegetation, and may or may not have outflow	7
7	The groundwater table surface is exposed as a pool, but without a focused inflow source, and with no outflow	Exposure
	Pool with one or more focused, subaqueous inflow sources, and generally with outflow, usually focused outflow	8
8	Springs source is an open pool of groundwater, not surrounded by a springs-created mound	Limnocrene
	Springs source is surrounded by, and has generated, a mound that may be chemical precipitate, ice, or organic matter	9

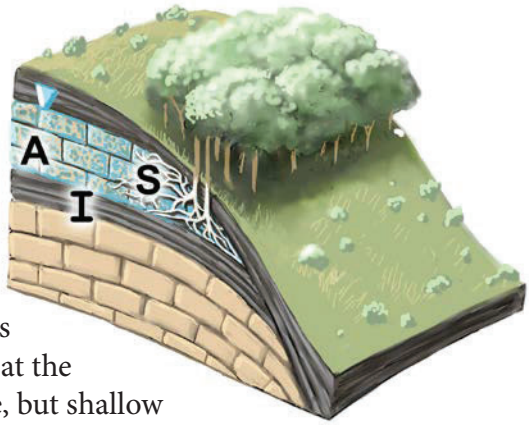
SiteName_____ID_____ Observer_____

Spring Type Dichotomous Key Page 2

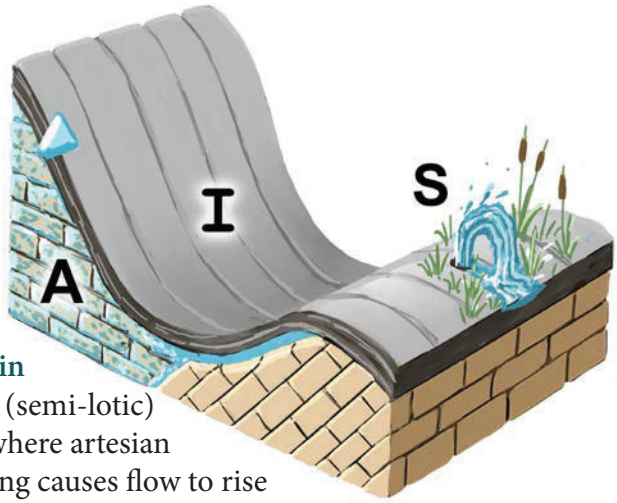
No.	Alternative	Springs Type
9	Springs source is surrounded by, or emerges from a mound composed of carbonate or other chemical precipitate	Mound-form (Carbonate)
	Springs source is surrounded by, and/or emerges from a mound composed of ice in a permafrost-dominated landscape (not reported in New Mexico)	Mound-form (ice)
	Springs source is surrounded by, and/or emerges from a mound composed of organic matter, such as decomposing vegetation	Mound-form (organic)
10	Springs flow emerges explosively and periodically, either by geothermal-derived or gas-derived pressure (not reported in New Mexico)	Geyser
	The springs flow emerges non-explosively, but by the action of gravity	11
11	Flow emerges from a focused point and rises well above ground level (10 cm or more)	Fountain
	Flow may emerge from a focused point, but without substantial rise above ground level	12
12	Flow emerges from a near-vertical or overhung, cliff-dominated bedrock surface, and not within an established surface flow channel (although a surface channel may exist above the source cliff)	13
	Not as above	14
13	Focused flow emerges from a nearly vertical bedrock cliff face (sometimes from a cave) and cascades, usually with some madicolous flow (a shallow sheet of white water)	Gushet
	Flow emerges across a horizontal geologic contact, typically dripping along a seepage front of sandstone over a shale or clay aquitard, and often creating a wet backwall. If a surface channel exists above the source area, a plunge pool and runout channel are likely to occur. This springs type may include unvegetated seepage patches on near-vertical or overhung bedrock walls.	Hanging garden
14	Flow emerges within a surface flow-dominated channel, which upstream may be a perennial stream or a dry channel	Rheocrene
	Flow emerges from a non-bedrock slope at a slope angle between 16° and 60°, and without an upslope channel. In some cases, these springs may emerge from the base of a cliff, but not from the cliff itself	15
15	Flow emerges within an active riparian channel margin or floodplain channel terrace and the source is subject to regular flood scour	Hillslope (Secondarily Rheocrene)
	Flow emerges in an uplands habitat, not associated with a channel that is subject to regular surface flow stream flood scouring	Hillslope (Uplands)



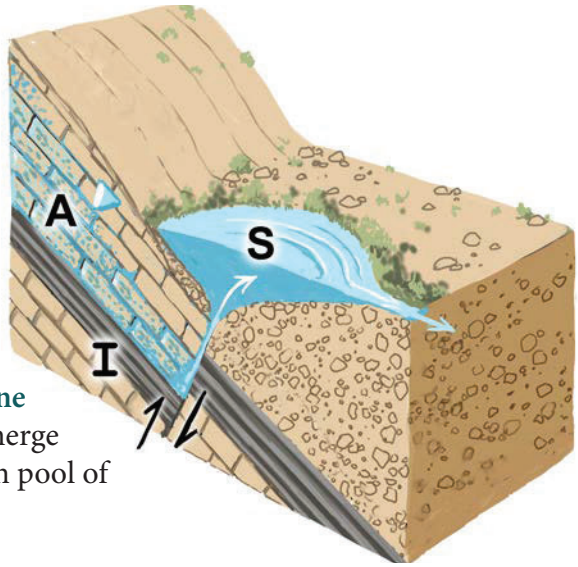
Exposure springs occur where a water table is exposed, without flowing, at the Earth's surface.



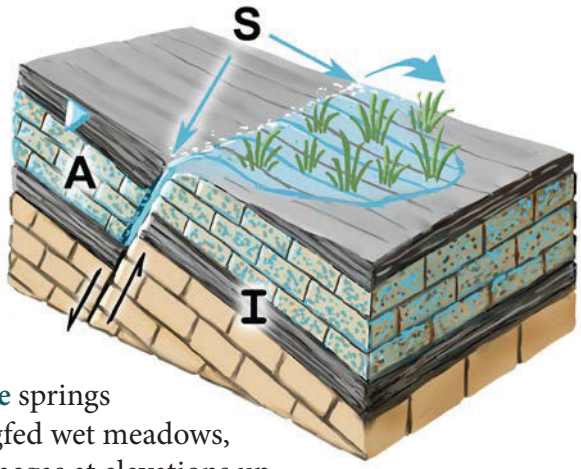
Hypocrene springs occur where groundwater is not expressed at the Earth's surface, but shallow groundwater is discharged by transpiration through wetland vegetation.



