



**Bio-Physical Resources of Concern
Associated
with
Proposed Ground Water-Withdrawal**

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Introduction

This report is in response to proposed groundwater pumping in Spring Valley to the west of Great Basin National Park (GRBA) and Snake Valley to the east of GRBA. The NPS contracted with the U.S. Geological Survey (USGS) in 2002, to research and prepare a report on the susceptibility of GRBA and surrounding valleys to the effects of ground water pumping. This Scientific Investigations Report # 2006-5009 titled “*Characterization of Surface-Water Resources in the Great Basin National Park Area and Their Susceptibility to Ground-Water Withdrawals in Adjacent Valleys, White Pine County, Nevada*” disclosed those areas within GRBA that are likely or potentially susceptible to effects from ground water withdrawal. This report lists and describes those bio-physical resources of concern by watershed within those areas mapped by the USGS as likely or potentially susceptible to effects from ground water withdrawal.

The USGS report disclosed that there are no areas of NPS administered lands on the west side of GRBA susceptible to direct effects of ground water pumping in Spring Valley. Areas of susceptibility with anticipated direct effects on the east side of GRBA from pumping in Snake Valley would cover 6,040 acres containing National Park Service resources. In summary, these resources include: four stream systems totaling 9.25 miles; 18 separate wetlands totaling 137 acres; 25 or more perennial springs; 156 acres of riparian habitat; and, 23 cave systems including Lehman Caves. Figure 1 below shows the USGS areas of likely and potential susceptibility.



WEST SIDE BIO-PHYSICAL RESOURCES

The USGS report disclosed that there are no areas of NPS administered lands on the west side of GRBA susceptible to direct effects of groundwater pumping in Spring Valley. An area of likely susceptible to effects is adjacent to the park boundary in the Pine/Ridge watershed. Included here are those bio-physical resources within 1/4 mile of the USGS mapped area.

PINE/RIDGE WATERSHED

The Pine Ridge watershed of Great Basin National Park (GRBA) is located on the west side of the South Snake Range and includes 1,714 acres NPS administered lands. There are 13 known springs, three saturated wetlands and two streams within the park boundary. The two streams are connected via an irrigation ditch outside the park. The USGS identified 0 acres within GRBA as likely susceptible to effects from groundwater withdrawal. Five springs are within less than a quarter mile of the likely susceptible area and two stream systems flow into the likely susceptible area. These springs and streams and their associated resources are included due to the adjacent likely susceptible designated area. See figure 2.

Stream Resources

The length of Ridge Creek within GRBA is 935 ft. After leaving National Park Service (NPS) lands it flows additional 0.8 mile across Forest Service lands before being diverted into Pine Creek. Ridge Creek has a total length of 1.0 mile. Discharge measurements taken on Aug 29 2002 found 1.0 cfs on Ridge Creek.

Pine Creek flows for 0.8 mile within GRBA and 0.8 mile across Forest Service lands where it too is diverted into an irrigation ditch. Discharge measurements taken on Aug 29 2002 found 0.7 cfs on Pine Creek.

The merged streams, called collectively as Pine Creek ditch, flow for 0.6 mile before entering a 2.8 mile long pipeline taking the water to the fields below

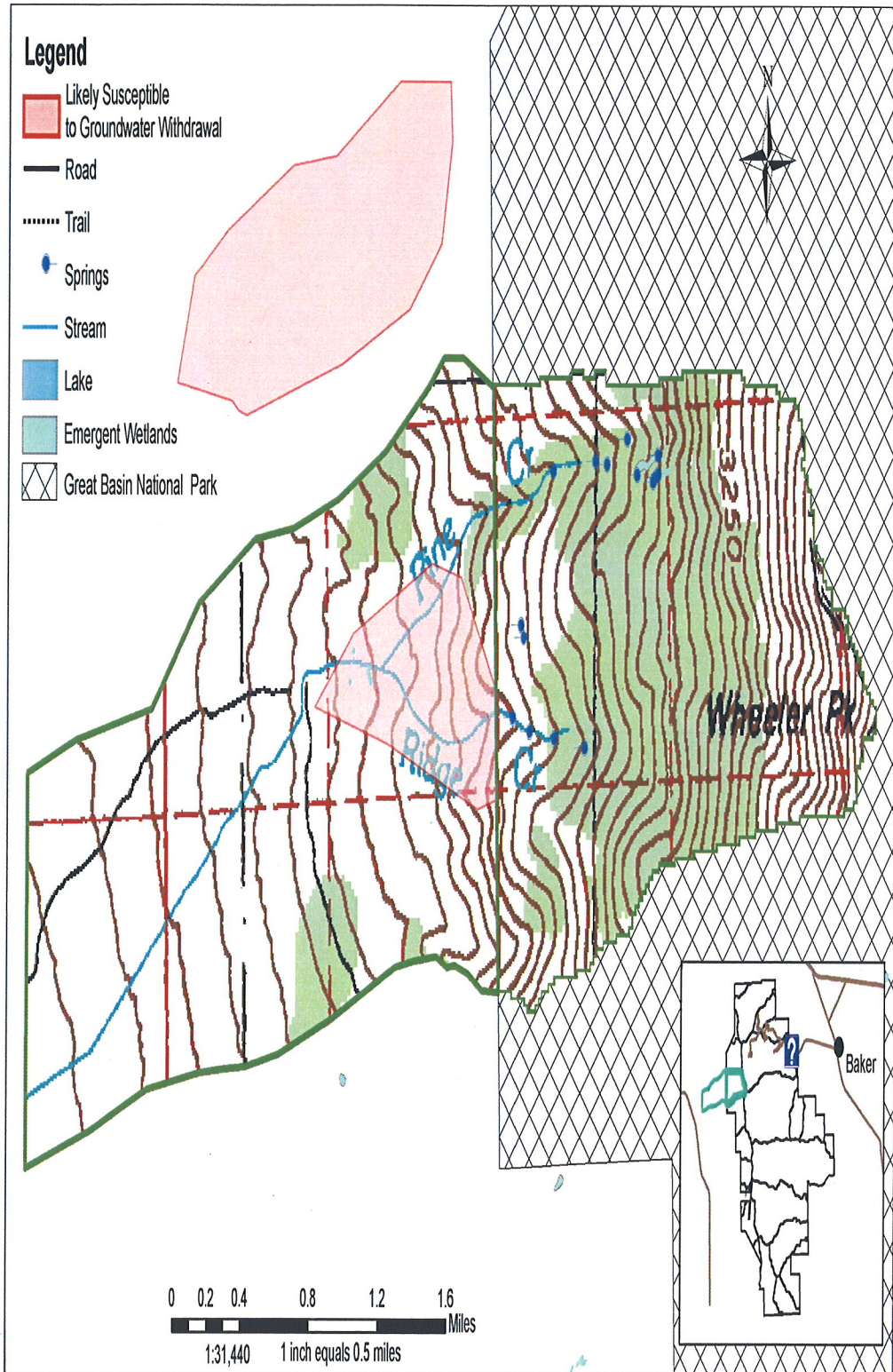
Vegetation Resources (Riparian)

Riparian vegetation along both Pine and Ridge Creeks within GRBA consists of ponderosa pine/mixed conifer, aspens, wood rose and water birch along the higher elevations and Ponderosa pine, aspens, willows, and water birch along the lower elevations.

Below the boundary of GRBA and within the likely susceptible area, there are 0.8 mile of Ponderosa pine, aspens, and willow habitats on Forest Service lands along Pine Creek and 0.8 mile of the same riparian habitats on Forest Service lands along Ridge Creek.

Below the irrigation ditch point of diversion on Pine Creek, 0.6 mile or 21 percent of the total ponderosa pine/riparian habitats have been lost due to water diversions for irrigation. Below the irrigation ditch point of diversion on Ridge Creek enough seepage occurs to maintain riparian vegetation. This is complemented by three springs along the 0.6 mile reach before all water subs into the alluvium. These springs and the 0.6 mile reach of the historic Ridge Creek channel are all within the USGS area of likely susceptible.

Figure 2 - Pine Ridge Watershed



Fish Resources - Genetically pure Western Bonneville Cutthroat trout (BCT) occupy both Pine and Ridge creeks. The BCT in these systems are considered conservation populations and have been used to restore this species to streams on the east side of the park (NPS 2000). Prior to the introduction of BCT, these stream systems were fishless. Nevada Division of Wildlife (NDOW) conducted surveys at four sites on Humboldt-Toiyabe National Forest lands. Using the program Microfish, NDOW estimates 827 fish per mile.

Stream Macro Invertebrates Resources - Macroinvertebrate surveys were conducted by personnel from the National Aquatic Monitoring Center at Utah State University (BugLab). Samples from within the area likely to be susceptible to groundwater withdrawal had the greatest abundance of macroinvertebrates overall and within the important Ephemeroptera, Plecoptera, Trichoptera (EPT) group. Table 1 displays the results of this analysis.

Table 1. Pine Creek Macro Invertebrates Resource

Sample Date	Station	Habitat	Area	Abundance	EPTA	EPTT	Richness	Families
08/89	GBNP-23	Riffle	0.744	1082	537	13	27	17
08/89	GBNP-23	Multiple	Qualitative	34	31	10	13	10
08/89	GBNP-23	Riffle	0.744	2102	531	14	23	16
08/89	GBNP-23	Multiple	Qualitative	66	48	10	18	13

Spring Resources - From 2002 through 2004, GRBA conducted an in-depth baseline spring surveys covering the entire park. All springs data are from this inventory and are found in NPS 2006 Final Report - Springs of Great Basin National Park. Fifteen springs occur in the Pine and Ridge Creek watersheds. Five of these 15 springs are less than a quarter mile from the USGS designated area as likely susceptible to impacts from ground water withdrawal. They have been included for validation purposes due to possible effects based upon close proximity to the likely zone.

PIRI_006

UTMs: 729302, 4318589 **Visited:** 7/28/04

Elevation: 2,510 m

Springhead Size: Single spring 1.0 m x 1.0 m

Spring Tail: 350 m

Ecological Site: Aspen/Mixed conifer

Aquatic Biota: No mollusks present.

Discharge: 0.01 cfs

Ave. Depth: 10.0 cm

Water Quality: Temp: 5.7°C, DO: 6.4 mg/L,

SPCO: 43.6 uS/cm, pH: 9.1.



PIRI_008

UTMs: 729143, 4318648 **Visited:** 7/28/04
Elevation: 2,492 m
Springhead Size: Single spring 1.0 m x 1.3 m
Spring Tail: >150 m
Ecological Site: Aspen/Mixed conifer
Aquatic Biota: No mollusks present.
Discharge: 0.1 cfs
Ave. Depth: 15.0 cm
Water Quality: Temp: 6.2°C, DO: 7.2 mg/L
SPCO: 34.8 uS/cm, pH: 10.2.



PIRI_010

UTMs: 729216, 4319043 **Visited:** 7/29/04
Elevation: 2,555 m
Springhead Size: Complex 0.5 m x 0.3 m
Spring Tail: >200 m
Ecological Site: Aspen
Aquatic Biota: No mollusks present.
Discharge: 0.01 cfs
Ave. Depth: 1.0 cm
Water Quality: Temp: 10.9°C, DO: 8.0 mg/L
SPCO: 81.1 uS/cm, pH: 7.9.



