

Springs Ecosystem Assessment Protocol Scoring Criteria

Aquifer and Water Quality

AFWQ0 Springs Dewatered (Y/N)

AFWQ1 Aquifer functionality

- 0 Aquifer depleted
- 1 Aquifer nearly depleted
- 2 Aquifer in significant decline
- 3 Aquifer declining slightly but detectably
- 4 Low to moderate aquifer withdrawal
- 5 Aquifer not or only very slightly pumped
- 6 Aquifer pristine; good potential reference site
- 9 Unable to assess aquifer functionality

AFWQ2 Springs discharge

- 0 No flow
- 1 Less than .1 liters per second
- 2 Between .1 and 1 liters per second
- 3 Between 1 and 10 liters per second
- 4 Between 10 and 100 liters per second
- 5 Between 100 and 1000 liters per second
- 6 Over 1000 liters per second
- 9 Unable to assess flow

AFWQ3 Flow naturalness

- 0 Springs dewatered
- 1 Springs mostly dewatered
- 2 Springs flow strongly reduced
- 3 Springs flow slightly, but distinctively, reduced
- 4 Springs flow only slightly reduced
- 5 Springs flow apparently natural
- 6 Springs pristine; good potential reference site
- 9 Unable to assess flow naturalness

AFWQ4 Flow persistence

- 0 No springs flow
- 1 Flow ephemeral, less than 50% of time
- 2 Flow rarely ephemeral
- 3 Flow recently persistent
- 4 Flow apparent during Holocene
- 5 Flow continuous since late Pleistocene
- 6 Flow since mid-Pleistocene or earlier
- 9 Unable to assess flow persistence

AFWQ5 Water quality

- 0 No water
- 1 Water quality less than 10% of natural condition
- 2 Water quality 10 to 30% of natural condition
- 3 Water quality 30 to 60% of natural condition
- 4 Water quality 60 to 90% of natural condition
- 5 Water quality 90 to 99% of natural condition
- 6 Water quality fully natural
- 9 Unable to assess water quality

AFWQ6 Algal and periphyton cover

- 0 Algal or periphyton cover wholly unnatural
- 1 Natural cover of algae or periphyton very poor
- 2 Natural cover of algae or periphyton poor
- 3 Natural cover of algae or periphyton moderate
- 4 Natural cover of algae or periphyton good
- 5 Natural cover of algae or periphyton very good
- 6 Cover of algae or periphyton wholly natural
- 9 Unable to assess algal and periphyton cover

Geomorphology

GEO1 Geomorphic functionality

- 0 Site obliterated unnaturally
- 1 <25% original natural microhabitat types remain
- 2 25-50% of natural microhabitat types remain
- 3 50-75% of natural microhabitat types remain
- 4 75-90% of natural microhabitat types remain
- 5 90-98% of natural microhabitat types remain
- 6 Natural microhabitat types pristine
- 9 Unable to geomorphic functionality

GEO2 Runout channel geometry

- 0 Original runout channel unnaturally obliterated
- 1 Channel virtually obliterated, trenched, or otherwise manipulated
- 2 Channel strongly altered, with only scant evidence of original course
- 3 Channel highly altered but with some functionality
- 4 Channel slightly altered, mostly functional
- 5 Channel functioning apparently naturally
- 6 Channel pristine
- 9 Unable to assess channel geometry

GEO3 Soil integrity

- 0 Natural soils eliminated
- 1 Virtually all natural soils eliminated
- 2 Soils thin or eliminated on most of site but a detectable amount remaining
- 3 Soils patchy and compromised, with degraded functionality
- 4 Soils large intact, and only slightly compromised
- 5 Soils apparently natural, with very minor reduction in functionality
- 6 Soils fully natural
- 9 Unable to assess soil integrity

GEO4 Geomorphic diversity

- 0 None; a completely unnatural condition
- 1 Very low geomorphic diversity
- 2 Low geomorphic diversity
- 3 Moderate geomorphic diversity
- 4 Good geomorphic diversity
- 5 Very good geomorphic diversity
- 6 Pristine; fully natural geomorphic diversity
- 9 Unable to assess geomorphic diversity