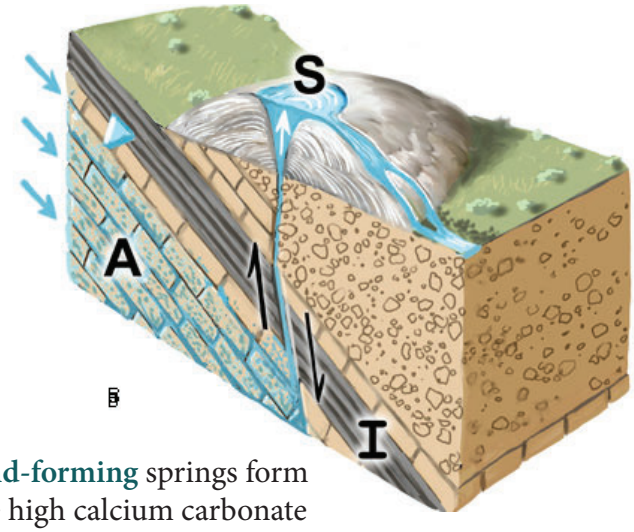
Fountain springs (semi-lotic) occur where artesian upwelling causes flow to rise higher than the surrounding landscape.



Limnocrene springs emerge into a open pool of water.

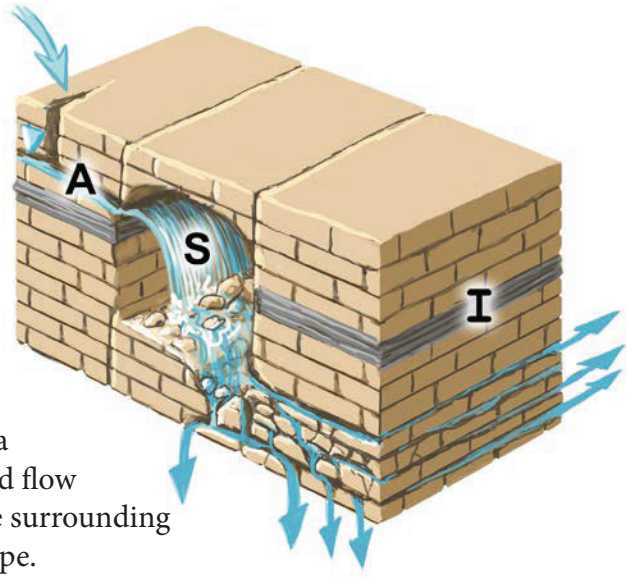


Helocrene springs are springfed wet meadows, called ciénegas at elevations up to about 2,135 m (7,000 ft), or groundwater-dependent fens at higher elevations.

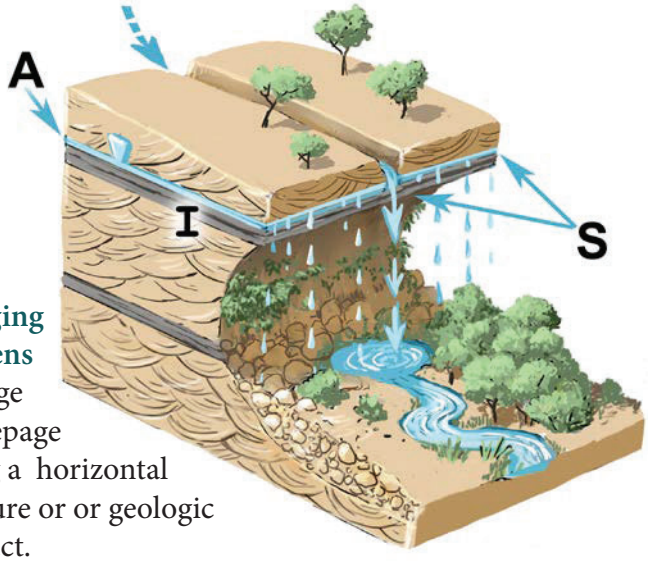


Mound-forming springs form where high calcium carbonate concentrations create travertine. This type also forms in the arctic where ice builds up, forming pingo ice hills or aufeis ice sheets.

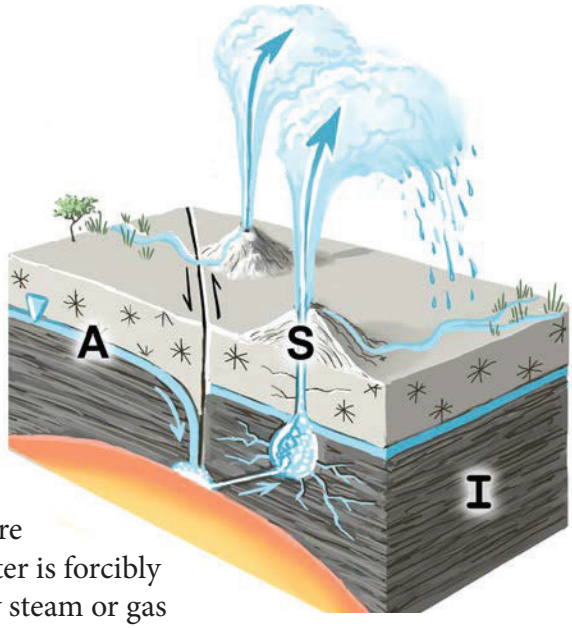
Fig. 50. Lentic and semi-lotic springs types, redrawn for SSI by V. Leshyk, modified from Springer and Stevens (2009).



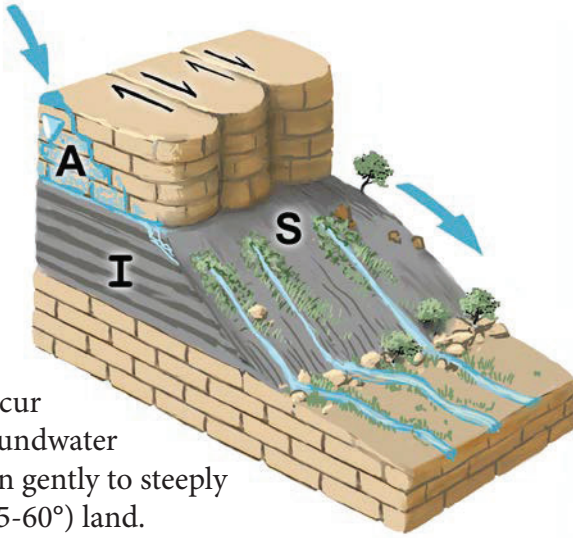
Cave springs emerge within a cave and flow into the surrounding landscape.



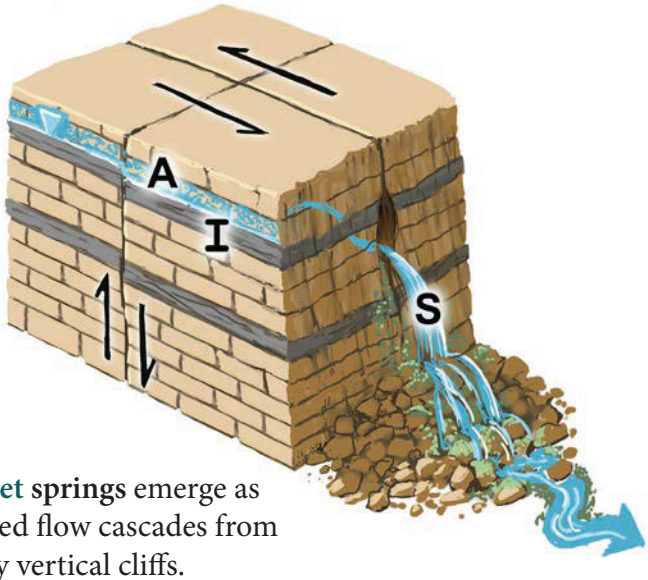
Hanging gardens emerge as seepage along a horizontal fracture or or geologic contact.



