Biological Resources for Cave, Dry Lake, and Delamar Valleys

PRESENTATION TO THE OFFICE OF THE NEVADA STATE ENGINEER

Prepared by

SOUTHERN NEVADA
WATER AUTHORITY

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Biological Resources for Cave, Dry Lake, and Delamar Valleys

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Pertaining to:
Groundwater Applications 53987 through 53992 in
Cave, Dry Lake, and Delamar Valleys

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ACRONYMS

BA	Biological Assessment
BLM	Bureau of Land Management
BO	Biological Opinion
DRI	Desert Research Institute
EIS	Environmental Impact Statement
ESA	Endangered Species Act
GBBO	Great Basin Bird Observatory
GWD	Groundwater Development
HA	hydrographic area
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Impact Statement
NNHP	Nevada Natural Heritage Program
POD	point of diversion
ROW	right-of-way
SNWA	Southern Nevada Water Authority
USFWS	U.S. Fish and Wildlife Service
UTM	Universal Transverse Mercator

ABBREVIATIONS

afy	acre-feet per year
amsl	above mean sea level
bgs	below ground surface
cm	centimeter
ft	foot
in.	inch
m	meter
mi	mi

1.0 INTRODUCTION

This report provides an overview of the ongoing Federal environmental compliance and associated biological studies for the Clark, Lincoln and White Pine Counties Groundwater Development (GWD) Project, and an evaluation of potential effects on Sensitive Biological Resources from the development of Southern Nevada Water Authority (SNWA) applications 53987 through 53992, inclusive, in Cave (Hydrographic Area [HA] 180), Dry Lake (HA 181) and Delamar (HA 182) Valleys.

Sensitive Biological Resources, as considered by this report, include sensitive species, big game species, and the groundwater dependent habitats they rely upon. These resources have been identified through Federal environmental compliance processes (i.e., National Environmental Policy Act of 1970 [NEPA] public scoping comments), coordination with Federal and state agencies via technical workshops, and extensive literature review and use of databases such as the Nevada Natural Heritage Program sensitive species database. Furthermore, sensitive species are defined as species recognized by federal or state agencies to have endangered, threatened or sensitive status. This includes, but is not limited to, all federally endangered, threatened and candidate species as identified under the Endangered Species Act (ESA) of 1973, State of Nevada protected species, and Bureau of Land Management (BLM) sensitive species.

Evaluating effects from groundwater pumping to Sensitive Biological Resources was based upon the following criteria: (1) whether or not a Sensitive Biological Resource is groundwater dependant and present within the area of effect; (2) the level of effect to a Sensitive Biological Resource predicted by the hydrologic analysis in Part C; (3) the relative range in distribution and/or overall status of an affected species; and, (4) the manner in which a particular species utilizes an affected habitat.

2.0 GROUNDWATER PROJECT FEDERAL ENVIRONMENTAL COMPLIANCE

SNWA submitted an application for permanent and temporary rights-of-way (ROW) to the BLM for the GWD Project in August, 2004 (Case File No. N-78803). The GWD Project includes the construction and operation of groundwater production, conveyance and treatment facilities, and power facilities (SNWA, 2007a). This project would convey up to 200,000 afy of water, including up to 167,000 afy of groundwater developed by SNWA and the remaining capacity provided for Lincoln County.

BLM is currently working to develop an Environmental Impact Statement (EIS) and Biological Assessment (BA), pursuant to the NEPA and the ESA of 1973, respectively. The EIS will assess the direct, indirect, and cumulative effects of the GWD Project on the physical, biological, and human environment, and the BA will evaluate direct, indirect and cumulative effects on Federal candidate and listed species and designated critical habitat. These Federal environmental compliance processes will ensure a thorough analysis of potential effects on environmental resources that may result from both the construction and operation of this project. The documents being prepared and the procedures being followed are intended to help public officials make decisions that are based on an understanding of environmental consequences. They are also intended to direct public officials on how to take actions that will protect, restore, and enhance the biological and human environment. To ensure that the best available information is utilized for the EIS, the BLM has gathered a group of 14 Cooperating Agencies and one Technical Advisory Agency, which are assisting in the development of the EIS. A final EIS, Record of Decision and Biological Opinion (BO) are anticipated in mid-2009.