PIRI_011

UTMs: 729244, 4318992 **Visited:** 7/29/04
Elevation: 2,564 m
Springhead Size: Single spring 0.25 m x 0.3 m
Spring Tail: 30 m
Ecological Site: Aspen
Aquatic Biota: No mollusks present.
Discharge: 0.01 cfs
Ave. Depth: 1.0 cm
Water Quality: Temp: 8.8°C, DO: 7.5 mg/L
SPCO: 92.2 uS/cm, pH: 7.4.



PIRI_015

Name: PIRI_015 **Visited:** 7/29/04
UTMs: 729515, 4319705
Elevation: 2,571 m
Springhead Size: Single spring 2.5 m x 1.3 m
Spring Tail: 130 m
Ecological Site: Aspen/Wet meadow
Aquatic Biota: No mollusks present.
Discharge: 0.01 cfs
Ave. Depth: 3.0 cm
Water Quality: Temp: 6.7°C, DO: 6.7 mg/L
LSPCO: 102 uS/cm, pH: 7.5.



NPS Sensitive Wildlife Resources

Based upon vegetative communities, the following are those NPS Sensitive species thought to occur or whose presence has been confirmed or are thought to occur due to suitable habitats in the Pine and Ridge Creek watersheds.

Mammals

Merriam's shrew (*Sorex merriami*)

Presence unconfirmed in park but suitable habitat exists. Listed on the watch list by the Nevada Natural Heritage Program. Prefers sage steppe habitat. Threatened due to conversion of sage steppe habitat by piñon and juniper. Relevant vouchers: Rickart and Robson (2005)

Water Shrew (*Sorex palustris*)

Confirmed in park. Dependent upon riparian habitat and aquatic ecosystems. Subject to extirpation by water loss and non-native trout. Relevant voucher specimens: Hall (1946); McDonald and Brown (1992); Rickart and Robson (2005)

Pallid bat (*Antrozous pallidus*)

Presence confirmed in park. Listed on the watch list by the Nevada Natural Heritage Program. Primary habitats include piñon/juniper, sagebrush, and salt desert scrub. Foraging habitats associated with springs. Roosts in caves and mines. Primary threats include loss of foraging habitats (springs), and encroachment of sage steppe habitat by piñon and juniper. Relevant vouchers: Ports and Bradley (1996), Baldino (1998b), Bradley et al. (2005), Rickart and Robson (2005).

Spotted Bat (*Euderma maculatum*)

Anecdotal report from park. Suitable habitat is present. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Utilizes a variety of habitats but limestone cliffs, canyon walls, and caves are critical roosting habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Soulages (1966), Bradley et al. (2005), Rickart and Robson (2005).

Fringed Myotis (*Myotis thysanodes*)

Unconfirmed in park. Suitable habitat is present. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Occurs in woodlands and sage steppe habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Bradley et al. (2005), Rickart and Robson (2005).

Long-Legged Myotis (*Myotis volans*)

Presence confirmed in park. Listed on the watch list by the Nevada Natural Heritage Program. Habitats include piñon juniper and coniferous forests. Roosts are in hollow trees, rock crevices, and caves. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Hall (1946), Baldino (1998b), Bradley et al. (2005), Rickart and Robson (2005).

Silver-Haired Bat (*Lasionycteris noctivagans*)

Confirmed in park. On the Nevada Natural Heritage watch list Program. Occupies woodland and riparian habitats. Foraging habitats associated with springs and streams. Primary threats include loss of foraging habitats (springs and streams) and riparian vegetation. Relevant voucher: Soulages (1966), Baldino (1998a, 1998b), Bradley et al. (2005), Rickart and Robson (2005).

Townsend's Big-Eared Bat (*Corynorhinus townsendii*)

Presence confirmed in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Utilizes piñon juniper and sage steppe habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Hall(1946), Soulages (1966), Baldino (1998a, 1998b), Bradley et al. (2005), Rickart and Robson (2005).

Hoary bat (*Lasiurus cinereus*)

Undocumented in park, but suitable habitat exists. Documented at Shoshone Ponds, Spring Valley. Its habitat includes forested uplands and riparian areas. Foraging habitats associated with open water. Primary threats include loss of foraging habitats (open water, springs and streams) and riparian vegetation. Relevant vouchers: Baldino (1998b), Bradley et al. (2005), Rickart and Robson (2005).

Ringtail (*Bassaricus astutus*)

Presence confirmed in park. Within park, species is approaching the northern limits of range within Great Basin physiographic region. Utilizes a variety of woodland and forested habitats associated with stream and springs. Relevant vouchers: Rickart and Robson (2005).

Long-tailed weasel (*Mustela frenata*)

Presence confirmed in park. Broad habitat and elevation range. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. Several historic park records. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Striped skunk (*Mephitis mephitis*)

Presence confirmed in park. Wide habitat and elevation range. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. No historic records but several recent sightings. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Spotted skunk (*Spilogale putorius*)

Presence documented in park in 2005. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Sagebrush Vole (*Lemmiscus curtatus*)

Undocumented in park but suitable habitat exists. Shrub steppe obligate imperiled due to loss of sage steppe habitat due to encroachment by piñon, juniper, mountain mahogany and white fir. Occurs over a wide elevational gradient. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Pygmy Rabbit (*Brachylagus idahoensis*)

Presence confirmed in park. Locally rare native species; protected under Nevada state law; and state listed as at-risk of extinction by Nevada Natural Heritage Program. Habitat is mature sagebrush. Loss of habitat from piñon juniper encroachment largest threat. Relevant vouchers: Hall (1946); Rickart and Robson (2005); John Hines (pers. comm.), Eveline Sequine (pers. comm.)

Birds

Northern Goshawk (*Accipiter gentilis*)

Presence confirmed in park. White Pine County Sensitive Species. Listed as species of concern by FWS, BLM, and USFS. Preferred nesting habitat is aspens and forested riparian areas. Inventories on-going. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Swainson's Hawk (*Buteo swainsoni*)

Presence confirmed in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Ferruginous Hawk (*Buteo regalis*)

Present in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Petitioned for listing under ESA in 1991, but precluded. Shrub and grass habitat and prey species may be in decline. Inventories needed. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Short-eared Owl (*Asio flammeus*)

Probably present in park. White Pine County Watch List, BLM special status species. Audubon Watchlist. Primary threats include loss of streamside riparian vegetation and wetland habitat loss. Relevant vouchers: Hartley and Gubanich (2004).

Flammulated Owl (*Otus flammeolus*)

Present in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Loss or degradation of Ponderosa pine woodlands and Ponderosa pine/riparian areas is the cause of downward trending populations. Pine and Ridge creeks contain suitable habitat with is declining due to stream diversions and fire suppression. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Lewis's Woodpecker (*Melanerpes lewis*)

Presence confirmed in park. White Pine County Watch list, BLM special status species. Audubon's Watchlist. Populations declining due to loss of ponderosa pine, riparian ponderosa pine and riparian cottonwood/aspen habitats. Pine, Ridge, Shingle and Williams creeks all contain suitable habitat with is either declining due to stream diversions and/or fire suppression. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Brewer's Sparrow (*Spizella breweri*)

Presence confirmed in park Audubon Watchlist. Population declining since the 1960's, with larger declines since the 1980's due to loss of sagebrush habitat. Relevant vouchers: Hartley and Gubanich (2004)

Yellow Warbler (*Dendroica petechia*)

Presence confirmed in park. White Pine County Watch list, proposed BLM special status species. Good indicator species for riparian thicket health. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

MacGillivray's Warbler (*Oporornis tolmiei*)

Presence confirmed in park. White Pine County Watch list, proposed BLM special status species. Good indicator species for riparian habitat health. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Reptiles and Amphibians

Ringneck snake (*Diadophis punctatus*)

Undocumented in park but suitable habitat exists. Historic records from outside park. Highly secretive and patchily distributed in the Great Basin. Relevant vouchers: Lindsdale (1940), Setser et al. (2002), Hamilton (2003b), Stebbins (2003); Bosworth et al. (2004).

Sonoran Mountain kingsnake (*Lampropeltis pyromelana*)

Presence confirmed in park in 2006 on Spring Valley side. Imperiled due to encroachment of or loss of preferred sage steppe and ponderosa pine habitats. Relevant vouchers: Lindsdale (1940), Setser et al. (2002), Hamilton (2003b), Stebbins (2003), Hubbs (2004).

Fish

Bonneville Cutthroat Trout (*Oncorhynchus clarki utah*)

Presence confirmed in park. Locally rare native species; species is endemic to the park or local vicinity; Region 4 USDA Forest Service Sensitive species; US Fish and Wildlife Service Sensitive species; protected under Nevada State Law; and listed as critically imperiled by the Nature Conservancy Nevada Natural Heritage Program. Extirpated from most of park. Reintroduced to park starting in 2000. Currently GRBA has 5 populations in 18 miles of streams.