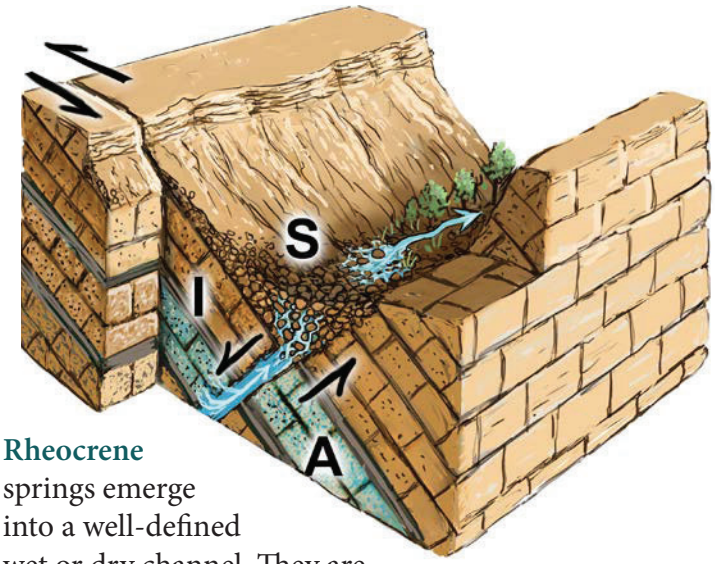
Geyser springs occur where groundwater is forcibly erupted by steam or gas pressure.



Hillslope springs occur where groundwater emerges on gently to steeply sloping (15-60°) land.



Gushet springs emerge as focused flow cascades from nearly vertical cliffs.



Rheocrene springs emerge into a well-defined wet or dry channel. They are commonly subject to regular surface-flow flooding.

Fig. 51. Lotic springs types, redrawn for SSI by V. Leshyk, modified from Springer and Stevens (2009).

SiteName_____ID_____Observer_____

Primary Type [ ] Secondary Type [ ]

Condition Assessment Questions Page 1

Aquifer Functionality and Water Quality

The following questions are related to the apparent condition of the aquifer and water table, short-term climatic conditions, and the quality of groundwater at the source(s), as well as anthropogenic alteration of surface flow. Score with half decimals from 1.0 to 4.0.

A. Water table: Is there evidence that the water table is dropping and the aquifer is failing to produce natural quantities of water for the springs ecosystem? For example, is woody vegetation (e.g., cottonwood, tree willow, other woody phreatophytes) showing evidence of mortality or declining health? Is woody upland vegetation encroaching? Or is an area now dry that was apparently previously groundwater supported? Is there an abandoned well or windmill? Any of these can indicate a declining water table. [ ]

1. The aquifer is depleted or in significant decline, as evidenced by: total loss of springs fauna (requires knowledge of springs fauna formerly occupying the site); total loss of wetland vegetation cover (observed as dead wetland plants), and/or substantial encroachment of upland vegetation.
2. The aquifer is moderately depleted, with evidence of decreasing or dying springs-dependent fauna or wetland vegetation cover, and/or encroachment of upland vegetation.
3. Aquifer is slightly but detectably depleted, with minor evidence of decreasing or dying wetland vegetation cover and/or limited encroachment of upland vegetation.
4. The aquifer appears to be in pristine or near-pristine condition, with no evidence of reduced flow, loss of wetland vegetation, or encroachment of upland vegetation.

-- Surveyors are unable to assess the water table condition in the field, but will conduct follow-up research (e.g., interview the land manager) and assign a score.

B. Surface water quality: What is the quality of water after it emerges onto the surface? Is there visual, olfactory, or other evidence of contamination (e.g., feces, strong odor, unusual color)? [ ]

1. The surface water quality is extremely poor with strong visual, olfactory, or other indications.
2. Moderately low surface water quality, with some visual, olfactory, or other indications.
3. Moderately high surface water quality, with little visual, olfactory, or other indication of impairment.
4. High surface water quality, with no visual, olfactory, or other indication of impairment.

-- Surveyors were unable to assess surface water quality in the field, but will conduct follow-up research (e.g., locate existing water quality data) and assign a score.

C. Springs flow: Is there evidence that the springs flow has been altered through human actions, such as wells, diversions, or capping? [ ]

1. The springs ecosystem that previously flowed is dry, with no flow evident at the source(s), or has been completely diverted or capped.
2. Springsflow from the source(s) has been greatly reduced due to wells, diversions, or capping.
3. Springsflow from the source(s) appears to have been slightly reduced due to wells, diversions, or capping.
4. Springsflow from the source(s) appears to be natural or near natural, with no wells, diversions, or capping.

-- Surveyors are unable to assess springsflow in the field, but will conduct follow-up research (e.g., locating historical information about use) and assign a score.

Comments about aquifer functionality and water quality.

Geomorphology

The following questions are related to the natural geomorphic integrity of the springs ecosystem. Score with half decimals from 1.0 to 4.0.

D. Natural geomorphic diversity: Are the expected microhabitats for this springs ecosystem type present, and/or are additional natural microhabitats or anthropogenic microhabitats present? Are geomorphic processes negatively influenced by human activities at the springs? Use Worksheet D to calculate this assessment score. The score calculated using Worksheet D may be interpreted using these descriptions: [ ]

1. The microhabitats that are expected or may occur in this springs ecosystem type are missing.
2. Few of the microhabitats that are expected or may occur in this springs ecosystem type are present.
3. Most, but not all of the microhabitats that are expected or may occur in this springs ecosystem type are present.
4. All of the microhabitats that are expected, as well as others that may occur in this springs ecosystem type are present.

SiteName_____ID_____Observer_____

Condition Assessment Questions Page 2

E. Soil integrity: To what extent are the soils, if present, altered due to anthropogenic influences? Natural soils can be affected by trampling, paving, trailing, vehicle tracks, fire pits, and other factors. What percent of the natural soils have been affected by these impacts? If an estimated percent cover is within 5% of a boundary score, a half-decimal should be applied.

1. 1. Between 75 to 100% of the surface area of natural soils, including peat, have been eliminated.
2. Between 50 to 75% of the surface area of natural soils, including peat, are altered and highly compromised.
3. Between 25 to 50% of the surface area of natural soils and/or peat deposits are altered, and soils are somewhat compromised.
4. Between 0 to 25% of the surface area of natural soils and/or peat deposits are altered, or natural soils are not expected to occur at that springs ecosystem type (e.g., bedrock-dominated gushet or hanging gardens springs).

F. Natural physical disturbance: Is the site subject to its natural geomorphic disturbance regime, including flooding, rockfall, mammalian herbivore influences, or other natural disturbances? Fire disturbance is considered in the next question. Upstream impoundments and channel alterations influence natural flooding, or inundate rheocrene springs downstream. Stabilization measures reduce natural disturbances such as rockfall or sprawling. Intensive mammalian herbivore use can alter the site geomorphology. Exclosures, while well-intended, can eliminate wildlife use, resulting in proliferation of wetland vegetation and loss of surface water and habitat. The four characteristics of ecological disturbance are timing, magnitude, duration, and frequency.