The BLM is required by Section 505 of the Federal Land Policy and Management Act of 1976 to "minimize damage" to scenic and aesthetic values and fish and wildlife habitat, and "otherwise protect" the environment by including Terms and Conditions in any Right of Way that it grants. Furthermore, BLM is precluded by the ESA from taking actions that will jeopardize Federal listed species or result in the destruction or adverse modification of designated critical habitat for such species (Endangered Species Act, 1973). Given the existing Federal environmental laws, the BLM and U.S. Fish and Wildlife Service (USFWS) will require appropriate monitoring and mitigation measures, based on the final analysis in the EIS and BO, which will ensure conservation of biological resources in the GWD Project area.

3.0 BIOLOGICAL STUDIES

As part of the analysis for the GWD Project EIS and BA, a number of biological investigations were conducted by SNWA and other organizations between 2005 and 2007. These research efforts included both terrestrial and aquatic biological surveys in and around the GWD Project area, including Cave, Dry Lake, and Delamar Valleys. Research efforts were either focused on the proposed ROW alignment or on habitats that were thought to be potentially connected to and dependent upon groundwater at or below the alluvial fan/mountain block interface. The emphasis of these studies was to further characterize the baseline condition of biological resources in both project and adjacent valleys.

Biological resource investigations conducted within Delamar, Dry Lake and/or Cave Valleys consist of the following:

Ecological Evaluation of Aquatic Ecosystems

This study included characterization of the physical habitat, including water quality, and qualitative documentation of submergent vegetation, fish, amphibians, springsnails and aquatic macroinvertebrates. In addition, emergent and terrestrial vegetation were mapped in the adjacent riparian and wetland areas. A total of seven (7) springs were studied across Cave, Dry Lake, and Delamar Valleys (BIO-WEST, Inc., 2007). This project was coordinated with Federal and state resource agencies, Desert Research Institute (DRI), U.S. Geological Survey, Biological Resources Division, and representatives of the University of Nevada, Reno.

Amphibian Surveys

In addition to the BIO-WEST effort, nocturnal amphibian surveys were conducted at accessible springs in Dry Lake and Delamar Valleys. Access to springs in Cave Valley was not granted by the private land owners. This effort was coordinated with Nevada Department of Wildlife (NDOW).

Bat Surveys

Acoustic surveys for bats, using AnaBat technology, and/or mist netting were conducted seasonally at six (6) total sites in Cave, Dry Lake, and Delamar Valleys between April 2005 and July 2006 (O'Farrell, 2006). This effort was coordinated with NDOW.

Breeding Bird Surveys

The Great Basin Bird Observatory (GBBO) coordinated breeding bird surveys in Cave Valley in the 2005 through 2007 breeding seasons. The intent of this effort was to document bird species that utilize phreatophytic and wetland habitats for breeding (GBBO, 2007). No transects were sampled in Dry Lake and Delamar Valleys due to the absence of suitable habitat. This effort was coordinated with Nevada Partners in Flight, which include state and Federal resource agencies.

Pygmy Rabbit Surveys

BLM protocol surveys were conducted from November 2005 to May 2006 in suitable habitats along the proposed facility alignment in northern Cave and Dry Lake Valleys (SNWA, 2007b). These surveys provide information on baseline occurrence of pygmy rabbits. Southern Dry Lake and Delamar Valleys do not contain suitable pygmy rabbit habitat. This effort was coordinated with NDOW.

Reptile Surveys

SNWA coordinated with NDOW to conduct reptile surveys during the summer of 2007 in Dry Lake and Cave Valleys. The purpose of the study was to characterize the baseline occurrence of reptiles in Great Basin Desert valley bottoms in the project area. Reptile arrays, including pitfall and funnel traps were placed along the proposed project alignment and were each run for five (5) days.

Sage Grouse Lek Surveys

SNWA conducted sage grouse lek surveys in coordination with NDOW in northern Cave and Dry Lake Valleys between March 16 and April 27, 2007 (SNWA, 2007c). The surveys consisted of aerial helicopter surveys and on-the-ground lek visits. Known lek locations were the main target of ground surveys and the identification of new leks along the proposed alignment was the focus of the aerial effort. This effort was coordinated with NDOW and BLM.