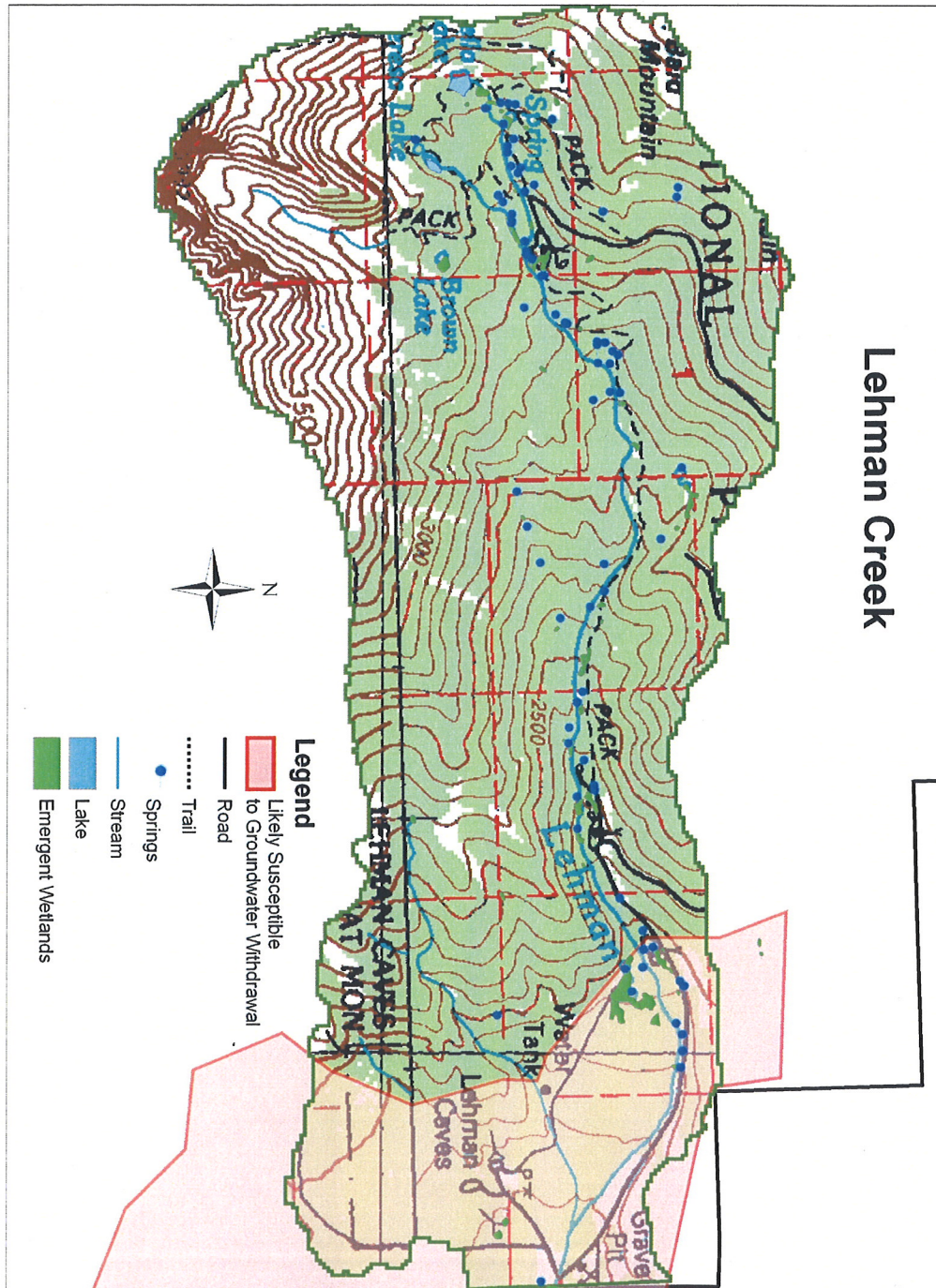
EAST SIDE BIO-PHYSICAL RESOURCES

USGS designated areas of likely and potentially susceptibility on the east side of GRBA from groundwater pumping in both Spring Valley and Snake Valley covers 5,913 acres containing NPS bio-physical resources. These acres are within 4 watersheds. In summary, bio-physical resources include: four stream systems totaling 9.25 miles; 18 separate wetlands totaling 137 acres; 25 or more perennial springs; 156 acres of riparian habitat; and, 23 cave systems including Lehman Caves.

LEHMAN CREEK WATERSHED

The Lehman Creek watershed includes 8,224 acres. Of this, 1349 acres are within the USGS designated area of likely susceptible to impacts from groundwater withdrawal. See Figure 3.

Figure 3. - Lehman Creek Watershed.



Stream Resources

Lehman Creek is the second largest creek in the park and flows for 6.5 mi before reaching the boundary at 6,550 ft. It is the most visible creek in the park, with three campgrounds; 3.2 miles of hiking trail; and outstanding recreational fishing opportunities. Approximately 2.25 miles are within the area classified by the USGS as likely susceptible to impact from ground water withdrawal.

Water Quantity - A USGS stream gaging station is installed on Lower Lehman Creek approximately 0.6 mi above the park boundary. The station is identified as 10243260 LEHMAN CREEK NEAR BAKER, NV. The period of record is December 1947 to September 1955, October 1992 to September 1997, July 2002 to current year. Average annual discharge is 5.3 cfs. Of the complete years of record, 1953 had the smallest mean discharge, 2.23 cfs, and 1995 and 1952 had the largest mean discharge, 11.2 cfs and 9.26 cfs, respectively.

Water Quality - Water quality for Lehman Creek is divided into three sections: from the park boundary to Upper Lehman Campground is considered Lower Lehman Creek and the area determined likely susceptible to ground water withdrawal. Table 2 gives the means water quality attributes and number of samples.

**Table 2. Means Water Quality Parameter
for Lower Lehman Creek**

Mean Water Temp. (Deg. C)	Mean Dissolved Oxygen (mg/L)	Mean Specific Conductance (uS/cm)	Mean pH
8.8	9.0	52.6	7.1
53 samples	26 samples	56 samples	44 samples

Fish Resources - Fishing is an important recreational activity along Lehman Creek. The last fish population survey was completed in 2003. All fish within the Lehman Creek watershed are nonnative salmonids. The survey was conducted at the Lower Lehman campground on August 1, 2003. A 109 yard three pass survey was used with a Smith-Root electrofisher. A total of 157 fish were contacted, with 49 rainbow, 52 brook trout, and 17 brown trout. The population estimate was 2,527 trout/mile.

Angler Use - Using the 10 percent Angler Questionnaire, NDOW estimates that during the ten year period of 1977-1986, angler use averaged 1922 days per year.

Macroinvertebrate Resources - Macroinvertebrate surveys were conducted by personnel from the National Aquatic Monitoring Center at Utah State University. Samples from within the area likely to be susceptible to groundwater withdrawal had the greatest abundance of macroinvertebrates overall and within the important Ephemeroptera, Plecoptera, Trichoptera (EPT) group. Table 3 shows the result of this analysis.

Table 3. - Macro Invertebrate Results From Lower Lehman

Sample Date	Station - Lower Lehman	Habitat	Area	Abundance	EPTA	EPTT	Richness	Families
10/97	GBNP-08	Multiple	Qualitative	130	109	14	22	16
10/97	GBNP-08	Riffle	0.993	7713	5894	18	37	23
05/98	GBNP-08	Riffle	0.744	5487	4447	15	30	19
05/98	GBNP-08	Multiple	Qualitative	107	97	15	24	14

Vegetation Resources

Riparian - Lower Lehman Creek riparian vegetation is dominated by ponderosa pine, aspen, narrowleaf cottonwood, willows, sagebrush, rabbitbrush, skunkbrush, wood rose, and a variety of native forbs and grasses. A total of 54 acres of riparian vegetation are within the likely susceptible to ground water withdrawal USGS delineated area.

Wetlands - There are 8 saturated emergent wetland complexes within the likely susceptible to groundwater withdrawal USGS delineated area constitute 119 acres.

Upland - There are 875 acres of mountain sage/shrub steppe; 203 acres of pinyon-juniper woodlands; and, 152 acres of black sage/shrub steppe within the likely susceptible to ground water withdrawal USGS delineated area.

Spring Resources

All springs data are from the 2003 inventory and contained in NPS 2006 Final Report - Springs of Great Basin National Park. A 2003 survey found 77 springs, within the watershed. Thirteen springs are within the USGS designated area of likely susceptible to impacts from ground water withdrawal.

LEHM_001

UTMs: 741805, 4321553 **Visited:** 5/08/03

Elevation: 1,994 m

Spring Head Size: Spring complex 1m x 1m heads

Spring Tail: 60 m

Ecological Site: Sage Steppe

Aquatic Biota: No mollusks present

Discharge: 0.03 cfs

Ave. Depth: 4.0 cm

Temp: 8.5°C

Water Quality: DO: 7.2 mg/L, SPCO: 173 uS/cm, pH: 7.6,



LEHM_001

UTMs: 741805, 4321553 **Visited:** 5/08/03
Elevation: 1,994 m
Spring Head Size: Spring complex 1m x 1m heads
Spring Tail: 60 m
Ecological Site: Sage Steppe
Aquatic Biota: No mollusks present
Discharge: 0.03 cfs
Ave. Depth: 4.0 cm
Temp: 8.5°C
Water Quality: DO: 7.2 mg/L, SPCO: 173 uS/cm, pH: 7.6,



LEHM_003

UTMs: 739392, 4322528 **Visited:** 5/19/03
Elevation: 2,212 m
Spring Head Size: Single spring, 3.5 x 3.5 m
Spring Tail: 420 m
Ecological Site: Sage Steppe/ wet meadow
Aquatic Biota: No mollusks present
Discharge: 0.002 cfs
Ave depth: 0.5 cm
Temp: 11.1°C
Water Quality: DO: 5.1 mg/L, SPCO: 242 uS/cm, pH:7.4



LEHM_004

UTMs: 739428, 4322562 **Visited:** 5/19/03
Elevation: 2,300 m
Spring Head Size: Spring complex, 1.1 x 0.9 m
Spring Tail: 33 m
Ecological Site: wet meadow complex
Aquatic Biota: No mollusks present
Discharge: <0.1 cfs
Ave depth: 0.5 cm
Temp: 10.9°C
Water Quality: DO: 6.6 mg/L, SPCO: 110 uS/cm, pH: 7.3.



LEHM_005

UTMs: 739283, 4322240 **Visited:** 5/19/03
Elevation: 2,223 m
Spring Head Size: Single spring, 0.3 x 0.2 m
Spring Tail: 12 m
Ecological Site: wet meadow complex
Aquatic Biota: No mollusks present
Discharge: 0.006 cfs
Ave depth: 4.0 cm
Temp: 7.7°C
Water Quality: DO: 4.2 mg/L SPCO: 104 uS/cm, pH: 6.6.



LEHM_006

UTMs: 739811, 4322545 **Visited:** 5/20/03
Elevation: 2,164 m
Spring Head Size: Spring complex 0.2 x 0.2 m
Spring Tail: 20 m
Ecological Site: Aspen
Aquatic Biota: No mollusks present
Discharge: 0.003 cfs
Ave. Depth: 3.0 m
Temp: 6.0°C
Water Quality: DO: 6.9 mg/L, SPCO: 58 uS/cm,
pH: 6.8.



LEHM_007

UTMs: 740072, 4322532 **Visited:** 5/20/03
Elevation: 2,146 m
Spring Head Size: Single Spring, 0.8 x 0.6 m
Spring Tail: 8 m
Ecological Site: Mixed Conifer/Aspen
Aquatic Biota: No mollusks present
Discharge: <0.1 cfs
Ave. Depth: 1.0 cm
Temp: 14.3°C
Water Quality: DO: 8.1 mg/L, SPCO: 220 uS/cm,
pH: 6.4.



LEHM_008

UTMs: 739141, 4322245 **Visited:** 5/21/03
Elevation: 2,214 m
Spring Head Size: Single spring, 2.6 x 7.6 m
Spring Tail: 3 m
Ecological Site: Wet Meadow Complex/Willows
Aquatic Biota: No mollusks present
Discharge: 0.001 cfs
Ave. Depth: 0.5 cm
Temp: 9.7°C
Water Quality: DO: n/d , SPCO: 76.1 uS/cm,
pH: 6.7.



LEHM_009

UTMs: 739941, 4322547 **Visited:** 5/20/03
Elevation: 2,151 m
Spring Head Size: Single spring, n/d
Spring Tail: 50 m
Ecological Site: Pinyon -Juniper woodlands
Aquatic Biota: No mollusks present
Discharge: <0.1 cfs
Ave. Depth: 1.5 cm
Temp: 13.4°C
Water Quality: DO: n/d , SPCO: 121 uS/cm,
pH: 6.4,



LEHM_011

UTMs: 739725, 4322501 **Visited:** 5/21/03
Elevation: 2,214 m
Spring Head Size: Single spring, 7 x 5.2 m
Spring Tail: 70 m
Ecological Site: Wet Meadow complex
Aquatic Biota: No mollusks present
Discharge: 0.002 cfs
Ave. Depth: 1.5 cm
Temp: 10.8°C
Water Quality: DO: 5.4 mg/L, SPCO: 79.5 uS/cm, pH: 6.4.



LEHM_013

UTMs: 739121, 4322317 **Visited:** 5/27/03
Elevation: 2,087 m
Spring Head Size: Single spring, 3.8 x 2.8 m
Spring Tail: 7 m
Ecological Site: Wet Meadow/Aspen/conifer
Aquatic Biota: No mollusks present
Discharge: <0.001 cfs
Ave. Depth: 1.3 cm
Temp: 11.7°C
Water Quality: DO: 3.6 mg/L, SPCO: 96.4 uS/cm, pH: 6.5.