GEO5 Natural physical disturbance

- 0 Natural disturbance regime obliterated
- 1 Natural disturbance regime virtually eliminated
- 2 Highly altered natural disturbance regime
- 3 Moderately altered natural disturbance regime
- 4 Little altered natural disturbance regime
- 5 Nearly natural disturbance regime
- 6 Natural disturbance regime virtually pristine
- 9 Unable to assess natural disturbance regime

Site _____ Date _____

Habitat

HAB1 Isolation

- 0 <10 m from the nearest springs ecosystem
- 1 10-50 m from the nearest springs ecosystem
- 2 50-100 m from the nearest springs ecosystem
- 3 100-500 m from the nearest springs ecosystem
- 4 500-1000 m from the nearest springs ecosystem
- 5 1-10 km from the nearest springs ecosystem
- 6 >10 km from the nearest springs ecosystem
- 9 Unknown distance to nearest springs ecosystem

HAB2 Habitat patch size

- 0 No springs habitat area
- 1 < 10 sq m habitat area
- 2 10 - 100 sq m habitat area
- 3 100-1000 sq m habitat area
- 4 .1 - 1 hectare habitat area
- 5 1 - 10 hectare habitat area
- 6 >10 hectare habitat area
- 9 Unable to assess habitat area

HAB3 Microhabitat quality

- 0 No microhabitats exist or remain
- 1 Very low microhabitat quality
- 2 Low microhabitat quality
- 3 Moderate microhabitat quality
- 4 Good microhabitat quality with some indication of impairment
- 5 Very good microhabitat quality, but past impairment suspected
- 6 Pristine microhabitat quality
- 9 Unable to assess microhabitat impairment

HAB4 Native plant ecological role

- 0 No native plant species present
- 1 Native species cover and biomass <25% of natural condition
- 2 Native species cover and biomass 25-50% of natural condition
- 3 Native species cover and biomass 50-75% of natural condition
- 4 Native species cover and biomass 75-90% of natural condition
- 5 Native species cover and biomass 90-98% of natural condition
- 6 Native species cover and biomass virtually pristine
- 9 Unable to assess native plant species ecological role

HAB5 Trophic dynamics

- 0 No trophic dynamics occurring
- 1 Trophic dynamics and ecological efficiency scarcely extant (<25%)
- 2 Trophic dynamics and ecological efficiency poor (25-50%)
- 3 Trophic dynamics and ecological efficiency moderate (50-75%)
- 4 Trophic dynamics and ecological efficiency fair (75-90%)
- 5 Trophic dynamics and ecological efficiency good (90-98%)
- 6 Trophic dynamics and ecological efficiency pristine (>98%)

- 9 Unable to assess trophic dynamics and ecological efficiency

Biolota

BIO1a Native plant richness and diversity

- 0 No native plant species remaining
- 1 <25% of expected species remaining
- 2 25-50% of expected species remaining
- 3 50-75% of expected species remaining
- 4 75-90% of expected species remaining
- 5 90-98% of expected species remaining
- 6 >98% of expected species remaining
- 9 Unable to assess native vascular plant richness and diversity

BIO1b Native faunal diversity

- 0 No expected species remaining
- 1 <25% of expected species remaining
- 2 25-50% of expected species remaining
- 3 50-75% of expected species remaining
- 4 75-90% of expected species remaining
- 5 90-98% of expected species remaining
- 6 >98% of expected species remaining
- 9 Unable to assess native faunal diversity

BIO2a Sensitive plant richness

- 0 No sensitive or listed plant species remain
- 1 <25% of expected species remaining
- 2 25-50% of expected species remaining
- 3 50-75% of expected species remaining
- 4 75-90% of expected species remaining
- 5 90-98% of expected species remaining
- 6 >98% of expected species remaining
- 9 Unable to assess native sensitive vascular plant species

BIO2b Sensitive faunal richness

- 0 No sensitive or listed faunal species remain
- 1 <25% of expected species remaining
- 2 25-50% of expected species remaining
- 3 50-75% of expected species remaining
- 4 75-90% of expected species remaining
- 5 90-98% of expected species remaining
- 6 >98 of expected species remaining
- 9 Unable to assess native sensitive faunal species

BIO3a Nonnative plant rarity

- 0 >75% of plant species are non-native
- 1 50-75% of plant species are non-native
- 2 25-50% of plant species are non-native
- 3 10-25% of plant species are non-native
- 4 5-10% of plant species are non-native
- 5 2-5% of plant species are non-native
- 6 <2% of plant species are non-native
- 9 Unable to assess nonnative plant species rarity