Small Mammal Surveys

Baseline data were collected between May 2005 and September 2006 by running a total of 30 transects in Cave, Dry Lake, and Delamar Valleys using Sherman live traps (SNWA, 2007d). This effort was coordinated with NDOW.

Raptor Surveys

SNWA, GBBO, and NDOW conducted winter raptor surveys during the past three years (2005 to 2007). These surveys included driving roads in Cave, Dry Lake, and Delamar Valleys in January and February of each year and documenting all raptors observed. This effort was coordinated with NDOW and BLM.

Ferruginous Hawk Surveys

SNWA provided funding to augment NDOW Ferruginous Hawk nesting surveys in 2005. These surveys included helicopter and ground surveys in Cave and Dry Lake Valleys. No suitable nesting habitat is present in Delamar Valley.

Terrestrial Invertebrate Surveys

Sampling was conducted between May and August 2006 at 13 locations across Cave, Dry Lake, and Delamar Valleys, using both passive and active sampling methods, to provide a baseline of invertebrate species occurring in these valleys.

Sensitive Plant Surveys

Wildland International conducted pedestrian surveys of the proposed GWD Project alignment and groundwater exploratory areas for sensitive plants and general wildlife in Cave, Dry Lake, and Delamar Valleys. This effort was coordinated with the Nevada Natural Heritage Program (NNHP).

Weed Surveys

Tri-County Weeds have surveyed the proposed GWD Project alignment in Cave, Dry Lake, and Delamar Valleys for invasive and noxious weeds.

In addition to the information generated from the above studies, significant data on the Sensitive Biological Resources present in Cave, Dry Lake and Delamar Valleys is held by NDOW, BLM, NNHP, and DRI, and was used for this report.

4.0 ENVIRONMENTAL SETTING

Biologically, Cave, Dry Lake, and Delamar Valleys (Figure 1) span a transitional area between the Mojave and Great Basin Deserts, which includes typical basin and range topography, and corresponding changes in soils and plant communities from the valley floors to the mountain tops. The exact boundary between the Mojave and Great Basin Deserts is vague, but can be distinguished by the occurrence of specific plant species (e.g., Joshua tree) and plant communities (e.g., Great Basin sagebrush). Northern Delamar and southern Dry Lake Valley is the general vicinity of this indistinct boundary. Differences in valley floor elevation, latitude, and precipitation are driving factors in the distribution of plant and wildlife communities throughout these valleys. Surface water occurrence in the valleys is quite limited and includes ephemeral playas, stock water improvements, and isolated perennial and ephemeral springs.

The below discussion introduces the Sensitive Biological Resources and Springs of Interest evaluated in this report. Phreatophytic plant species, such as greasewood and rabbitbrush, have no sensitive status but encompass a vegetation community in some valley floors that have the potential, depending on the specific circumstances, to be affected by groundwater development and may provide habitat to sensitive species. Springs of Interest were selected for analysis based on the following criteria: (1) they exist at or below the mountain block/alluvial interface; (2) they were identified by DRI, NDOW, FWS, BLM and/or other biological professionals as having particular biological value; and/or (3) there are records of sensitive species utilization.

4.1 Cave Valley

Cave Valley is an isolated valley situated between the southern reaches of the Egan Range on the west and the Schell Creek Range on the east. The majority of the valley occurs within Lincoln County; however, the northern quarter of the valley occurs in White Pine County. The length of the growing season is relatively short in comparison to more southern basins because of the latitude and high altitude of the valley floor. A playa is located at the southern end of the valley at an altitude of approximately 6,000 ft. According to Eakin (1962), a pluvial lake occupied this area in the late Pleistocene and remnants of this lake are evident in the soils and gravels representative of beaches and bars. No surface water connection to the White River was present during the late Pleistocene (Eakin, 1962).