LEHM_067

UTMs: 739296, 4322106 **Visited:** 7/23/03
Elevation: 2,222 m
Spring Head Size: Spring complex, 10 x 5 m
Spring Tail: 20 m
Ecological Site: Wet Meadow complex
Aquatic Biota: Pea clams and snails
No Spring snails
Discharge: 0.035 cfs
Ave. Depth: 4.0 cm
Temp: 15.1°C
Water Quality: DO: 5.7 mg/L, SPCO: 116 uS/cm, pH: n/d.



LEHM_087

UTMs: 739472, 4322155 **Visited:** 10/04/04
Elevation: 2,185 m
Spring Head Size: Single spring,
Spring Tail: 8 m
Ecological Site: Sagebrush steppe
Aquatic Biota: No mollusks present
Discharge: <0.001 cfs
Ave. Depth: 0.2 cm
Temp: 9.5°C
Water Quality: DO: n/a, SPCO: 131.9 uS/cm, pH: 6.7.



NPS Sensitive Wildlife Resources

Based upon vegetative communities, the following are those NPS Sensitive species thought to occur or whose presence has been confirmed within suitable habitats in the Lehman Creek watersheds.

Mammals

Merriam's shrew (*Sorex merriami*)

Presence unconfirmed in park but suitable habitat exists. Listed on the watch list by the Nevada Natural Heritage Program. Prefers sage steppe habitat. Threatened due to conversion of sage steppe habitat by piñon and juniper. Relevant vouchers: Rickart and Robson (2005)

Water Shrew (*Sorex palustris*)

Confirmed in park. Dependent upon riparian habitat and aquatic ecosystems. Subject to extirpation by water loss and non-native trout. Relevant vouchers: Hall (1946); McDonald and Brown (1992); Rickart and Robson (2005)

Pallid bat (*Antrozous pallidus*)

Presence confirmed in park. Listed on the watch list by the Nevada Natural Heritage Program. Primary habitats include piñon/juniper, sagebrush, and salt desert scrub. Foraging habitats associated with springs. Roosts in caves and mines. Primary threats include loss of foraging habitats (springs), and encroachment of sage steppe habitat by piñon and juniper. Relevant vouchers: Ports and Bradley (1996), Baldino (1998b), Bradley et al. (2005), Rickart and Robson (2005).

Spotted Bat (*Euderma maculatum*)

Anecdotal report from park. Suitable habitat is present. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Utilizes a variety of habitats but limestone cliffs, canyon walls, and caves are critical roosting habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Soulages (1966), Bradley et al. (2005), Rickart and Robson (2005).

Fringed Myotis (*Myotis thysanodes*)

Unconfirmed in park. Suitable habitat is present. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Occurs in woodlands and sage steppe habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Bradley et al. (2005), Rickart and Robson (2005).

Long-Legged Myotis (*Myotis volans*)

Presence confirmed in park. Listed on the watch list by the Nevada Natural Heritage Program. Habitats include piñon juniper and coniferous forests. Roosts are in hollow trees, rock crevices, and caves. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Hall (1946), Baldino (1998b), Bradley et al. (2005), Rickart and Robson (2005).

Silver-Haired Bat (*Lasionycteris noctivagans*)

Confirmed in park. On the Nevada Natural Heritage watch list Program. Occupies woodland and riparian habitats. Foraging habitats associated with springs and streams. Primary threats include loss of foraging habitats (springs and streams) and riparian vegetation. Relevant vouchers: Soulages (1966), Baldino (1998a, 1998b), Bradley et al. (2005), Rickart and Robson (2005).

Townsend's Big-Eared Bat (*Corynorhinus townsendii*)

Presence confirmed in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Utilizes piñon juniper and sage steppe habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Hall (1946), Soulages (1966), Baldino (1998a, 1998b), Bradley et al. (2005), Rickart and Robson (2005).

Hoary bat (*Lasiurus cinereus*)

Undocumented in park, but suitable habitat exists. Documented at Shoshone Ponds, Spring Valley. Its habitat includes forested uplands and riparian areas. Foraging habitats associated with open water. Primary threats include loss of foraging habitats (open water, springs and streams) and riparian vegetation. Relevant vouchers: Baldino (1998b), Bradley et al. (2005), Rickart and Robson (2005).

Ringtail (*Bassaricus astutus*)

Presence confirmed in park. Within park, species is approaching the northern limits of range within Great Basin physiographic region. Utilizes a variety of woodland and forested habitats associated with stream and springs. Relevant vouchers: Rickart and Robson (2005).

Long-tailed weasel (*Mustela frenata*)

Presence confirmed in park. Broad habitat and elevation range. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. Several historic park records. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Striped skunk (*Mephitis mephitis*)

Presence confirmed in park. Wide habitat and elevation range. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. No historic records but several recent sightings. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Spotted skunk (*Spilogale putorius*)

Presence documented in park in 2005. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Sagebrush Vole (*Lemmiscus curtatus*)

Undocumented in park but suitable habitat exists. Shrub steppe obligate imperiled due to loss of sage steppe habitat due to encroachment by piñon, juniper, mountain mahogany and white fir. Occurs over a wide elevational gradient. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Pygmy Rabbit (*Brachylagus idahoensis*)

Presence confirmed in park. Locally rare native species; protected under Nevada state law; and state listed as at-risk of extinction by Nevada Natural Heritage Program. Habitat is mature sagebrush. Loss of habitat from piñon juniper encroachment largest threat. Relevant vouchers: Hall (1946); Rickart and Robson (2005); John Hines (pers. comm.), Eveline Sequine (pers. comm.)

Birds

Northern Goshawk (*Accipiter gentilis*)

Presence confirmed in park. White Pine County Sensitive Species. Listed as species of concern by FWS, BLM, and USFS. Preferred nesting habitat is aspens and forested riparian areas. Inventories on-going. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Swainson's Hawk (*Buteo swainsoni*)

Presence confirmed in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Ferruginous Hawk (*Buteo regalis*)

Present in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Petitioned for listing under ESA in 1991, but precluded. Shrub and grass habitat and prey species may be in decline. Inventories needed. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Short-eared Owl (*Asio flammeus*)

Probably present in park. White Pine County Watch List, BLM special status species. Audubon Watchlist. Primary threats include loss of streamside riparian vegetation and wetland habitat loss. Relevant vouchers: Hartley and Gubanich (2004).

Flammulated Owl (*Otus flammeohus*)

Present in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Loss or degradation of Ponderosa pine woodlands and Ponderosa pine/riparian areas is the cause of downward trending populations. Pine and Ridge creeks contain suitable habitat with is declining due to stream diversions and fire suppression. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Lewis's Woodpecker (*Melanerpes lewis*)

Presence confirmed in park. White Pine County Watch list, BLM special status species. Audubon's Watchlist. Populations declining due to loss of ponderosa pine, riparian ponderosa pine and riparian cottonwood/aspen habitats. Pine, Ridge, Shingle and Williams creeks all contain suitable habitat with is either declining due to stream diversions and/or fire suppression. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Brewer's Sparrow (*Spizella breweri*)

Presence confirmed in park Audubon Watchlist. Population declining since the 1960's, with larger declines since the 1980's due to loss of sagebrush habitat. Relevant vouchers: Hartley and Gubanich (2004)

Yellow Warbler (*Dendroica petechia*)

Presence confirmed in park. White Pine County Watch list, proposed BLM special status species. Good indicator species for riparian thicket health. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

MacGillivray's Warbler (*Oporornis tolmiei*)

Presence confirmed in park. White Pine County Watch list, proposed BLM special status species. Good indicator species for riparian habitat health. Relevant references: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Reptiles and Amphibians

Ringneck snake (*Diadophis punctatus*)

Undocumented in park but suitable habitat exists. Historic records from outside park. Highly secretive and patchily distributed in the Great Basin. Relevant references: Lindsdale (1940), Setser et al. (2002), Hamilton (2003b), Stebbins (2003); Bosworth et al. (2004).

Sonoran Mountain kingsnake (*Lampropeltis pyromelana*)

Presence confirmed in park in 2006 on Spring Valley side. Imperiled due to encroachment of or loss of preferred sage steppe and ponderosa pine habitats. Relevant references: Lindsdale (1940), Setser et al. (2002), Hamilton (2003b), Stebbins (2003), Hubbs (2004).

Cave Resources

From 2002 through 2004, GRBA Resource Management staffs surveyed and inventoried all known caves within the park boundary. All cave information present here is contained within the unpublished NPS 2006 management document titled "Caves Resource Condition Report." The Lehman Creek watershed is underlain by Prospect Mountain Quartzite and a small karst unit of Pole Canyon Limestone at 163.4 acres. The watershed contains perhaps the most significant cave resource both in the park and the state of Nevada, Lehman Caves. Lehman Caves is the longest cave in the state with 10,263 feet of mapped passage, including the entrance and exit tunnels. Other caves within the watershed include: Little Muddy Cave, Lehman Annex Cave, and Root Cave. A number of small karst features are also observed within the outcrop area of the Pole Canyon Limestone in the Lehman Creek Watershed. See table 4 for information specific to each cave.

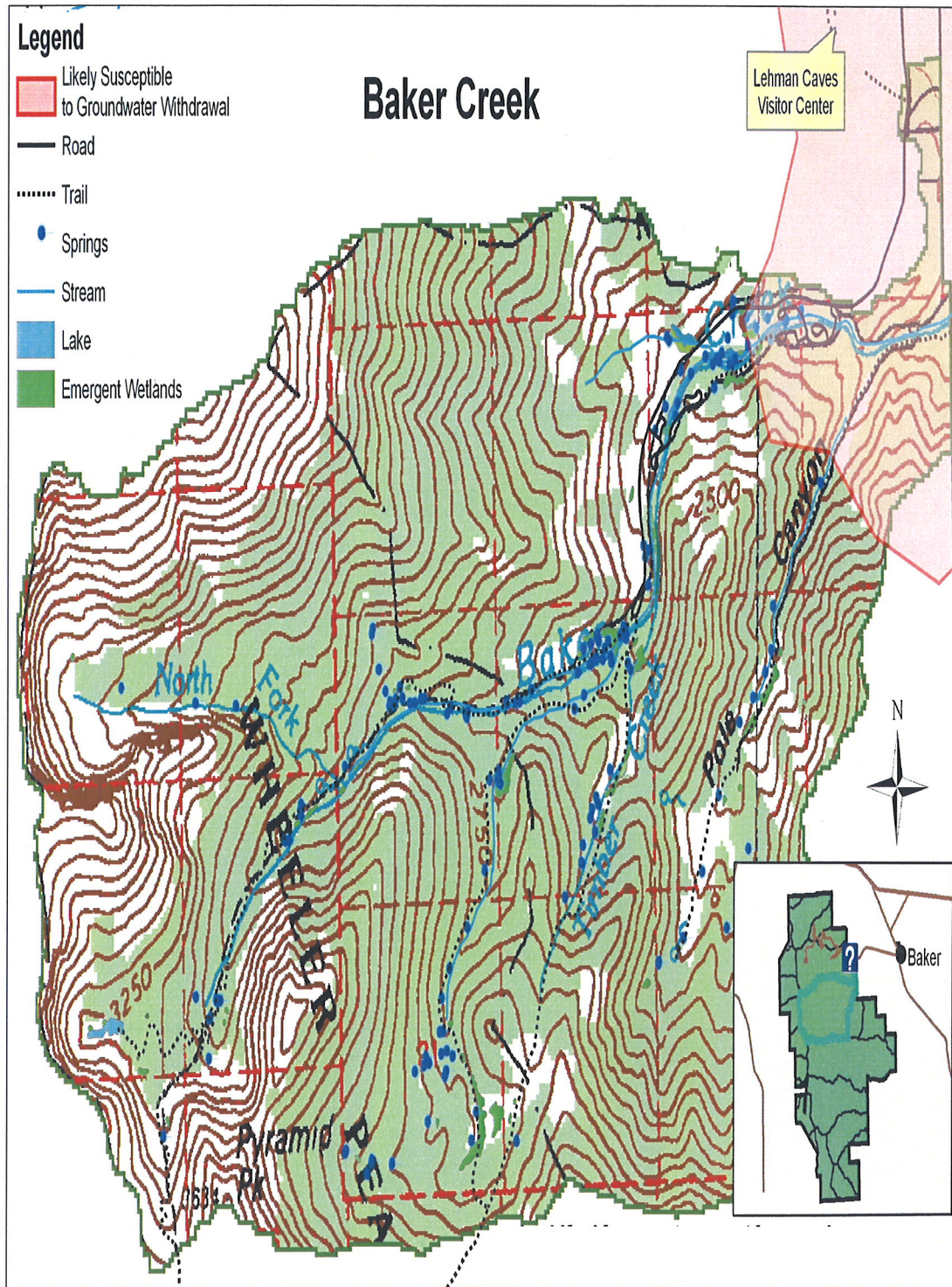
Table 4 - Caves of Lehman Watershed.