BIO3b Nonnative faunal rarity

- 0 >75% of faunal species are non-native
- 1 50-75% of faunal species are non-native
- 2 25-50% of faunal species are non-native
- 3 10-25% of faunal species are non-native
- 4 5-10% of faunal species are non-native
- 5 2-5% of the faunal species are non-native
- 6 <2% of faunal species are non-native
- 9 Unable to assess nonnative faunal species rarity

BIO4a Native plant demography

- 0 No native plant populations remain
- 1 <25% of dominant native plant populations present and self-sustaining
- 2 25-50% of dominant native plant populations present and self-sustaining
- 3 50-75% of dominant native plant populations present and self-sustaining
- 4 75-90% of dominant native plant populations present and self-sustaining
- 5 90-98% of dominant native plant populations present and self-sustaining
- 6 Dominant native plant populations self-sustaining in a natural condition
- 9 Unable to assess native vascular plant population demography

BIO4b Native faunal demography

- 0 No natural faunal populations remain
- 1 <25% of native faunal populations present and self-sustaining
- 2 25-50% of native faunal populations present and self-sustaining
- 3 50-75% of native faunal populations present and self-sustaining
- 4 75-90% of native faunal populations present and self-sustaining
- 5 90-98% of native faunal populations present and self-sustaining
- 6 Native faunal populations self-sustaining in a natural condition
- 9 Unable to assess native faunal population demography

Freedom from Human Influences

FHI1 Surface water quality

- 0 No flow
- 1 Very poor surface water quality
- 2 Poor surface water quality
- 3 Moderate surface water quality
- 4 Good surface water quality
- 5 Very good surface water quality
- 6 Excellent surface water quality
- 9 Unable to assess desired surface water quality

FHI2 Flow regulation

- 0 Flow regulation influences have eliminated or destroyed the springs
- 1 Very extensive flow regulation influences
- 2 Extensive flow regulation influences
- 3 Moderate flow regulation influences
- 4 Limited flow regulation influences
- 5 Very limited flow regulation influences
- 6 No flow regulation effects
- 9 Unable to assess flow regulation influences

FHI3 Road, Trail, and Railroad effects

- 0 Road, trail, or railroad influences have eliminated the springs
- 1 Very extensive road, trail, or railroad influences

- 2 Extensive road, trail, or railroad influences
- 3 Moderate road, trail, or railroad influences
- 4 Limited road, trail, or railroad influences
- 5 Very limited road, trail, or railroad influences
- 6 No road, trail, or railroad influences
- 9 Unable to assess road, trail, or railroad influences

FHI4 Fencing effects

- 0 Negative influences of fencing have eliminated the springs
- 1 Very extensive negative influences of fencing
- 2 Extensive negative influences of fencing
- 3 Moderate negative influences of fencing
- 4 Limited negative influences of fencing
- 5 Very limited negative influences of fencing
- 6 No negative influences of fencing
- 9 Unable to assess influences of fencing

FHI5 Construction effects

- 0 Construction influences eliminated the springs
- 1 Very extensive negative construction influences
- 2 Extensive negative construction influences
- 3 Moderate negative construction influences
- 4 Limited negative construction influences
- 5 Very limited negative construction influences
- 6 No negative construction influences
- 9 Unable to assess construction influences

FHI6 Herbivore effects

- 0 Herbivory influences have eliminated the springs
- 1 Very extensive negative herbivory influences
- 2 Extensive negative herbivory influences
- 3 Moderate negative herbivory influences
- 4 Limited negative herbivory influences
- 5 Very limited negative herbivory influences
- 6 No negative herbivory influences
- 9 Unable to assess herbivory influences

FHI7 Recreational effects

- 0 Recreation influences have eliminated the springs
- 1 Very extensive negative recreational influences
- 2 Extensive negative recreational influences
- 3 Moderate negative recreational influences
- 4 Limited negative recreational influences
- 5 Very limited negative recreational influences
- 6 No negative recreational influences
- 9 Unable to assess recreational influences