1. The natural disturbance regime is nearly or entirely altered, and is largely unrecoverable. All four characteristics have been altered.
2. The natural disturbance regime is moderately to highly altered, and is not likely to recover. Two or more disturbance characteristics have been altered.
3. The natural disturbance regime is slightly altered, but could recover. One disturbance characteristic has been altered.
4. The disturbance regime is nearly or entirely natural, and none of the disturbance characteristics have been altered.

---Surveyors could not evaluate the disturbance regime, but will conduct follow-up research (e.g., review hydrology) and assign a score.

G. Natural Fire Regime: Is the springs ecosystem subject to its natural fire disturbance regime? Has a past fire negatively affected the springs ecosystem? Has fire suppression created unnaturally dense vegetation, threatening the springs with a catastrophic burn?

1. The natural fire disturbance regime is nearly or entirely altered, and is largely unrecoverable. All four fire disturbance characteristics have been altered.
2. The natural fire disturbance regime is moderately to highly altered, and is not likely to recover. Two or more fire disturbance characteristics have been altered.
3. The natural fire disturbance regime is slightly altered, but could recover. One fire disturbance characteristic has been altered.
4. The fire disturbance regime is nearly or entirely natural, and none of the fire disturbance characteristics have been altered.

-- Surveyors could not evaluate the disturbance regime, but will conduct follow-up research (e.g., review fire boundary and intensity maps) and assign a score.

Comments about geomorphology, soils, and disturbance.

Geographic Context

The following questions relate to the level of isolation and size of the springs ecosystem. These intrinsic site characteristics reflect the ecological importance of the springs ecosystem and are likely to influence stewardship prioritization, but they do not reflect the condition and are therefore not counted in the assessment scoring. If an estimated distance or area is within 10% of a boundary score, a half-decimal should be applied.

H. Isolation from other springs ecosystems: How isolated is this springs ecosystem from other reported springs? The importance of a springs ecosystem increases with isolation.

1. The nearest reported springs ecosystem is less than 100 m away.
2. The nearest reported springs ecosystem is between 100 and 1,000 m away.
3. The nearest reported springs ecosystem is between 1 and 10 km away.
4. The nearest reported springs ecosystem is more than 10 km away.

-- Surveyors were unable to determine springs isolation, but will conduct follow-up research (e.g., GIS analysis of isolation) and assign a score.

SiteName_____ID_____Observer_____

Condition Assessment Questions Page 3

I. Isolation from perennial sources: How isolated is this springs ecosystem from the nearest perennial water body, such as a stream or lake? The importance of a springs ecosystem increases with isolation from other water bodies.

1. The nearest reported perennial water body is less than 100 m away.
2. The nearest reported perennial water body is between 100 and 1,000 m away.
3. The nearest reported perennial water body is between 1 and 10 km away.
4. The nearest reported perennial water body is more than 10 km away.

-- Surveyors were unable to determine the distance to the nearest perennial water body, but will conduct follow-up research (i.e., GIS analysis of isolation) and assign a score.

J. Habitat size: How large is this springs ecosystem? The importance of a springs ecosystem increases with its functioning size—the surface area that is directly influenced by the spring.

1. The springs ecosystem size is less than 100 m^2.
2. The springs ecosystem size is between 100 - 1,000 m^2.
3. The springs ecosystem size is between 1,000 and 10,000 m^2.
4. The springs ecosystem size is greater than 10,000 m^2.

---Surveyors were unable to determine the size of the springs ecosystem, but will conduct follow-up research. For example, if the ecosystem is too large to measure, aerial imagery may be used to assign a score.

Comments about the geographic context and importance of the springs ecosystem.

Habitat

The following questions relate to the capacity of the springs and its associated microhabitats to support native species and natural ecosystem processes. Habitat area, quality, productivity, and diversity strongly influence springs ecosystem ecology and biota, and anthropogenic degradation of springs habitat reduces the extent and importance of those ecological variables. Score with half decimals from 1.0 to 4.0.

K. Microhabitat quality: What is the condition of the microhabitats associated with the site? Consider the overall habitat quality in each of the microhabitats and the intensity of all apparent anthropogenic impacts. Springs ecosystems can support multiple microhabitats, and each of those microhabitats can support its own suite of species that may or may not interact with those in other microhabitats. Anthropogenic activities may affect one or more or all microhabitats. Human activities can influence some or all microhabitats at a springs ecosystem. For example, intensive livestock use may cause pedestal formation, feces deposition, erosion, or other impacts on wetland microhabitat surfaces. Construction of roads, springboxes, or berms, as well as pollution can degrade microhabitat quality.

1. No natural microhabitats remain, or the remaining natural microhabitats are in very poor condition.
2. At least one natural microhabitat is in poor condition, with significant impairment evident, and anthropogenic habitats may be present.
3. All natural microhabitats are ecologically moderately intact, but some impairment is evident. If anthropogenic habitats are present, they are historic and have recovered ecologically.
4. All natural microhabitats are nearly or fully ecologically intact, with little or no impairment. No anthropogenic microhabitats are present.

L. Native plant cover: What is the proportion of native to non-native plant cover? Native vegetation cover is generally supportive of native animal species, while non-native plant cover may exclude native fauna, increase wildfire frequency and intensity, and attract or support undesireable species through changes in ecological structure and processes. If an estimated percent cover is within 5% of a boundary score, a half-decimal should be applied.

1. No native plant species are present, or less than 40% of the plant cover is native.
2. Between 40 and 80% of the plant cover is native.
3. Between 80 and 95% of the plant cover is native.
4. More than 95% of the plant cover is native.

-- Surveyors were unable to evaluate the native plant species ecological role. For example, surveyors could collect plant specimens or photographs to be subsequently verified.

SiteName_____ID_____Observer_____

Condition Assessment Questions Page 4

M. Native food web dynamics: What is the condition of the natural food web at this springs ecosystem? Ecologically intact springs ecosystems support diverse food web interactions, with robust vegetation (where geomorphically appropriate) supporting diverse populations of invertebrate and vertebrate herbivores and predators. This can range from mountain lions to dragonflies. Trophic structure, as indicated by the presence of vegetation, primary consumers, and secondary or top consumers (predators), indicates that ecosystem functionality at a site is high.

1. No natural food web dynamics are evident, with no observation or evidence of predators.
2. There is some evidence of natural food web dynamics, indicated by the observation or evidence of at least one predator.
3. There is moderate evidence of natural food web dynamics, indicated by the observation or evidence of several predators from a range of trophic levels.
4. The food web dynamics appear to be natural or nearly natural, indicated by the observation or evidence of several predators from a range of trophic levels.

Comments about habitat quality, plant cover, and food web dynamics.

Biota

The following questions pertain to flora and faunal species detected during the survey. Floral and faunal species biodiversity is an important topic in stewardship discussions about springs. Score with half decimals from 1.0 to 4.0.