The valley floors are representative of sagebrush and saltbush scrub communities with basin big sagebrush and/or Wyoming big sagebrush as the dominating species (Wildland International, 2007). Utah juniper, greasewood and shadscale and/or four-winged saltbush are intermixed among the sagebrush (Wildland International, 2007). The playa area in the southern portion of the basin likely represents a perched, or semi-perched, system (Eakin, 1962; SNWA, 2007e). SNWA (2007e) indicates that the groundwater levels around the playa are greater than 150 ft. According to Meinzer

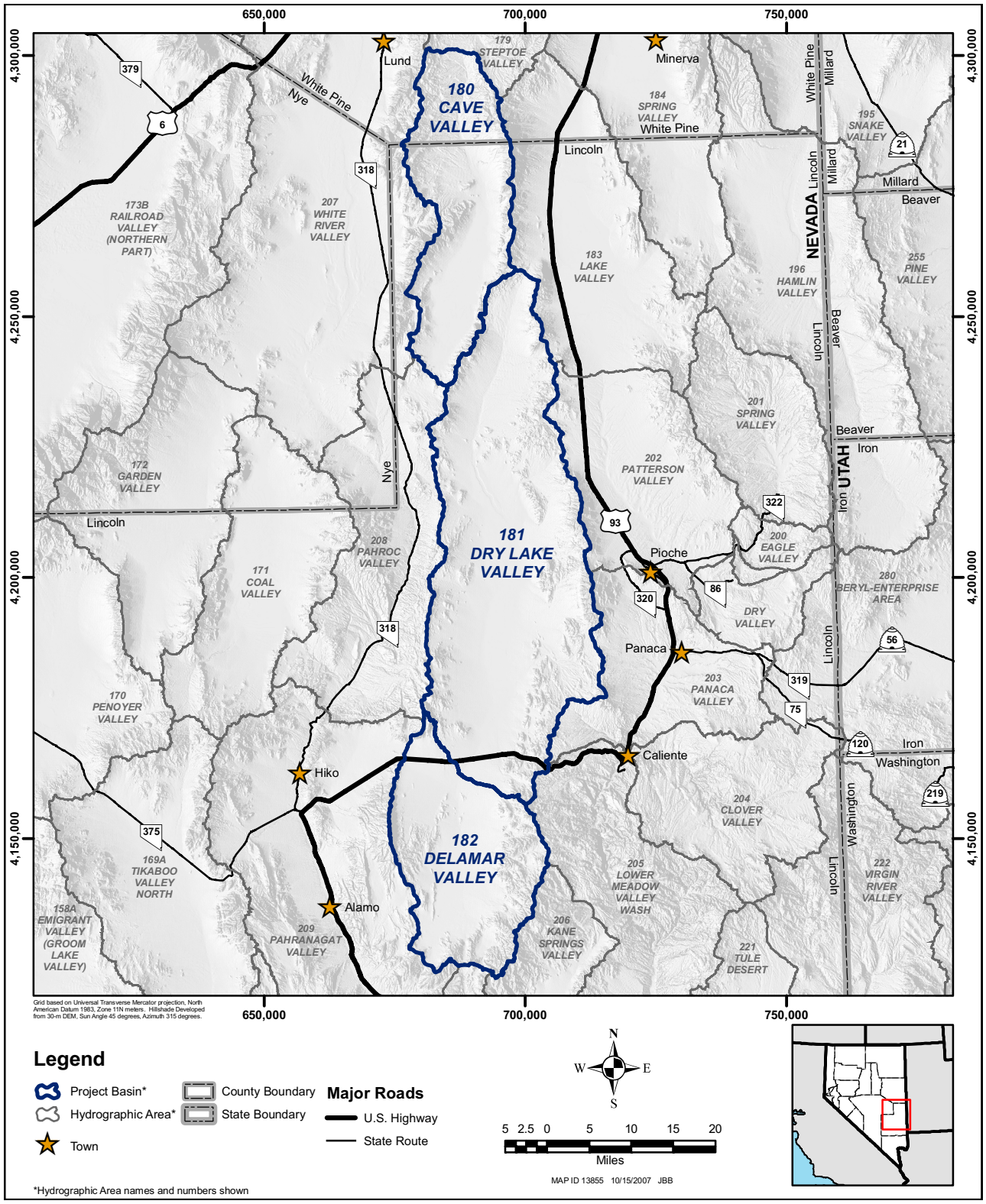

Figure 1
Overview of Cave, Dry Lake, and Delamar Valleys

(1927), greasewood and rabbitbrush, occur in areas where depth to water does not exceed 50 and 15 ft, respectively. SNWA, however, has identified a phreatophytic community present on and around the playa further suggesting the existence of a perched or semi-perched system.