FHI8 Adjacent lands condition

- 0 Ecological condition of adjacent landscape has eliminated the springs
- 1 Very extensive negative influences of adjacent landscape
- 2 Extensive negative influences of adjacent landscape
- 3 Moderate negative influences of adjacent landscape
- 4 Limited negative influences of adjacent landscape
- 5 Very limited negative influences of adjacent landscape
- 6 No negative influences of adjacent landscape
- 9 Unable to assess influences of adjacent landscape

Administrative Context

- AC1 Information quality/quantity**
 - 0 No information or map exists
 - 1 Very limited mapping or other information
 - 2 Limited mapping or other information exists
 - 3 A modest amount of credible mapping and other information exists
 - 4 Credible mapping and other scientific information exists
 - 5 A great deal of high quality mapping and other information has been gathered and compiled
 - 6 The springs is used as a research site, with much high quality information available
 - 9 Unable to assess information quantity and quality
- AC2 Indigenous significance**
 - 0 No significance as an indigenous cultural site
 - 1 Virtually no evidence of indigenous cultural features or resources
 - 2 One culturally significant feature or resource
 - 3 Two or more culturally significant features or resources
 - 4 Several culturally significant features or resources
 - 5 Numerous indigenous culturally significant features or resources
 - 6 Cultural significance essential for the well-being of one or more indigenous cultures
 - 9 Unable to assess indigenous cultural significance
- AC3 Historical significance**
 - 0 No historical significance
 - 1 Very little evidence of historically significant elements
 - 2 One historically significant element
 - 3 Two or more historically significant elements
 - 4 Several historically significant elements
 - 5 Numerous historically significant elements
 - 6 Historical significance essential for the well-being of the culture
 - 9 Unable to assess historical significance
- AC4 Recreational significance**
 - 0 Desired effects of recreational use not achieved
 - 1 Very extensive deviation from desired effects of recreational use
 - 2 Extensive deviation from desired effects of recreational use
 - 3 Moderate deviation from desired effects of recreational use
 - 4 Limited deviation from desired effects of recreational use
 - 5 Very limited deviation from desired effects of recreational use
 - 6 No deviation from desired effects of recreational use
 - 9 Unable to assess deviation from desired effects of recreational use

- AC5 Economic value**
 - 0 The springs has no economic value
 - 1 Very limited economic value
 - 2 Limited economic value
 - 3 Modest economic value
 - 4 Considerable economic value
 - 5 High economic value
 - 6 Very high economic value
 - 9 Unable to assess economic value
- AC6 Conformance to mgmt plan**
 - 0 No management plan
 - 1 Minimal management planning
 - 2 Very preliminary management plan
 - 3 Management plan exists, but receives little management attention
 - 4 Management plan given moderate attention
 - 5 Management plan given substantial management & legal consideration
 - 6 Management plan fully implemented and followed
 - 9 Unable to assess conformance to management plan
- AC7 Scientific/educational value**
 - 0 No features of scientific or educational interest
 - 1 One scientifically or educationally important feature
 - 2 Two features of scientific or educational interest
 - 3 Several features of scientific or educational interest
 - 4 4-9 features of scientific or educational interest
 - 5 At least 10 features of scientific or educational interest
 - 6 Numerous features of scientific or educational interest
 - 9 Unable to assess scientific or educational significance
- AC8 Environmental compliance**
 - 0 No socioenvironmental compliance conducted or considered
 - 1 Very little socioenvironmental compliance conducted or considered
 - 2 Little socioenvironmental compliance conducted or considered
 - 3 Preliminary socioenvironmental compliance conducted
 - 4 Socioenvironmental compliance undertaken, not yet completed
 - 5 Socioenvironmental compliance completed, not enacted
 - 6 Environmental compliance, and designation of critical habitat, is complete
 - 9 Unable to assess environmental compliance
- AC9 Legal status**
 - 0 No land, water, or ecosystem legal rights exist or are recognized
 - 1 Rights may exist but have not been adjudicated or enforced
 - 2 Rights exist but application for those rights/ uses are pending; no enforcement
 - 3 Rights exist and applications have been made; limited enforcement
 - 4 Rights applications have been completed; moderately robust enforcement
 - 5 Rights have been established; robust enforcement

Site _____ Date _____

- 6 Rights established and defended; legislative protection; robust enforcement
- 9 Unable to assess legal status