Name	Mgmt. Class	Biological Resources	Physical Resources
Lehman	1-C-II	three bat species, multiple macroinvertebrate species, multiple small mammals, fungus, bacteria	Perennial and intermittent pools, active speleothems
Root	4-C-III	roots, multiple macroinvertebrate species	active speleothems
Little Muddy	4-C-II	multiple macroinvertebrate species, fungus	active speleothems
Lehman Annex	5-C-II	multiple macroinvertebrate species, small mammals, Great Basin rattlesnake	intermittant pools, active speleothems

BAKER CREEK WATERSHED

The Baker Creek watershed includes 10,790 acres, of this, 593 acres are within the USGS designated area of likely susceptible to impacts from ground water withdrawal. See figure 4.

Figure 4. - Baker Creek Watershed.



Stream Resources

The Baker Creek Watershed contains the most water of any watershed in the South Snake Range. It includes a third order stream that is the largest in the park, 149 springs, and one lake. The main fork of Baker Creek begins at 10,213 ft and flows 6.1 miles before it leaves the park at 6740 ft in elevation. During very dry years, some higher elevation reaches may dry up. After Baker Creek leaves the park it is diverted for agricultural purposes. The total length of Baker Creek and its tributaries is 14.0 miles. Approximately 1.4 miles of Baker Creek are within the likely susceptible area.

Four subwatersheds provide additional water input to Baker Creek. The North Fork of Baker, which is a large glacial carved cirque, is an intermittent stream primarily fed by snow melt. The South Fork of Baker is a perennial stream that flows for 3.0 miles until it reaches Baker Creek. Pole Canyon has perennial water fed by springs beginning at 7,612 ft, the approximate center of the watershed. This perennial flow appears to persist for 0.7 miles as indicated by riparian dependent vegetation. Actual surface water reach is dependent on snowpack and precipitation patterns but typically the reach above the confluence with Baker Creek is intermittent. Approximately 0.5 miles of Pole Canyon Creek is within the likely susceptible area.

Water Quantity - Baker Creek had a stream gage from August 1913 through November 1915 and October 1947 through September 1955 and for a third time from October 1992 through September 1997. The average annual flow is 9.9 cfs with a range between 3.7 and 11.2 cfs. See graphical charts below.

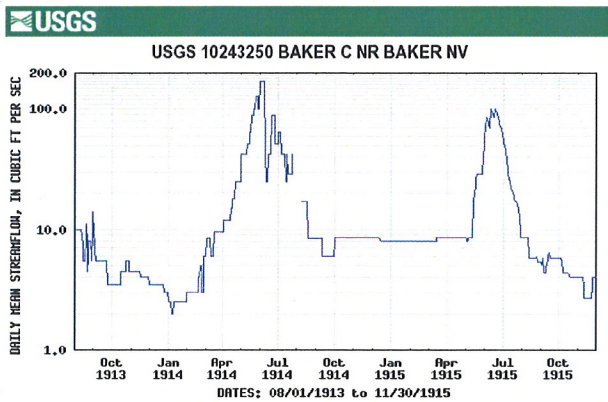


Figure 2. Baker Creek stream flow measures from 1913 through 1915.

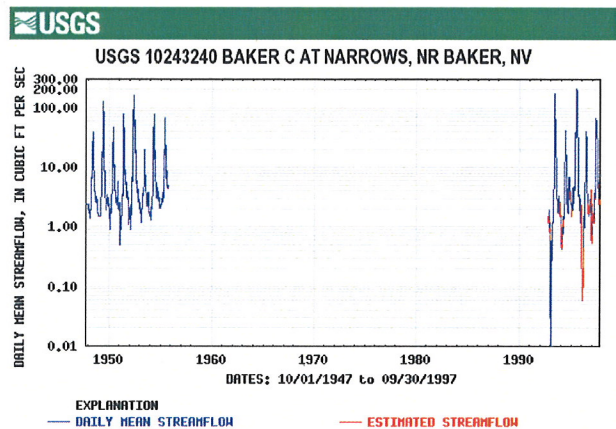


Figure 3. Baker Creek stream flow measures from 1947 through 1955 and 1992 through 1997.

Pressure transducers were installed along Baker Creek by the USGS as part of a stream and groundwater pumping study in 2003. The maximum flow recorded was 8.07 cfs while the minimum flow was 1.92 cfs (Elliott et. al. 2006).

Water Quality - Baker Creek has had numerous water quality samples since 1966. The mean summer water temperature was 8.3° C (Table 5). Dissolved oxygen is about 9 mg/L in both the main stem and tributaries, while specific conductance is a mean of 42.5 uS/cm in Lower Baker Creek. The pH is 7.4. No water quality parameters have been taken in the Pole Canyon intermittent stream section, and only limited parameters have been taken in the upstream tributaries.

Table 5 - Baker Creek Water Quality

Water Body	Mean Water Temp. (Deg. C)	Mean Dissolved Oxygen (mg/L)	Mean Specific Conductance (uS/cm)	Mean pH
Lower Baker Creek	8.3	8.7	42.5	7.4
	80 samples	41 samples	82 samples	79 samples

Stream habitat – High quality pools are found throughout the entire length of the stream. Riffles are best at the higher elevations and decrease in number at the lower elevation. The substrate consists of gravel and rocks in the upper elevations, with rocks, boulders, gravel, and some sand at the middle and lower elevations. The average slope gradient for Baker Creek ranges from 3.75% to 14.5%, with a mean of about 10%. The active channel width averages about 10 ft., with a maximum water depth averaging 8 in.

Fish Resources - Fishing is an important recreational activity along Baker Creek which has two campgrounds, one picnic area, and three trailheads. The last fish population survey was completed in 2003. The survey was conducted 50 meters above Baker Creek campground on August 4, 2003. A 100 m (109 yard) three pass depletion survey was done using a Smith-Root electrofisher. A total of 157 fish were caught, for an estimated 2,527 fish/mile and consisted of Brook, Brown and Rainbow trout as well as young of the year.

Bonneville cutthroat trout were reintroduced to the South Fork of Baker Creek in 2005. This is outside of the USGS likely susceptible designated area. All translocations occurred above 8,720 ft elevation where a physical barrier exists that prevents movement of nonnative fish upstream.

Angler Use - During the eleven year period of 1976-1986, angler use averaged 2,362 days per year on Baker Creek .

Macroinvertebrate Resources - Macroinvertebrate surveys were conducted by personnel from the National Aquatic Monitoring Center at Utah State University (BugLab). Samples from within the area likely to be susceptible to groundwater withdrawal had the greatest abundance of macroinvertebrates overall and within the important Ephemeroptera, Plecoptera, Trichoptera (EPT) group. See table 6.

Table 6. Macroinvertebrate results from Baker Creek

Sample Date	Station - Lower Lehman	Habitat	Area	Abundance	EPTA	EPIT	Richness	Families
10/97	GBNP-05	Multiple	Qualitative	90	79	15	21	18
10/97	GBNP-05	Riffle	0.993	2784	222	18	34	22
10/97	GBNP-05	Riffle	0.993	4972	3736	20	33	21
10/97	GBNP-05	Multiple	Qualitative	202	190	20	33	29

Vegetation Resources

Riparian - Lower Baker Creek riparian vegetation is dominated by aspen, narrowleaf cottonwood, river birch, willows, sagebrush, rabbitbrush, skunkbrush, wood rose, and a variety of native forbs and grasses. Area of riparian vegetation totals 40 acres.

Wetlands - There are three saturated emergent wetland complexes and two seasonally flooded scrub shrub wetlands within the likely susceptible to ground water withdrawal designated area comprising 16 acres.

Upland - The acreage of upland vegetative communities within the USGS likely susceptible to ground water withdrawal designated area includes: Mountain Big Sage/Grassland at 115 acres; 105 acres of Pinyon – Juniper Woodlands; 312 acres of Pinyon – Juniper/Mahogany Woodlands; and, 45 acres of Mahogany Savannah.

Sensitive Plants - Ten species of rare and/or sensitive plant species occur within Great Basin National Park. Of these, three could be found in the area likely susceptible to groundwater withdrawal. This includes Tunnel Springs beardtongue (*Penstemon concinnus*), Pennell's beardtongue (*Penstemon leiophyllus* var. *francisci-pennellii*), and Watson's goldenbush (*Ericameria watsonii*). Pennell's beardtongue and Watson's goldenbush have been documented within the potential impact area in Baker Creek. In addition, five sensitive species not known to be in the park but found on surrounding lands could also be present. They include, Mt. Moriah beardtongue (*Penstemon moriahensis*), Intermountain wavewing (*Cymopterus basalticus*), Pennell's whitlowgrass (*Draba pennellii*), Rayless Tansy-Aster (*Machaeranthera grindelioides* var. *depressa*), and Great Basin Fishhook Cactus (*Sclerocactus pubispinus*).

Spring Resources

The Baker Creek Watershed contains 149 springs. The lowest elevation spring is at 7,060 ft and the highest at 10,787 ft. Of these, 76 are single springs, and 73 are spring complexes. The majority of springs have an eastern aspect and a slope of 0-10 percent. The substrate is largely unsorted.