In the northern portion of Cave Valley are two springs of interest, Cave Spring and Parker Station, that have small wetland plant communities associated with them. These springs are at an elevation of 6,535 and 6,514 ft-amsl, respectively, and are the most biologically significant spring systems in Cave Valley that are near the alluvial/mountain block interface.

4.1.1 Federal and State Sensitive Species and Sensitive Habitats

Cave Spring and Parker Station Spring (Figure 2) are known to provide habitat to BLM and State sensitive species. Access to these springs has been limited by the private land owner, therefore the only aquatic biota surveys performed in these springs was the work conducted by Sada in June 1992 (Sada, 2005). Cave Spring (Figure 3) is considerably smaller in width and depth than the Parker Station spring with the maximum depth, as listed by Sada (2005) as 3 and 100 cm, respectively. Both springs support snails of the subclass Pulmonata (Sada, 2005). In addition, Sada (2005) also recorded a large population of the Hardy springsnail (*Pyrgulopsis marcida*) in the Parker Station spring. The Hardy springsnail is endemic to Nevada and is on the State of Nevada's Rare (At-Risk) Species List (NNHP, 2004a). This snail species is also known to occur in White River Valley. There are no known occurrences of sensitive or protected fish or amphibians at either spring.

Cave Spring was surveyed for bat utilization in 2005-2006. A total of seven species were recorded moderately utilizing this site over two years (O'Farrell, 2006). All seven species are BLM sensitive. O'Farrell (2006) found these bats utilizing the habitat associated with the spring for foraging and drinking.

Two BLM sensitive plant species have been observed in Cave Valley along the proposed GWD Project alignments (Wildland International, 2007). These include Parish's phacelia (*Phacelia parishii*), a small annual herb, and Welsh's cryptantha (*Cryptantha welshiii*), an herbaceous biennial or short-lived perennial (Wildland International, 2007 and NNHP, 2001). These species are herbaceous and are not considered to be phreatophytes, therefore, they have no ecological dependence on groundwater sources. Parish's phacelia is generally known to occur around playas and is likely dependent upon unique soils (salt-crusted silty-clay with gypsum deposits) and/or moist soils derived from surface water runoff (NNHP, 2001). Welsh's cryptantha occurs on dry open outcrops with sandy, silty and or clay soils (NNHP, 2001).

Pygmy rabbits (*Brachylagus idahoensis*) and Greater Sage Grouse (*Centrocercus urophasianus*) are sensitive wildlife resources that are known to occur within Great Basin sagebrush habitats within Cave Valley. Pygmy rabbits were petitioned for listing under the ESA, but in 2005 the USFWS determined that the species did not warrant listing (USFWS, 2005a). The current status of pygmy rabbit is as a BLM sensitive species and a state protected species. The pygmy rabbit is a sagebrush obligate and has no ecological dependence upon wetland or phreatophytic habitats (Committee for the High Desert, et al., 2003).