Risk

- 0 No risk to site
- 1 Negligible risk to site
- 2 Low risk to site
- 3 Moderate risk to site
- 4 Serious risk to site
- 5 Very great risk to site
- 6 Extreme risk to site
- 9 Unable to assess risk to site

Site _____ Date _____

Information Source _____ Cultural Radius (meters) _____

Cultural Values

Archaeological Value

- 0 No archaeological evidence present at or near spring
- 1 Almost no evidence of archeological remains near the spring
- 2 Minor evidence of archaeological artifacts near the spring (i.e., ceramics)
- 3 Moderate evidence of archaeological remains near the springs; hunting camp remains, potentially including hearth(s) but no dwellings evident
- 4 Artifacts, petroglyphs, minor ruins, and/or irrigation works are present, demonstrating fairly extensive prehistoric use of the site
- 5 Artifacts, petroglyphs, ruins, and/or water works, and dwelling sites are present, demonstrating extensive prehistoric use
- 6 Artifacts, petroglyphs, remains, and extensive ruins nearby, protected by the tribe due to great archaeological significance
- 9 Unable to assess archaeological value

Petroglyphs
Shrines
Walls
Jewelry
Ceramics
Flakes
Hearths
Ruins
Irrigation
Middens
Agriculture
Human Remains
Historical Archaeology
Other archaeology

Education/Knowledge Value

- 0 No knowledge of the site recorded in tribal history or academic records, and no information reasonably expected to exist
- 1 Knowledge of site expected to exist, but not available, no longer taught
- 2 Knowledge of site is documented but is minimal and not used in education or research
- 3 Moderate knowledge of site exists; is used to a moderate extent in education and/or as a research site
- 4 Fairly significant education and/or research significance
- 5 Very good educational and/or research significance, providing trans-generational knowledge
- 6 Outstanding educational and/or research significance; trans-generation knowledge; great concern about protecting site for educational purposes
- 9 Unable to assess educational or research significance

Youth education
Elder knowledge
Trans-generational
Culturally-specific
Academic research
Academic education
Non-academic education
Other knowledge

Ethnoecology

- 0 No record or presence of plant and/or animal species used for food, utilitarian, food, medicinal, ceremonial, or other purposes

- 1 Former presence of ethnobiological resources, but no longer present, or very few ethnobiological resources
- 2 Only 1 ethnobiologically important species present, or only a few species that can readily be obtained elsewhere
- 3 Several ethnobiologically important species present, although they can be found elsewhere
- 4 Several ethnobiologically important species present, of which at least one is difficult to acquire elsewhere
- 5 Numerous ethnobiologically important species present, with one or more being unique to the site
- 6 Many ethnobiologically important species present, including many that cannot be found elsewhere
- 9 Unable to assess ethnobiologically important species

Plants

Used for food
Firewood, constr, etc.
Medicinal purposes
Ceremonial purposes
Extirpated species
Endangered species
Restoration potential
Multiple use/other

Animals

Used for food
Utility animals
Medicinal purposes
Ceremonial purposes
Extirpated species
Endangered species
Restoration potential
Multiple use/other

Ethnogeological processes

Dyes
Paints
Ceramics

Tribal/Band Historical Significance

- 0 History of the site has been lost and is not taught in neither academic nor non-academic settings

- 1 History of the site is very limited and poorly available
- 2 History of the site is limited, primarily available in unpublished reports (i.e., water resources, cultural preservation office, etc.)
- 3 History of the site is moderately available and not well known
- 4 Site history information availability is good and relatively widely known
- 5 Site history information availability is very good and quite widely known in both academic and non-academic settings
- 6 Site history information is excellent, and is taught by the elders to other tribal members in both academic and non-academic settings
- 9 Unable to assess tribal history of the site

Spring on Historic Route

Site Sacredness

- 0 No record of historical or contemporary site sacredness; no possibility of the site being sacred
- 1 Site sacredness is very minor; sacredness possible but not specifically recognized
- 2 Site sacredness is recognized, but has no specific sacred role or function
- 3 Site sacredness is moderate, related to one specific role or function
- 4 Site sacredness is fairly high, related to two specific roles or functions
- 5 Site is highly sacred, related to several specific roles or functions
- 6 Site is very highly sacred, related to many specific roles or functions
- 9 Unable to assess sacredness of site
 - Sacredness of water
 - Sacredness of traditional foods
 - Sacredness of materials
 - Sacredness of medicines
 - Sacredness of ceremonial substances
 - Sacredness of archaeological remains
 - Sacredness of stories
 - Spirits or divine beings
 - Passage point to/from other worlds
 - Significance in afterlife
 - Site is sacred
 - Site is sacred for its pristine character
 - Site important as route or waypoint