N. Native vs. non-native plant species: What is the proportion of native plant species? Non-native plant species can overwhelm native plant communities at springs, thus the proportional representation of native and non-native plant species is an important assessment variable. If an estimated percent cover is within 5% of a boundary score, a half-decimal should be applied.

1. Between 0 and 40% of the plant species are native.
2. Between 40 and 80% of the plant species are native.
3. Between 80 and 95% of the plant species are native.
4. More than 95% of the plant species are native.

-- Surveyors were unable to evaluate the proportion of native plant species, but will conduct follow-up research (e.g., collect plant specimens for identification) and assign a score.

O. Presence of noxious weed species: How many plant species from the noxious list are present? Please see New Mexico Noxious Weed List, and complete Worksheet O.

1. Three or more NM noxious weed species are present.
2. Two NM noxious weed species are present.
3. One NM noxious weed species is present.
4. No NM noxious weed species are present.

-- Surveyors were unable to evaluate the presence of noxious species, but will conduct follow-up research (e.g. collect samples for identification) and assign a score.

P. Plant demography: Is the population structure (demography) of woody vegetation appropriate to the site? For example, is the springs ecosystem becoming unnaturally dominated by woody plant species (e.g., conifer, Russian olive, Siberian elm, tamarisk) or invasive wetland species (e.g., *Typha* or *Phragmites*), as evidenced by the presence of multiple life stages (e.g., seedling, sapling, mature plants)? Upland woody shrubs or trees encroaching onto the site can reveal an unnatural transition due to human activity or disturbance.

1. The site is almost entirely dominated by woody plant species or invasive wetland species.
2. The site is largely, but not entirely dominated by woody plant species or invasive wetland species.
3. The site contains some encroachment by woody plant species or invasive wetland species.
4. The vegetation at the springs ecosystem appears appropriate.

Q. Sensitive flora and fauna richness: Did surveyors identify any sensitive plant or animal species? Rare, endemic, sensitive, threatened and/or endangered species often present policy-related or legal management issues to springs stewards.

4. One or more sensitive or listed plant or animal species were identified, or the site is designated critical habitat for a species.

--- Surveyors were unable to evaluate the presence of such species, or due to spring type or naturally non-supportive habitat there is no reason to expect any of these species at the site.

Sensitive species present or reported at the site. Indicate whether, rare, common, or abundant.

SiteName_____ID_____Observer_____

Condition Assessment Questions Page 5

R. Proportion of native animal species: What is the proportion of native invertebrate and vertebrate species? Non-native animal species can exert negative impacts on native species and ecological processes, degrading the springs ecosystem. If an estimated percent cover is within 5% of a boundary score, a half-decimal should be applied.

1. Between 0 and 40% of the animal species present are native.
2. Between 40 and 80% of the animal species present are native.
3. Between 80 and 95% of the animal species present are native.
4. More than 95% of the animal species are native.

---Surveyors were unable to evaluate the proportion of native animal species, but will conduct follow-up research and assign a score.

S. Number of non-native animal species: How many non-native aquatic and terrestrial animal species are present? For example, to what extent are nonnative mollusks, crayfish, bullfrogs, and game or aquarium fish species present? Non-native animal species can exert negative impacts on native species and ecological processes, degrading the springs ecosystem. One caveat: not all animal species occupying a springs ecosystem are likely to be detected during a single site visit. Therefore, this score is expected to be refined with multiple visits. Please complete Worksheet S.

1. Three or more nonnative animal species were detected.
2. Two nonnative animal species were detected.
3. One nonnative animal species was detected.
4. No nonnative animal species were detected.

---Surveyors were unable to evaluate the presence of non-native species, but will conduct follow-up research (e.g. collect samples for identification) and assign a score.

Comments about Biota.

SiteName_____ID_____Observer_____

Primary Type | | Secondary Type | |

Worksheet D

Table 2. Probability of microhabitats occurring at each springs type.

	Microhabitat Type												
Spring Type	Backwall or sloped bedrock	Cave	Channel	Colluvial slope	Mound	Pool	Terrace	Pool margin	Low gradient cienega	High gradient cienega	No. Likely	No. Possible	No. Unlikely
Cave	High	High	High	Low	Low	Med	Med	Med	Low	Low	3	3	4
Exposure	Med	Low	Low	Med	Low	High	Low	High	Low	Low	2	2	6
Fountain	Low	Low	Med	Med	Med	High	Med	Low	Med	Low	1	5	4
Gushet	High	Med	High	Med	Low	Med	High	Med	Low	Med	3	5	2
Geyser	High	Low	Med	Low	High	Med	Med	Low	Low	Low	2	3	5
Hanging garden	High	Low	High	High	Low	High	High	High	Low	Low	6	0	4
Helocrene	Low	Low	Med	Low	Med	Med	Med	Med	High	High	2	5	3
Hillsope-rheocrene	Med	Low	High	Med	Low	Med	High	Low	Med	Med	2	5	3
Hillsope-upland	Med	Low	High	Med	Low	Med	High	Low	Med	Med	2	5	3
Hypocrene *	Med	Low	Low	Med	Med	Low	Med	High	High	Med	2	5	3
Limnocrene	Med	Low	Med	Low	Med	High	Med	High	Med	Low	2	5	3
Mound-form	High	Low	Med	Med	High	Med	Med	High	Med	Med	3	6	1
Rheocrene	Med	Low	High	Med	Low	Med	High	Low	Med	Low	2	4	4

Table 3. Scoring worksheet with the count of each microhabitat and anthropogenic influence for each.

Microhabitat Type	Likelihood	Liklihood Score	Count	Score	Anthro Count
Backwall or Sloping Bedrock					
Cave					
Channel					
Colluvial Slope					
Spring mound					
Pool					
Terrace					
Pool margin					
Low gradient cienega					
High gradient cienega					
				Totals:	

SiteName_____ID_____Observer_____

Primary Type | | Secondary Type | |

Worksheet D (cont.)

Scoring Question D requires the following steps:

1) Table 2 is a reference list showing the probability of occurrence of each natural microhabitat at a given springs type. Use Table 2 to look up the probability of occurrence of each natural microhabitat for the springs type being surveyed. In the Likelihood column of Table 3, copy these probabilities for the springs type you are surveying.
2) The Likelihood Score column in Table 3 will autofill based on the values entered into the Likelihood column (low probability = 1, medium probability = 2, and high probability = 3).
3) In the Count column in Table 3, record how many of each microhabitat were observed at the spring (e.g. there may have been 1 channel and 2 terraces). These data should also have been recorded on page 1 of the inventory field sheets.
4) Multiply values in the Likelihood Score column by values in the Count column to generate values for the Prelim. Score column.
5) Sum the Prelim Score column to generate a Preliminary Site Sore.
6) Table 4 is a cross-walk reference list to convert the Preliminary Site Score to a Preliminary Question D Assessment Score. For example, if you are surveying a hanging garden and use Table 3 to calculate a Preliminary Site Score of 10, your Preliminary Question D Assessment Score will be 2.5 (from the right column of Table 4).
7) Now return to Table 3 and record the number of significant anthropogenic microhabitats present (e.g., berms, concrete slabs, metal tanks, etc.).
8) Subtract the number of significant anthropogenic microhabitats from the preliminary Question D Assessment Score to generate a final Question D score. Record this final score in the box for Assessment Question D on the assessment field sheet.