Within the area that is likely susceptible to groundwater withdrawal there are eight springs present. There are another 15 springs within 0.5 mile of the susceptible area. Springs within the susceptible area include:

BAKE_054

UTMs: 740062, 4319632 **Visited:** 5/05/04
Elevation: 2,215 m
Spring Head Size: Spring Complex, 0.5 X 0.5 m
Spring Tail: 30 m
Ecological Site: Pinyon/Juniper
Aquatic Biota: No Mollusks present
Discharge: 0.001 – 0.01 cfs
Ave. Depth: 1.0 cm
Temp: 7.9°C
Water Quality: DO: 5.3 mg/L, SPCO: 99.1 uS/cm,
pH: 7.0



BAKE_055

UTMs: 739943, 4319380 **Visited:** 5/05/04
Elevation: 2,199 m
Spring Head Size: Single Spring, 0.5 X 0.5 m
Spring Tail: 20 m
Ecological Site: Pinyon/Juniper
Aquatic Biota: No Mollusks present
Discharge: 0.001 - 0.01 cfs
Ave. Depth: 2.0 cm
Temp: 8.3°C
Water Quality: DO: 3.1 mg/L, SPCO: 219 uS/cm,
pH: 7.3



BAKE_056

UTMs: 739855, 4319283 **Visited:** 5/05/04
Elevation: 2,202 m
Spring Head Size: Single Spring, 0.3 X 0.2 m
Spring Tail: 70 m
Ecological Site: Pinyon/Juniper
Aquatic Biota: No Mollusks present
Discharge: 0.001 - 0.01 cfs
Ave. Depth: 3.0 cm
Temp: 7.6°C
Water Quality: DO: 5.0 mg/L, SPCO: 105 uS/cm,
pH: 6.6



BAKE_058

UTMs: 739844, 4319441 **Visited:** 5/07/04
Elevation: 2,204 m
Spring Head Size: Spring Complex, 1 X 1 m
Spring Tail: 10 m
Ecological Site: Aspen/Mixed conifer
Aquatic Biota: No Mollusks present
Discharge: 0.001 - 0.01 cfs
Ave. Depth: 4.0 cm
Temp: 13°C
Water Quality: DO: 3.7 mg/L, SPCO: 160 uS/cm,
pH: 6.6



BAKE_060

UTMs: 740417, 4319475 **Visited:** 4/27/04
Elevation: 2,173 m
Spring Head Size: Single Spring, 0.5 X 0.5 m
Spring Tail: 2 m
Ecological Site: Sagebrush steppe
Aquatic Biota: No Mollusks present
Discharge: <0.001 cfs
Ave. Depth: 8.0 cm
Temp: 13.7°C
Water Quality: DO: 1.8 mg/L, SPCO: 72.0 uS/cm,
pH: 5.5



BAKE_061

UTMs: 740406, 4319450 **Visited:** 4/30/04
Elevation: 2,152 m
Spring Head Size: Spring Complex, 0.5 X 0.2 m
Spring Tail: 10 m
Ecological Site: Aspen/Mixed conifer
Aquatic Biota: Mollusks present
Discharge: 0.001 – 0.01 cfs
Ave. Depth: 6.5 cm
Temp: 7.3°C
Water Quality: DO: 2.6 mg/L, SPCO: 45.9 uS/cm, pH: 6.0



BAKE_062

UTMs: 740257, 4319422 **Visited:** 4/30/04
Elevation: 2,160 m
Spring Head Size: Spring Complex, 0.6 X 0.2 m
Spring Tail: 20 m
Ecological Site: Aspen/Mixed conifer
Aquatic Biota: Mollusks present (clams)
Discharge: 0.001 – 0.01 cfs
Ave. Depth: 4.5 cm
Temp: 6.7°C
Water Quality: DO: 4.0 mg/L, SPCO: 47.4 uS/cm, pH: 6.1



BAKE_063

UTMs: 740246, 4319411 **Visited:** 4/30/04
Elevation: 2,168 m
Spring Head Size: Spring Complex, 0.55 X 0.45 m
Spring Tail: 20 m
Ecological Site: Aspen/Mixed conifer
Aquatic Biota: No Mollusks present
Discharge: 0.001 – 0.01 cfs
Ave. Depth: 3.5 cm
Temp: 7.1°C
Water Quality: DO: 2.4 mg/L, SPCO: 46.4 uS/cm, pH: 5.5



NPS Sensitive Wildlife Resources

Based upon vegetative communities, the following are those NPS Sensitive species whose presence has been confirmed or are thought to occur within suitable habitats in the Baker Creek watershed.

Mammals

Merriam's shrew (*Sorex merriami*)

Presence unconfirmed in park but suitable habitat exists. Listed on the watch list by the Nevada Natural Heritage Program. Prefers sage steppe habitat. Threatened due to conversion of sage steppe habitat by piñon and juniper. Relevant vouchers: Rickart and Robson (2005)

Water Shrew (*Sorex palustris*)

Confirmed in park. Dependent upon riparian habitat and aquatic ecosystems. Subject to extirpation by water loss and non-native trout. Relevant vouchers: Hall (1946); McDonald and Brown (1992); Rickart and Robson (2005)

Pallid bat (*Antrozous pallidus*)

Presence confirmed in park. Listed on the watch list by the Nevada Natural Heritage Program. Primary habitats include piñon/juniper, sagebrush, and salt desert scrub. Foraging habitats associated with springs. Roosts in caves and mines. Primary threats include loss of foraging habitats (springs), and encroachment of sage steppe habitat by piñon and juniper. Relevant vouchers: Ports and Bradley (1996), Baldino (1998b), Bradley et al. (2005), Rickart and Robson (2005).

Spotted Bat (*Euderma maculatum*)

Anecdotal report from park. Suitable habitat is present. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Utilizes a variety of habitats but limestone cliffs, canyon walls, and caves are critical roosting habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Soulages (1966), Bradley et al. (2005), Rickart and Robson (2005).

Fringed Myotis (*Myotis thysanodes*)

Unconfirmed in park. Suitable habitat is present. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Occurs in woodlands and sage steppe habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Bradley et al. (2005), Rickart and Robson (2005).

Long-Legged Myotis (*Myotis volans*)

Presence confirmed in park. Listed on the watch list by the Nevada Natural Heritage Program. Habitats include piñon juniper and coniferous forests. Roosts are in hollow trees, rock crevices, and caves. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Hall (1946), Baldino (1998b), Bradley et al. (2005), Rickart and Robson (2005).

Silver-Haired Bat (*Lasionycteris noctivagans*)

Confirmed in park. On the Nevada Natural Heritage watch list Program. Occupies woodland and riparian habitats. Foraging habitats associated with springs and streams. Primary threats include loss of foraging habitats (springs and streams) and riparian vegetation. Relevant vouchers: Soulages (1966), Baldino (1998a, 1998b), Bradley et al. (2005), Rickart and Robson (2005).

Townsend's Big-Eared Bat (*Corynorhinus townsendii*)

Presence confirmed in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Utilizes piñon juniper and sage steppe habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Hall (1946), Soulages (1966), Baldino (1998a, 1998b), Bradley et al. (2005), Rickart and Robson (2005).

Hoary bat (*Lasiurus cinereus*)

Undocumented in park, but suitable habitat exists. Documented at Shoshone Ponds, Spring Valley. Its habitat includes forested uplands and riparian areas. Foraging habitats associated with open water. Primary threats include loss of foraging habitats (open water, springs and streams) and riparian vegetation. Relevant vouchers: Bradley et al. (2005), Rickart and Robson (2005).

Ringtail (*Bassaricus astutus*)

Presence confirmed in park. Within park, species is approaching the northern limits of range within Great Basin physiographic region. Utilizes a variety of woodland and forested habitats associated with stream and springs. Relevant vouchers: Rickart and Robson (2005).

Long-tailed weasel (*Mustela frenata*)

Presence confirmed in park. Broad habitat and elevation range. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. Several historic park records. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Striped skunk (*Mephitis mephitis*)

Presence confirmed in park. Wide habitat and elevation range. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. No historic records but several recent sightings. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Spotted skunk (*Spilogale putorius*)

Presence documented in park in 2005. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Sagebrush Vole (*Lemmiscus curtatus*)

Undocumented in park but suitable habitat exists. Shrub steppe obligate imperiled due to loss of sage steppe habitat due to encroachment by piñon, juniper, mountain mahogany and white fir. Occurs over a wide elevational gradient. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Pygmy Rabbit (*Brachylagus idahoensis*)

Presence confirmed in park. Locally rare native species; protected under Nevada state law; and state listed as at-risk of extinction by Nevada Natural Heritage Program. Habitat is mature sagebrush. Loss of habitat from piñon juniper encroachment largest threat. Relevant vouchers: Hall (1946); Rickart and Robson (2005); John Hines(pers. comm.) , Eveline Sequine (pers. comm.)

Birds

Northern Goshawk (*Accipiter gentilis*)

Presence confirmed in park. White Pine County Sensitive Species. Listed as species of concern by FWS, BLM, and USFS. Preferred nesting habitat is aspens and forested riparian areas. Inventories on-going. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Swainson's Hawk (*Buteo swainsoni*)

Presence confirmed in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Ferruginous Hawk (*Buteo regalis*)

Present confirmed in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Petitioned for listing under ESA in 1991, but precluded. Shrub and grass habitat and prey species may be in decline. Inventories needed. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Short-eared Owl (*Asio flammeus*)

Probably present in park. White Pine County Watch List, BLM special status species. Audubon Watchlist. Primary threats include loss of streamside riparian vegetation and wetland habitat loss. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Flammulated Owl (*Otus flammeolus*)

Present in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Loss or degradation of Ponderosa pine woodlands and Ponderosa pine/riparian areas is the cause of downward trending populations. Pine and Ridge creeks contain suitable habitat with is declining due to stream diversions and fire suppression. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Lewis's Woodpecker (*Melanerpes lewis*)

Presence confirmed in park. White Pine County Watch list, BLM special status species. Audubon's Watchlist. Populations declining due to loss of ponderosa pine, riparian ponderosa pine and riparian cottonwood/aspen habitats. Pine, Ridge, Shingle and Williams creeks all contain suitable habitat with is either declining due to stream diversions and/or fire suppression. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Brewer's Sparrow (*Spizella breweri*)

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Yellow Warbler (*Dendroica petechia*)

Presence confirmed in park. White Pine County Watch list, proposed BLM special status species. Good indicator species for riparian thicket health. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

MacGillivray's Warbler (*Oporornis tolmiei*)

Presence confirmed in park. White Pine County Watch list, proposed BLM special status species. Good indicator species for riparian habitat health. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Reptiles and Amphibians

Ringneck snake (*Diadophis punctatus*)

Undocumented in park but suitable habitat exists. Historic records from outside park. Highly secretive and patchily distributed in the Great Basin. Relevant vouchers: Lindsdale (1940), Setser et al. (2002), Hamilton (2003b), Stebbins (2003); Bosworth et al. (2004).

Sonoran Mountain kingsnake (*Lampropeltis pyromelana*)

Presence confirmed in park in 2006 on Spring Valley side. Imperiled due to encroachment of or loss of preferred sage steppe and ponderosa pine habitats. Relevant vouchers: Lindsdale (1940), Setser et al. (2002), Hamilton (2003b), Stebbins (2003), Hubbs (2004).

Cave Resources

The Baker Creek Watershed is underlain by insoluble rocks, predominantly the Prospect Mountain Quartzite along with Tertiary granites. The carbonate unit in the Baker Creek watershed is the Middle Cambrian Pole Canyon Limestone. There is extensive karst development along Baker Creek, consisting of numerous epikarstic features, along with solution pits. The Baker Creek watershed contains some of the most highly developed karst drainage networks in the park, and in the State of Nevada. There are 15 caves within the USGS designated likely susceptible to effects from groundwater withdrawal area of Baker Creek watershed. The Baker Creek Cave System (BCCS) is the most important cave resource in the watershed, however there are many small karst features, as well as shelter caves located in Baker Creek. Caves located along Baker Creek are likely hydrologically connected. All cave information present here is contained within the unpublished NPS 2006 management document titled "Caves Resource Condition Report."