**National Registry of Historic Places
NRHP Condition**

- 0 Site has no potential for listing with the Tribe(s) or non-tribal agencies
- 1 Site has not been recognized by Tribe(s) as having potential

- for NRHP status, or has been recognized as having very little potential
- 2 Site has been recognized by the Tribe(s) and/or non-Tribal agencies as having low potential for NRHP status
- 3 Site has been recognized by the Tribe(s) and/or non-Tribal agencies as having moderate potential for NRHP status, but not formally proposed
- 4 Site is recognized and listed with the Tribe(s), and NRHP status has been proposed
- 5 Site is recognized and listed with the Tribe(s), and NRHP status is anticipated and pending
- 6 NRHP status has been fully completed with both the Tribe(s) and the federal government
- 9 Unable to assess NRHP potential

Application Status

- 0 No culturally significant properties exist
- 1 NRHP status application completed
- 2 NRHP application submitted
- 3 NRHP status pending acceptance of application
- 4 NRHP status approved, but process not complete
- 5 NRHP status approved
- 6 NRHP status established
- 9 Unable to assess NRHP process

Recognized by Tribe as worthy of listing
 Recognized by agencies as worthy of listing
 Application submitted and refused

Economic Value

- 0 No economic use or sale of springs resources
- 1 Very little economic value OR formerly of very limited economic value, but no longer used for agriculture, recreation, or ethnobiological economics
- 2 Low economic value; use or sale of springs resources depends on erratic availability of resources, weather conditions, etc
- 3 Moderate economic use(s) or value of springs resources, primarily for single family subsistence; limited financial benefits to larger community
- 4 Good economic uses and sale of springs agricultural, recreation, and/or ethnobiological resources to the Tribe and/or external communities
- 5 Very good economic uses and sale of springs' agricultural, recreation, and/or ethnobiological resources to the Tribe and/or external communities
- 6 Tribe receives excellent financial benefits from the use(s) and sale of springs agricultural, recreation, non-use, and/or ethnobiological resources
- 9 Unable to assess economic value to the Tribe and/or external communities

Single family use/sales
 Communal use/sales
 Tribal use/sales
 Livestock support
 Potable water
 Irrigation water

- Mineral extraction
- Mining permits
- Electrical power
- Recreational visitation
- Non-agricultural plants
- Non-agricultural animals
- Aquatic agric. plants
- Wetland agric. plants
- Nonhunted ethnofaunal
- Native fish
- Farmed fish
- Fishing permits
- Wildlife
- Hunting licenses
- Real estate
- Non-use values
- Other economic values

- 6 Extensive use—8 or more uses and non-use value
- 9 Unable to assess tribal use or non-use value

- Tribal water use
- External water use
- Irrigation use
- Agricultural use
- Ceremonial use
- Fishing use
- Hunting use
- Gathering use
- Educational use
- Mineral extraction
- Fuel use
- Energy use
- Aesthetic use
- Recreational use
- Guiding visitation use
- Route in use

Tribal Legal Significance

- 0 No legal interest or consideration of the site's resources
- 1 Little to no legal status; very little outside interest
- 2 Very low legal status; little outside interest
- 3 Moderate legal significance – some outside interest
- 4 Legal status is fairly well established, and the site is fairly well protected
- 5 Site legal status is clearly established, and may apply to more than one Tribe
- 6 Site legal status very clearly established; legal standing is an important precedent
- 9 Unable to assess legal status

- Tribal—individual
- Tribal-clan
- Tribal
- Tribal—multicultural
- State
- Federal
- Agency
- Other

Tribal Contemporary Use

- o Tribal use or non-use value
- 1 No direct use but may have potential or non-use value
- 2 One minor use and may have potential non-use value
- 3 Slight use—2 uses plus some non-use value
- 4 Moderate use—3-5 uses plus some non-use value
- 5 Much use—5-7 uses plus some non-use value