Table 4. Assessment Score chart for condition assessment question D.

Cave	Exposure	Fountain	Gushet	Geyser	Hanging Garden	Helocrene	Hillslope-rheocrene	Hillslope (upland)	Hypocrene	Limnocrene	Mound-Form	Rheocrene	Anthropogenic	Assessment Score
≤ 0	≤ 0	≤ 0	≤ 0	≤ 0	≤ 0	≤ 0	≤ 0	≤ 0	≤ 0	≤ 0	≤ 0	≤ 0	All	1
1	1		1	1	1-4	1	1	1	1	1	1	1		1.5
2-3	2		2-3	2	5-7	2	2	2	2	2	2-3	2		2
4-5	3		4-5	3	8-10	3	3	3	3	3	4-5	3		2.5
6-7	4	1-2	6-7	4	11-13	4	4	4	4	4	6-7	4		3
8	5		8	5	14-17	5	5	5	5	5	8	5		3.5
≥ 9	≥ 6	≥ 3	≥ 9	≥ 6	≥ 18	≥ 6	≥ 6	≥ 6	≥ 6	≥ 6	≥ 9	≥ 6		4

SiteName_____ID_____Observer_____

Worksheet O

New Mexico Noxious Weed List
Updated September 2016

If a species is absent, check the absent box; if present, enter 1. Count the total at the bottom of page 2, and respond to question O.

Class C Species: Class C species are wide-spread in the state. Management decisions for these species should be determined at the local level, based on feasibility of control and level of infestation.	**Absent**	**Present**
Cheatgrass, *Bromus tectorum*		
Curlyleaf pondweed, *Potamogeton crispus*		
Eurasian watermilfoil, *Myriophyllum spicatum*		
Giant cane, *Arundo donax*		
Hydrilla, *Hydrilla verticllata*		
Jointed goatgrass, *Aegilops cylindrica*		
Musk thistle, *Carduus nutan*		
Parrotfeather, *Myriophyllum aquaticum*		
Russian olive, *Elaeagnus angustifolia*		
Saltcedar, *Tamarix spp.*		
Siberian elm, *Ulmus pumila*		
Tree of heaven, *Ailanthus altissima*		
Class B Species: Class B Species are limited to portions of the state. In areas with severe infestations, management should be designed to contain the infestation and stop any further spread.	**Absent**	**Present**
African rue, *Peganum harmala*		
Bull thistle, *Cirsium vulgare*		
Chicory, *Cichorium intybus*		
Halogeton, *Halogeton glomeratus*		
Malta starthistle, *Centaurea melitensis*		
Perennial pepperweed, *Lepidium latifolium*		
Poison hemlock, *Conium maculatum*		
Quackgrass, *Elytrigia repens*		
Russian knapweed *Acroptilon repens*		
Spiny cocklebur, *Xanthium spinosum*		
Teasel, *Dipsacus fullonum*		

Worksheet O (Cont.)

SiteName_____

Watch List Species: Watch List species are species of concern in the state. These species have the potential to become problematic. More data is needed to determine if these species should be listed. When these species are encountered please document their location and contact appropriate authorities.	**Absent**	**Present**
Crimson fountaingrass, *Pennisetum setaceum*		
Meadow knapweed, *Centaurea pratensis*		
Myrtle spurge, *Euphorbia myrsinites*		
Pampas grass, *Cortaderia sellonana*		
Sahara mustard, *Brassica tournefortii*		
Syrian beancaper, *Zygophyllum fabago L.*		
Wall rocket, *Diplotaxis tenuifolia*		
Class A Species: Class A species are currently not present in New Mexico, or have limited distribution. Preventing new infestations of these species and eradicating existing infestations is the highest priority	**Absent**	**Present**
Alfombrilla, *Drymaria arenariodes*		
Black henbane, *Hyoscyamus niger*		
Brazillian egeria, *Egeria densa*		
Camelthorn, *Alhagi psuedalhagi*		
Canada thistle, *Cirsium arvense*		
Dalmation toadflax, *Linaria dalmatica*		
Diffuse knapweed, *Centaurea diffusa*		
Dyer's woad, *Isatis tinctoria*		
Giant salvinia, *Salvinia molesta*		
Hoary cress, *Cardaria spp.*		
Leafy spurge, *Euphorbia esula*		
Oxeye daisy, *Leucanthemum vulgare*		
Purple loosestrife, *Lythrum salicaria*		
Purple starthistle, *Centaurea calcitrapa*		
Ravenna grass, *Saccharum ravennae*		
Scentless chamomile, *Matricaria perforata*		
Scotch thistle, *Onopordum acanthium*		
Spotted knapweed, *Centaurea biebersteinii*		
Yellow toadflax, *Linaria vulgaris*		
Yellow starthistle, *Centaurea solstitialis*		
Total Noxious Weed Species Present:		

Worksheet P

SiteName_____

This table lists vegetation elements that are considered unnatural for each springs type. For the springs type you are surveying, circle all elements present. In the right column, record the total number of unnatural vegetation elements for the springs type you are surveying.

Springs Type	Ground Cover	Woody Cover	Tree Cover	# Unnatural Elements
Cave	Excessive algal cover	n/a	n/a	
Exposure	Excessive algal, Typha or Phragmites cover	Dead shrub cover (all life stages)	Dead tree cover (all stages)	
Fountain	Dead wetland vegetation (all life stages)	Excessive phreatophyte or upland shrub seedling or sapling cover	Excessive phreatophyte or conifer seedlings or saplings	
Geyser	Excessive algal cover	Excessive phreatophyte or upland seedling or sapling shrub cover	Excessive phreatophyte or conifer seedlings or saplings	
Gushet	Dead wetland vegetation, or excessive non-wetland plant species	Dead shrubs, or excessive upland shrub seedling or sapling cover	Dead trees, or excessive conifer or upland plant seedlings or sapling presence	
Hanging Garden	Dead wetland vegetation, or excessive non-wetland plant species	Dead shrubs, or excessive upland shrub seedling or sapling cover	Dead trees, or excessive conifer or upland plant seedlings or sapling presence	
Helocrene	Dead wetland vegetation or excessive unvegetated ground (alkaline springs may not support no or little wetland vegetation)	Dead shrubs, or excessive phreatophyte or upland shrub seedling or sapling cover	Dead, or unnaturally excessive phreatophyte or upland tree seedling or sapling cover	
Hillslope	Dead wetland vegetation, or excessive non-wetland plant species	Dead shrubs, or excessive phreatophyte or upland shrub seedling or sapling cover	Dead, or unnaturally excessive phreatophyte or upland tree seedling or sapling cover	
Hypocrene	Dead wetland vegetation	Dead shrubs	Dead tree seedlings, saplings, mature individuals	
Limnocrene	Excessive unnatural algal, Typha or Phragmites cover	Dead shrubs, or excessive upland shrub seedling or sapling cover	Dead trees, or excessive upland tree seedling or sapling cover	
Mound-form	Excessive unnatural algal, Typha or Phragmites cover	Dead shrubs, or excessive upland shrub seedling or sapling cover	Dead trees, or excessive upland tree seedling or sapling cover	
Rheocrene	Excessive unnatural algal, Typha or Phragmites cover	Dead shrubs, or excessive upland shrub seedling or sapling cover in riparian zone	Dead trees or excessive upland tree seedling or sapling cover in riparian zone	
Total Count				

Worksheet S

If species is present, place a checkmark in the right-most column of the table. Count the total at the bottom of the last page, and respond to question S.