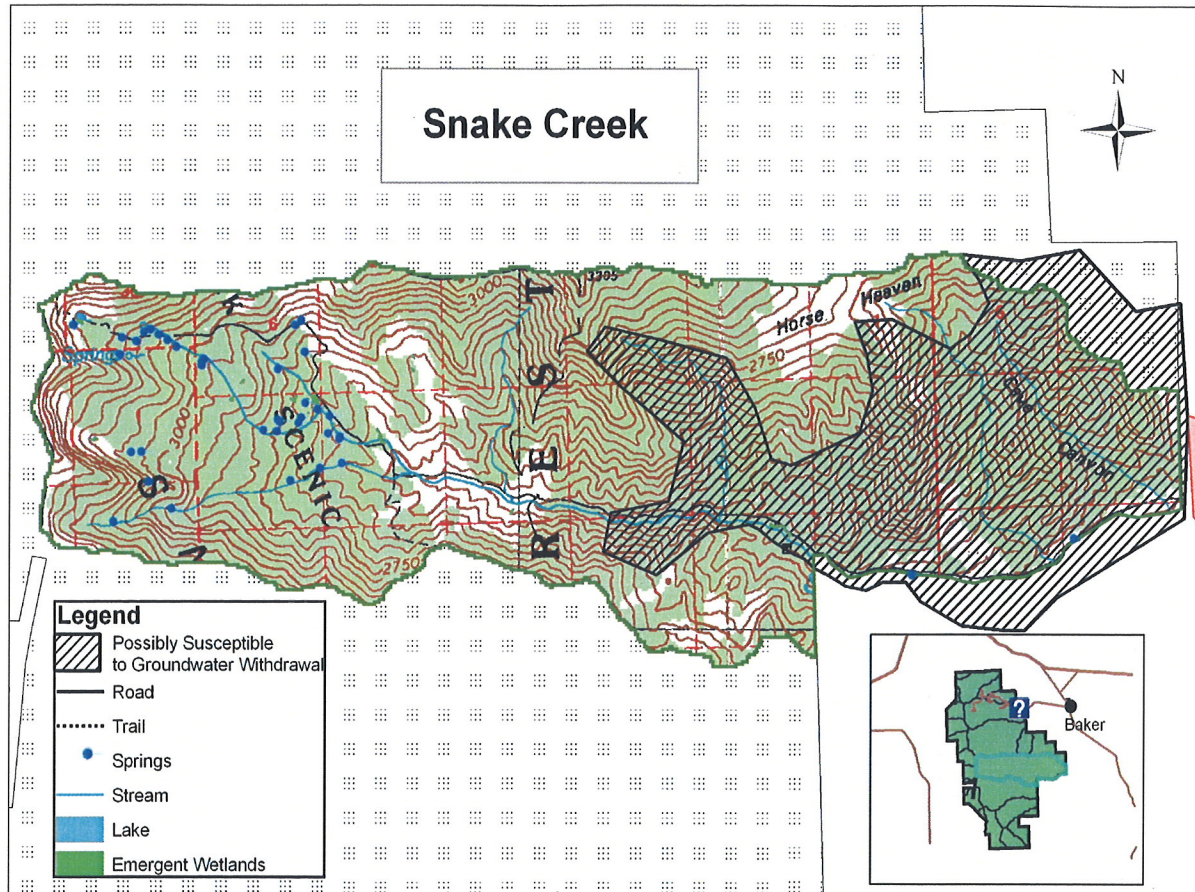
Table 7. - Caves of the Baker Creek Watershed.

Name	Mgmt. Class	Biological Resources	Physical Resources
Upper Pictograph	3-C-I	five bat species, multiple macroinvertebrate species, woodrats	Pictographs, seasonal ice formations, active speleothems
Lower Pictograph	3-C-II	one bat species, multiple macroinvertebrate species, woodrats,	Pictographs, active speleothems
Wheeler's Deep	3-C-IV	four bat species, multiple macroinvertebrate species	perennial stream, intermittant stream, active speleothems
Ice	3-B-II	two bat species, multiple macroinvertebrate species	intermittant stream, active speleothems, seasonal ice formations
Halliday's Deep	3-C-III	two bat species, multiple macroinvertebrate species	intermittant stream, active speleothems
Model	4-C-III	four bat species, multiple macroinvertebrate species, woodrats, ringtails	perennial stream, intermittant stream, active speleothems
Dynamite	6-A-V	macroinvertebrate species	intermittant stream
Three Hole	3-A-I	macroinvertebrate species, one bat species, woodrats,	speleothems
Systems Key	3-C-III	two bat species, multiple macroinvertebrate species	perennial stream, intermittant stream, multiple active speleothems
T Cave	3-A-I	macroinvertebrate species, woodrats, snails, beetles, skunks	speleothems
Coyote Hole	3-A-I	macroinvertebrate species, woodrats	speleothems
Fools Hole	3-A-II	macroinvertebrate species, woodrats	speleothems
Sink Cave	3-B-II	macroinvertebrate species	intermittant stream
Hinding Hole	3-A-II	macroinvertebrate species	speleothems
Rockfall Cave	3-A-IV	macroinvertebrate species	speleothems

SNAKE CREEK WATERSHED

The Snake Creek watershed includes 13,021 acres, of this, 4,098 acres are within the USGS designated area of possibly susceptible to impacts from groundwater withdrawal. See Figure 5.

Figure 5 - Snake Creek Watershed



Stream Resources

The Snake Creek Watershed contains 40 springs, 25 saturated wetlands, two lakes, and one stream. The stream has three main tributaries: the south, middle, and north forks. The South Fork of Snake Creek is the primary channel and begins at 10,285 ft. The Middle Fork begins as three perennial springs at 9,680 ft, and then flows 1.3 miles to the confluence of the North Fork of Snake Creek at 8,620 ft. The North fork begins at 9,040 ft. A single channel is formed at 8,060 ft. Snake Creek then flows 1.4 miles before being diverted into a three-mile long pipeline, installed in 1961, which begins at 7,610 ft and ends at 6,760 ft. Local agricultural interests felt that water was seeping underground through this three mile section of Snake Creek canyon. NPS research has disproved the need for this pipeline showing the majority of water that is used in Garrison, Utah comes from Spring Creek, 1 mile below the park boundary. Currently, water only flows in the channel through this section during spring runoff and after heavy thunderstorms. Upon leaving the pipe, the stream flows 2.3 miles to the park boundary at 6,190 ft. The total length of Snake Creek is 16.4 miles. The total length within the USGS potentially susceptible area is 5.1 miles.

Water Quantity – Pressure transducers were installed on Snake Creek at the park boundary and 40 m above the pipeline diversion in October 2002 as part of the USGS susceptibility study. These continuous-reading transducers showed that during the winter of drought years, the creek goes dry before the park boundary. The base flow is one cfs, with a maximum estimated flow of 15.5 cfs during spring runoff.

Water Quality - Water quality parameters have been measured over 789 times on Snake Creek at a multitude of sites. Parameters are similar to other creeks in the park and are displayed in Table 8.

Table 8 - Water Quality Parameters for Snake Creek

Water Body	Mean Water Temp. (Deg. C)	Mean Dissolved Oxygen (mg/L)	Mean Specific Conductance (uS/cm)	Mean pH
Snake Above Pipeline	8.9	8.9	103.7	7.7
	52 samples	36 samples	53 samples	51 samples
Snake below Pipeline	10.3	8.7	175.1	7.9
	76 samples	53 samples	79 samples	83 samples

Stream Habitat - Snake Creek was rated as Proper Functioning Condition except from Tilford Springs to a large rock ridge at 7,350 ft. This reach was particularly affected by the proximity of the road and pipeline which diverts water from the streambed. This combination resulted in more dead and dying riparian vegetation, a lack of young riparian vegetation, and pinyon-juniper encroachment. In addition, the Snake Creek road presented a problem in areas due to sedimentation to the stream and the possibility of undercutting during flood events (Greene and Mann 1997). This area is within the USGS designated area and is already in a downward trend. In 2001, eight locations along Snake Creek had physical habitat surveys conducted at them. The optimal ratio of pools to riffles is 1:1. The assessment score for the locations varied from 157 to 175 out of a possible 200, placing all the stream reaches in the Good or Healthy category. The channel in Snake Creek has an average slope gradient of 3 to 13.5 percent, and an average bankfull channel width of 9.6 to 12 ft.

Pipeline. A three-mile long pipeline was installed on Snake Creek in 1961. 2.8 miles of this pipeline and affected stream channel are within the USGS designated potentially susceptible to groundwater withdrawal designated area.

Fish Resources - Fishing is an important recreational activity along Snake Creek due to the road, 20 dispersed campsites scattered along the creek and two trailheads. The last fish population survey was completed in 2000. Six 100 m three-pass depletion surveys were conducted along upper Snake Creek. The first site, located at 6755 ft, just downstream from a three-mile long pipeline, which is considered to be a fish barrier, contained 155 trout, for an estimate of 2495 trout/mile. Trout caught included 9 brook trout and 129 brown trout.

The remaining five sites were all located above the pipeline, and the only fish recovered were brook trout. Estimates of the number of Brook trout above the pipeline ranged from 700 to 3,500 fish per mile, depending on elevation. In 2002, all fish were removed upstream of the pipeline using the piscicide antimycin. Bonneville cutthroat trout were reintroduced to upper Snake Creek in 2005. The section of Snake Creek below the pipeline was not treated and still contains Brown trout.

Angler Use - NDOW's 10 percent angler questionnaire was used to determine that during the period 1976-1985 angler use averaged 2,199 days per year. In the three years following the termination of stocking, 1986-1989, angler use averaged 891 days per year. (Haskins et al. 1991).

Macroinvertebrate Resources – Snake Creek has had extensive macroinvertebrate surveys due to the treatment with the piscicide antimycin for the removal of nonnative fish in 2002. Surveys include four years of pre-treatment samples at multiple sites and extensive sampling post-treatment to monitor impacts and recovery. Table 4 provides a summary of pre-treatment macroinvertebrate samples. For the four years of pre-treatment surveys, total macroinvertebrate abundance averaged 1,642 specimens/m² in pre-treatment samples while the EPT group abundance averaged 766 specimens/m². Overall taxa numbers averaged 38 taxa and EPT group taxa numbers averaged 22 taxa in pre-treatment samples. In 2003, one year post-treatments abundance and the numbers of taxa returned to pre-treatment levels (Darby et. al. 2004).

Table 9. Macroinvertebrate results from Snake Creek

Sample Date	Station	Habitat	Area	Abundance	EPTA	EPTT	Richness	Families
10/97	GBNP-09	Multiple	Qualitative	97	74	13	19	17
10/97	GBNP-09	Riffle	0.993	3874	2384	19	34	22
10/97	GBNP-10	Multiple	Qualitative	86	79	12	15	14
10/97	GBNP-11	Multiple	Qualitative	151	108	14	28	20
10/97	GBNP-11	Riffle	0.993	1886	285	16	31	19

Vegetation Resources

Riparian - Lower Snake Creek riparian vegetation is dominated by aspen, narrowleaf cottonwood, river birch, willows, sagebrush, rabbitbrush, skunkbrush, wood rose, and a variety of native forbs and grasses. Area of riparian vegetation total 62 acres within the area possibly susceptible to groundwater withdrawal.