New Mexico Exotic Animal List

Edited from the USGS Nonidigenous Aquatic Species (https://nas.er.usgs.gov/queries/SpeciesList.aspx?Group=&Sortby=1&state=NM) and the Biota Information System of New Mexico (BISON; http://bison-m.org/)

Group	Common Name	Family	Scientific Name	Nativity in NM	Present
Amphibians-Frogs	American Bullfrog	Ranidae	*Lithobates catesbeianus*	Exotic	
Amphibians-Frogs	Green Frog	Ranidae	*Lithobates clamitans*	Exotic	
Amphibians-Frogs	Barred Tiger Salamander	Ambystomatidae	*Ambystoma mavortium*	Exotic	
Birds	Chukar	Phasianidae	*Alektoris chukar*	Exotic	
Birds	Eurasian Collard Dove	Columbidae	*Streptopelia decaocto*	Exotic	
Birds	European House Sparrow	Passeridae	*Passer domesticus*	Exotic	
Birds	Pheasant	Phasianidae	*Phasianus colchicus*	Exotic	
Birds	Rock Dove (Common Pigeon)	Columbidae	*Columba livia*	Exotic	
Birds	Starling	Sternidae	*Sternus vulgaris*	Exotic	
Coelenterates-Hydrozoans	freshwater jellyfish	Olindiidae	*Craspedacusta sowerbyi*	Exotic	
Crustaceans-Cladocerans	a waterflea	Daphnidae	*Daphnia lumholtzi*	Exotic	
Crustaceans-Copepods	a calanoid copepod	Temoridae	*Eurytemora affinis*	Exotic	
Crustaceans-Copepods	anchor worm	Lernaeidae	*Lernaea cyprinacea*	Exotic	
Crustaceans-Crayfish	Red Swamp Crayfish	Cambaridae	*Procambarus clarkii*	Exotic	
Crustaceans-Crayfish	Rusty Crayfish	Cambaridae	*Faxonius rusticus*	Exotic	
Crustaceans-Crayfish	Virile Crayfish	Cambaridae	*Orconectes virilis*	Exotic	
Crustaceans-Crayfish	Western plains crayfish	Cambaridae	*Faxonius causeyi*	Native (part)	
Fishes	Arctic Grayling	Salmonidae	*Thymallus arcticus*	Exotic	
Fishes	Bairdiella	Sciaenidae	*Bairdiella icistia*	Exotic	
Fishes	Black Bullhead	Ictaluridae	*Ameiurus melas*	Native (part)	

Group	Common Name	Family	Scientific Name	Nativity in NM	Present
Fishes	Black Crappie	Centrarchidae	*Pomoxis nigromaculatus*	Exotic	
Fishes	Black Drum	Sciaenidae	*Pogonias cromis*	Exotic	
Fishes	Blue Catfish	Ictaluridae	*Ictalurus furcatus*	Native (part)	
Fishes	Bluegill	Centrarchidae	*Lepomis macrochirus*	Native (part)	
Fishes	Brook Stickleback	Gasterosteidae	*Culaea inconstans*	Exotic	
Fishes	Brook Trout	Salmonidae	*Salvelinus fontinalis*	Exotic	
Fishes	Brown Bullhead	Ictaluridae	*Ameiurus nebulosus*	Exotic	
Fishes	Brown Trout	Salmonidae	*Salmo trutta*	Exotic	
Fishes	Bullhead Minnow	Cyprinidae	*Pimephales vigilax*	Exotic	
Fishes	Channel Catfish	Ictaluridae	*Ictalurus punctatus*	Native (part)	
Fishes	Coho Salmon	Salmonidae	*Oncorhynchus kisutch*	Exotic	
Fishes	Common Carp	Cyprinidae	*Cyprinus carpio*	Exotic	
Fishes	Cutbow trout	Salmonidae	*Oncorhynchus clarkii x mykiss*	Native Hybrid	
Fishes	Cutthroat Trout	Salmonidae	*Oncorhynchus clarkii*	Exotic	
Fishes	Dolly Varden	Salmonidae	*Salvelinus malma*	Exotic	
Fishes	Fathead Minnow	Cyprinidae	*Pimephales promelas*	Native (part)	
Fishes	Flathead Catfish	Ictaluridae	*Pylodictis olivaris*	Native (part)	
Fishes	Gila Topminnow	Poeciliidae	*Poeciliopsis occidentalis occidentalis*	Native	
Fishes	Gizzard Shad	Clupeidae	*Dorosoma cepedianum*	Exotic	
Fishes	Golden Shiner	Cyprinidae	*Notemigonus crysoleucas*	Exotic	
Fishes	Golden Trout	Salmonidae	*Oncorhynchus aguabonita*	Exotic	
Fishes	Goldfish	Cyprinidae	*Carassius auratus*	Exotic	
Fishes	Grass Carp	Cyprinidae	*Ctenopharyngodon idella*	Exotic	
Fishes	Green Sunfish	Centrarchidae	*Lepomis cyanellus*	Native (part)	
Fishes	Gulf Killifish	Fundulidae	*Fundulus grandis*	Exotic	
Fishes	Guppy	Poeciliidae	*Poecilia reticulata*	Exotic	
Fishes	Inland Silverside	Atherinopsidae	*Menidia beryllina*	Exotic	
Fishes	Iowa Darter	Percidae	*Etheostoma exile*	Exotic	
Fishes	Kokanee Salmon	Salmonidae	*Oncorhynchus nerka*	Exotic	