Wetlands - Within the possibly susceptible to ground water withdrawal designated area there are three saturated scrub shrub wetlands identified by the USFWS National Wetland Inventory totaling 1.5 acres.

Upland - The acreage of potential upland vegetation types within the possibly susceptible to ground water withdrawal designated area includes:296 acres of Black Sage/Grassland; 2836 acres of Pinyon-Juniper Woodlands; 313 acres of Littleleaf Mahogany Woodlands; and, 440 acres of Mahogany Savanna.

Sensitive Plants – Three rare and/or sensitive plant species have been documented within the potential impact area in Snake Creek. These include: Tunnel Springs beardtongue (*Penstemon concinnus*); Pennell’s beardtongue (*Penstemon leiophyllus* var. *francisci-pennellii*); and Watson’s goldenbush (*Ericameria watsonii*). In addition, five sensitive species not known to be in the park but found on surrounding lands could also be present. They include, Mt. Moriah beardtongue (*Penstemon moriahensis*), Intermountain wavewing (*Cymopterus basalticus*), Pennell’s whitlowgrass (*Draba pennellii*), Rayless Tansy-Aster (*Machaeranthera grindelioides* var. *depressa*), and Great Basin Fishhook Cactus (*Sclerocactus pubispinus*).

Spring Resources

Forty springs are found in the Snake watershed, with the lowest elevation spring at 8,481 ft and the highest at 10,837 ft. Eighteen are single springs and 19 are spring complexes. Only two springs within the park, SNAK_055 and SNAK_056, are found within the possibly susceptible to groundwater withdrawal designated area. A number of springs are found along Snake Creek adjacent to the park on Humboldt National Forest lands, but these were not surveyed.

SNAK_055
UTMs: 747211, 4311308 **Visited:** 07/20/05
Elevation: 1,948 m
Spring Head Size: Single Spring, 30 X 10 m
Spring Tail: 30 m
Ecological Site: Riparian
Aquatic Biota: Mollusks present (Springsnails, clams)
Discharge: >1 cfs
Ave. Depth: 1.0 cm
Temp: 8.4°C
Water Quality: DO: 8.7 mg/L, SPCO: 276 uS/cm, pH: 6.8



SNAK_056
UTMs: 745110, 4310865 **Visited:** 07/20/05
Elevation: 2,067 m
Spring Head Size: Spring Complex, 10 X 10 m
Spring Tail: 80 m
Ecological Site: Riparian
Aquatic Biota: Mollusks- (Springsnails, clams).
Discharge: 0.01 - 0.1 cfs
Ave. Depth: —
Temp: 14.2°C
Water Quality: DO: 6.5 mg/L, SPCO: 260 uS/cm, pH: 7.3



NPS Sensitive Wildlife Resources

Based upon vegetative communities, the following are those NPS Sensitive species thought to occur or whose presence has been confirmed within suitable habitats in the Snake Creek Creek watersheds.

Mammals

Merriam's shrew (*Sorex merriami*)

Presence unconfirmed in park but suitable habitat exists. Listed on the watch list by the Nevada Natural Heritage Program. Prefers sage steppe habitat. Threatened due to conversion of sage steppe habitat by piñon and juniper. Relevant vouchers: Rickart and Robson (2005)

Water Shrew (*Sorex palustris*)

Confirmed from park. Dependent upon riparian habitat and aquatic ecosystems. Subject to extirpation by water loss and non-native trout. Relevant vouchers: Hall (1946); McDonald and Brown (1992); Rickart and Robson (2005)

Pallid bat (*Antrozous pallidus*)

Presence confirmed in park. Listed on the watch list by the Nevada Natural Heritage Program. Primary habitats include piñon/juniper, sagebrush, and salt desert scrub. Foraging habitats associated with springs. Roosts in caves and mines. Primary threats include loss of foraging habitats (springs), and encroachment of sage steppe habitat by piñon and juniper. Relevant vouchers: Ports and Bradley (1996), Baldino (1998b), Bradley et al. (2005), Rickart and Robson (2005).

Spotted Bat (*Euderma maculatum*)

Anecdotal report from park. Suitable habitat is present. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Utilizes a variety of habitats but limestone cliffs, canyon walls, and caves are critical roosting habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Soulages (1966), Bradley et al. (2005), Rickart and Robson (2005).

Fringed Myotis (*Myotis thysanodes*)

Unconfirmed in park. Suitable habitat is present. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Occurs in woodlands and sage steppe habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Bradley et al. (2005), Rickart and Robson (2005).

Long-Legged Myotis (*Myotis volans*)

Presence confirmed in park. Listed on the watch list by the Nevada Natural Heritage Program. Habitats include piñon juniper and coniferous forests. Roosts are in hollow trees, rock crevices, and caves. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Hall (1946), Baldino (1998b), Bradley et al. (2005), Rickart and Robson (2005).

Silver-Haired Bat (*Lasionycteris noctivagans*)

Confirmed in park. On the Nevada Natural Heritage watch list Program. Occupies woodland and riparian habitats. Foraging habitats associated with springs and streams. Primary threats include loss of foraging habitats (springs and streams) and riparian vegetation. Relevant vouchers: Soulages (1966), Baldino (1998a, 1998b), Bradley et al. (2005), Rickart and Robson (2005).

Townsend's Big-Eared Bat (*Corynorhinus townsendii*)

Presence confirmed in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. Utilizes piñon juniper and sage steppe habitats. Foraging habitats associated with springs. Primary threats include loss of foraging habitats (springs). Relevant vouchers: Hall (1946), Soulages (1966), Baldino (1998a, 1998b), Bradley et al. (2005), Rickart and Robson (2005).

Hoary bat (*Lasiurus cinereus*)

Undocumented in park, but suitable habitat exists. Documented at Shoshone Ponds, Spring Valley. Its habitat includes forested uplands and riparian areas. Foraging habitats associated with open water. Primary threats include loss of foraging habitats (open water, springs and streams) and riparian vegetation. Relevant vouchers: Baldino (1998b), Bradley et al. (2005), Rickart and Robson (2005).

Ringtail (*Bassaricus astutus*)

Presence confirmed in park. Within park, species is approaching the northern limits of range within Great Basin physiographic region. Utilizes a variety of woodland and forested habitats associated with stream and springs. Relevant vouchers: Rickart and Robson (2005).

Long-tailed weasel (*Mustela frenata*)

Presence confirmed in park. Broad habitat and elevation range. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. Several historic park records. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Striped skunk (*Mephitis mephitis*)

Presence confirmed in park. Wide habitat and elevation range. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. No historic records but several recent sightings. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Spotted skunk (*Spilogale putorius*)

Presence documented in park in 2005. Utilizes sagebrush steppe, woodlands and forested habitats associated with stream and springs. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Sagebrush Vole (*Lemmiscus curtatus*)

Undocumented in park but suitable habitat exists. Shrub steppe obligate imperiled due to loss of sage steppe habitat due to encroachment by piñon, juniper, mountain mahogany and white fir. Occurs over a wide elevational gradient. Relevant vouchers: Hall (1946); Rickart and Robson (2005).

Pygmy Rabbit (*Brachylagus idahoensis*)

Presence confirmed in park. Locally rare native species; protected under Nevada state law; and state listed as at-risk of extinction by Nevada Natural Heritage Program. Habitat is mature sagebrush. Loss of habitat from piñon juniper encroachment largest threat. Relevant vouchers: Hall (1946); Rickart and Robson (2005); John Hinespers. comm.), Eveline Sequine (pers. comm.)

Birds

Northern Goshawk (*Accipiter gentilis*)

Presence confirmed in park. White Pine County Sensitive Species. Listed as species of concern by FWS, BLM, and USFS. Preferred nesting habitat is aspens and forested riparian areas. Inventories on-going. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Swainson's Hawk (*Buteo swainsoni*)

Presence confirmed in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Ferruginous Hawk (*Buteo regalis*)

Present in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Petitioned for listing under ESA in 1991, but precluded. Shrub and grass habitat and prey species may be in decline. Inventories needed. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Short-eared Owl (*Asio flammeus*)

Probably present in park. White Pine County Watch List, BLM special status species. Audubon Watchlist. Primary threats include loss of streamside riparian vegetation and wetland habitat loss. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Flammulated Owl (*Otus flammeolus*)

Present in park. State listed as at-risk of extinction or serious decline by Nevada Natural Heritage Program. White Pine County Sensitive species. Audubon Watchlist. Loss or degradation of Ponderosa pine woodlands and Ponderosa pine/riparian areas is the cause of downward trending populations. Pine and Ridge creeks contain suitable habitat with is declining due to stream diversions and fire suppression. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Lewis's Woodpecker (*Melanerpes lewis*)

Presence confirmed in park. White Pine County Watch list, BLM special status species. Audubon's Watchlist. Populations declining due to loss of ponderosa pine, riparian ponderosa pine and riparian cottonwood/aspen habitats. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Brewer's Sparrow (*Spizella breweri*)

Presence confirmed in park Audubon Watchlist. Population declining since the 1960's, with larger declines since the 1980's due to loss of sagebrush habitat. Relevant vouchers: Hartley and Gubanich (2004)

Yellow Warbler (*Dendroica petechia*)

Presence confirmed in park. White Pine County Watch list, proposed BLM special status species. Good indicator species for riparian thicket health. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

MacGillivray's Warbler (*Oporornis tolmiei*)

Presence confirmed in park. White Pine County Watch list, proposed BLM special status species. Good indicator species for riparian habitat health. Relevant vouchers: Hartley and Gubanich (2004), Nevada Natural Heritage Program Database (2004).

Reptiles and Amphibians

Ringneck snake (*Diadophis punctatus*)

Undocumented in park but suitable habitat exists. Historic records from outside park. Highly secretive and patchily distributed in the Great Basin. Relevant vouchers: Lindsdale (1940), Setser et al. (2002), Hamilton (2003b), Stebbins (2003); Bosworth et al. (2004).

Sonoran Mountain kingsnake (*Lampropeltis pyromelana*)

Caves Resources

The underlying geology of the Snake Creek Watershed is nearly evenly divided between carbonates and insoluble rocks. The Watershed contains 7630 acres of exposed carbonates with caves found in the Cambrian Pole Canyon and Notch Peak Limestones, as well as the Ordovician/Devonian Dolomites. There are 4 caves within the areas designated as likely susceptible to the effects of groundwater withdrawal. Squirrel Springs Cave has a major resurgence signaling a possible connection with groundwater sources but this not well understood concerning the nature of and location of the recharge area. All cave information present here is contained within the unpublished NPS 2006 management document titled "Caves Resource Condition Report."

Table 10 - Caves of Snake Creek Watershed

Name	Mgmt. Class	Biological Resources	Physical Resources
Fox Skull	3-B-II	one bat species, woodrats, macroinvertebrate species	active speleothems
Bristlecone	6-B-III	multiple bat species, woodrats, macroinvertebrate species	active speleothems
Snake Creek	4-C-II	seven bat species, multiple macroinvertebrate species	intermittant pools, active speleothems
Squirrel Spring	3-C-II	woodrats, macroinvertebrate species	Spring, resurgence, intermittant pools, active speleothems

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