Group	Common Name	Family	Scientific Name	Nativity in NM	Present
Fishes	Lake Trout	Salmonidae	*Salvelinus namaycush*	Exotic	
Fishes	Largemouth Bass	Centrarchidae	*Micropterus salmoides*	Native (part)	
Fishes	Largespring Gambusia	Poeciliidae	*Gambusia geiseri*	Native	
Fishes	Longear Sunfish	Centrarchidae	*Lepomis megalotis*	Exotic	
Fishes	Mexican Golden Trout	Salmonidae	*Oncorhynchus chrysogaster*	Exotic	
Fishes	Northern Pike	Esocidae	*Esox lucius*	Exotic	
Fishes	Orangemouth Corvina	Sciaenidae	*Cynoscion xanthulus*	Exotic	
Fishes	Pirate Perch	Aphredoderidae	*Aphredoderus sayanus*	Exotic	
Fishes	Plains Killifish	Fundulidae	*Fundulus zebrinus*	Native (part)	
Fishes	Rainbow Trout	Salmonidae	*Oncorhynchus mykiss*	Exotic	
Fishes	Redear Sunfish	Centrarchidae	*Lepomis microlophus*	Exotic	
Fishes	Red Drum	Sciaenidae	*Sciaenops ocellatus*	Exotic	
Fishes	Rio Grande cutthroat trout	Salmonidae	*Oncorhynchus clarkii virginalis*	Native	
Fishes	Rock Bass	Centrarchidae	*Ambloplites rupestris*	Exotic	
Fishes	Sacramento Perch	Centrarchidae	*Archoplites interruptus*	Exotic	
Fishes	Sailfin Molly	Poeciliidae	*Poecilia latipinna*	Native	
Fishes	Sargo	Haemulidae	*Anisotremus davidsonii*	Exotic	
Fishes	Sheepshead Minnow	Cyprinodontidae	*Cyprinodon variegatus*	Largely exotic	
Fishes	Smallmouth Bass	Centrarchidae	*Micropterus dolomieu*	Exotic	
Fishes	Snake River Finespotted Cut-throat Trout	Salmonidae	*Oncorhynchus clarkii behnkei*	Exotic	
Fishes	Spotted Bass	Centrarchidae	*Micropterus punctulatus*	Exotic	
Fishes	Spooted Sea Trout	Salmonidae	*Cynoscion nebulosus*	Exotic	
Fishes	Striped Bass	Moronidae	*Morone saxatilis*	Exotic	
Fishes	Tench	Cyprinidae	*Tinca tinca*	Exotic	
Fishes	Threadfin Shad	Clupeidae	*Dorosoma petenense*	Exotic	
Fishes	Tilapia	Cichlidae	*Tilapia sp.*	Exotic	
Fishes	Walleye	Percidae	*Sander vitreus*	Exotic	
Fishes	Warmouth	Centrarchidae	*Lepomis gulosus*	Exotic	
Fishes	White Bass	Moronidae	*Morone chrysops*	Exotic	

Group	Common Name	Family	Scientific Name	Nativity in NM	Present
Fishes	White Crappie	Centrarchidae	*Pomoxis annularis*	Exotic	
Fishes	Wiper	Moronidae	*Morone chrysops x M. saxatilis*	Exotic	
Fishes	Yellow Bullhead	Ictaluridae	*Ameiurus natalis*	Exotic	
Fishes	Yellow Perch	Percidae	*Perca flavescens*	Exotic	
Fishes	Yellowstone cutthroat trout	Salmonidae	*Oncorhynchus clarkii bouvieri*	Exotic	
Fishes	Zebra danio	Cyprinidae	*Danio rerio*	Exotic	
Insect- Hymenoptera	Honey Bee	Apideae	*Apis melifera*	Exotic	
Insect- Lepidoptera	Small white	Pieridae	*Pieris rapae*	Exotic	
Mammals	Barbary Sheep (Aoudad)	Bovidae	*Ammotragus lervia*	Exotic	
Mammals	Black Rat	Muridae	*Rattus rattus*	Exotic	
Mammals	Domestic cat	Felidae	*Felis catus*	Exotic	
Mammals	Domestic Cow	Bovidae	*Bos taurus*	Exotic	
Mammals	Domestic dog	Canidae	*Canis lupus familiaris*	Exotic	
Mammals	Eastern Fox Squirrel	Sciuridae	*Sciurus niger*	Exotic	
Mammals	Feral Burro	Equidae	*Equus asinus*	Exotic	
Mammals	Feral Horse	Equidae	*Equus ferus caballus*	Exotic	
Mammals	Feral Pig	Suidae	*Sus scrofa*	Exotic	
Mammals	Himalayan Tahr	Bovidae	*Hemitragus jemlahicus*	Exotic	
Mammals	House Mouse	Muridae	Mus musculus	Exotic	
Mammals	Nine-banded Armadillo	Dasypodidae	*Dasypus novemcinctus mexicanus*	Exotic	
Mammals	Norway Rat	Muridae	*Rattus norvegicus*	Exotic	
Mammals	Nutria	Myocastoridae	*Myocastor coypus*	Exotic	
Mammals	Oryx	Bovidae	*Oryx gazella*	Exotic	
Mammals	Persian Ibex	Bovidae	*Capra aegagrus hircus*	Exotic	
Mammals	Siberian Ibex	Bovidae	*Capra siberica siberica*	Exotic	
Mollusks-Bivalves	Asian clam	Cyrenidae	*Corbicula fluminea*	Exotic	

Group	Common Name	Family	Scientific Name	Nativity in NM	Present
Mollusks-Gastropods	European ear snail	Lymnaeidae	*Radix auricularia*	Exotic	
Mollusks-Gastropods	European physa	Physidae	*Physella acuta*	Exotic?	
Platyhelminthes	Asian tapeworm	Bothriocephalidae	*Schyzocotyle acheilognathi*	Exotic	
Reptiles-Turtles	Malayan Snail-eating Turtle	Emydidae	*Malayemys subtrijuga*	Exotic	
Reptiles-Turtles	Midland Painted Turtle	Emydidae	*Chrysemys picta marginata*	Exotic	
Reptiles-Turtles	Red-Eared Slider	Emydidae	*Trachemys scripta elegans*	Native (part)	
Reptiles-Turtles	Snapping Turtle	Chelydridae	*Chelydra serpentina*	Native (part)	
Reptiles-Turtles	Yellow-bellied Slider	Emydidae	*Trachemys scripta scripta*	Exotic	
Reptiles- Squamates	Mediterranean Gecko	Gekkonidae	*Hemidactylus turcicus*	Exotic	
			Total Exotic Species Present:		

Table 5. New Mexico Springs Rapid Assessment Method summary worksheet

Assessment Question	Assessment Question Score	Sum of Question Scores	Category Score
Aquifer Functionality & Water Quality: A. Water table alteration			
Aquifer Functionality & Water Quality: B. Surface water quality impairment			
Aquifer Functionality & Water Quality: C. Springs flow rate			
Aquifer Functionality & Water Quality: Category Total Possible Score =12			
Geomorhology: D. Natural geomorphic diversity			
Geomorhology: E. Soil Integrity			
Geomorhology: F. Natural physical disturbance			
Geomorhology: G. Natural fire regime			
Geomorphology Category: Total Possible Score =16			
Geographic Context: H: Isolation from other springs			
Geographic Context: I. Isolation from nearest perennial water source			
Geographic Context: J. Springs habitat area (size)			
Geographic Context Category: (not counted in total score)			
Habitat: K. Microhabitat quality			
Habitat: L. Native plant cover			
Habitat: M. Native food-web dynamics			
Habitat Category: Total Possible Score =12			

Assessment Question	Assessment Question Score	Sum of Question Scores	Category Score
Biota: N. Native vs. non-native plant species richness			
Biota: O. Presence of noxious weed species			
Biota: P. Plant demography			
Biota: Q. Sensitive flora and fauna richness			
Biota: R. Native and non-native faunal species percent			
Biota: S. Non-native faunal species richness			
Biota Category: **Total Possible Score =20 (excluding Q)**			
Total Site Condition Score: (Total possible = 64) 1=irrecoverable 2=poor 3=good 4=pristine			