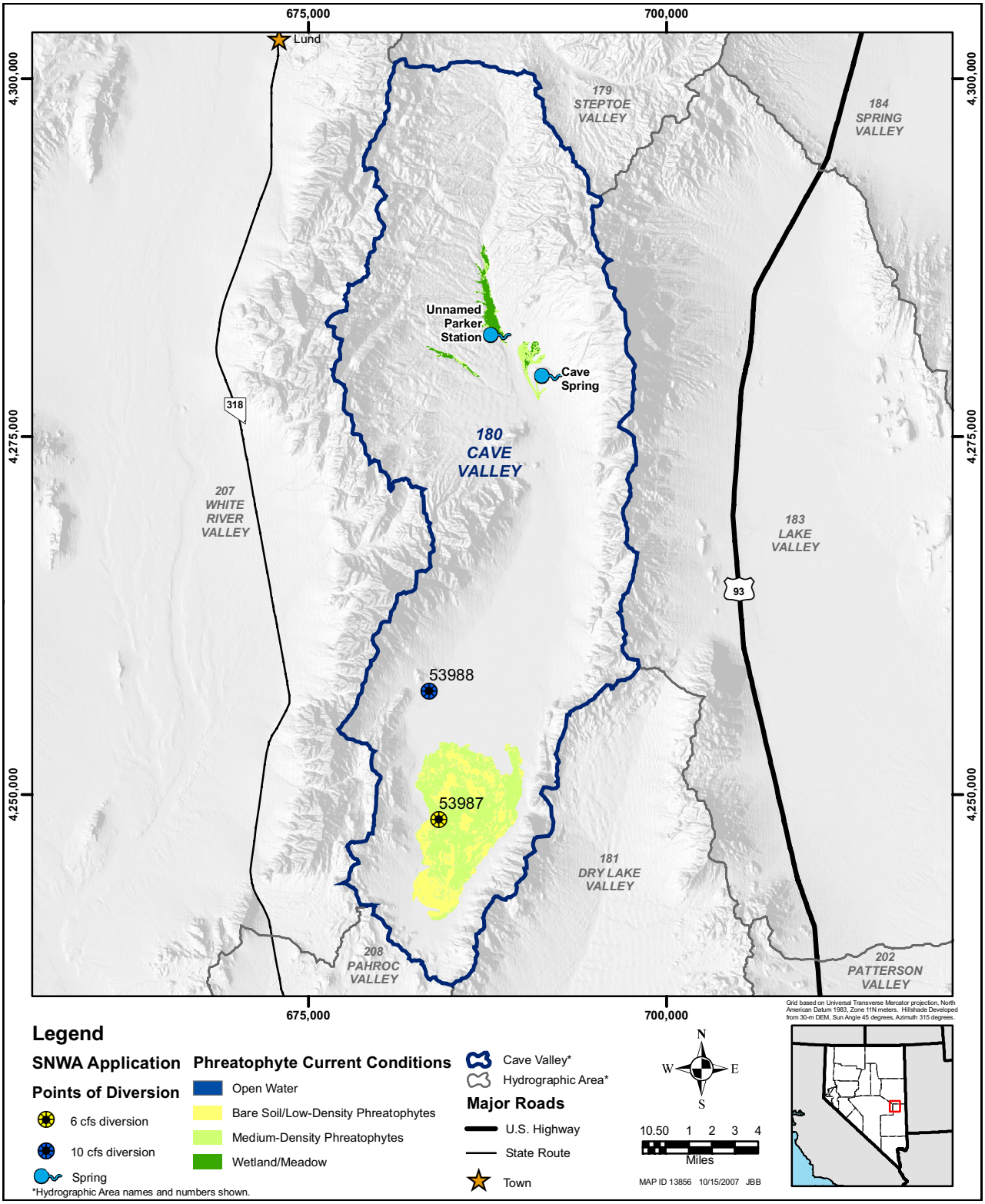

Figure 2
Cave Valley

Figure 3
Cave Spring

The Greater Sage Grouse has been petitioned to list under ESA eight times, but in 2005 the USFWS found the listing of the Greater Sage Grouse not warranted (USFWS, 2005b). The Greater Sage Grouse, however, remains a BLM sensitive species and a state protected species. In Cave Valley, Greater Sage Grouse are known to utilize the western and northern portions of the valley for breeding (SNWA, 2007c). The more mesic habitats associated with Cave Spring and Parker Station spring are likely utilized during spring and early summer for brood rearing (Connelly et al., 2000).

Additional biological resources that are of concern include elk, mule deer, and pronghorn. All three of these big game species are present in Cave Valley and utilize the various plant communities during different seasons of the year. The lower elevations of Cave Valley are utilized for wintering range, and the forested elevations of the valley provide forage and cover to mule deer and elk for most of the year (NDOW, 2004). Parker Station and Cave Valley springs are likely important sources of water for all three of these species.

4.2 Dry Lake Valley

Dry Lake Valley is bordered by the Burnt Springs Range on the east and the North Pahroc Range on the west and is entirely located within Lincoln County. Dry Lake Valley, in combination with Delamar Valley to the south, is a surficially closed basin and contains no perennial streams (Eakin, 1963). A large ephemeral drainage, known as Coyote Wash, occurs in the north end of the valley and drains into a pluvial dry lake, or playa.

No phreatophytic plant communities occur in Dry Lake Valley (SNWA, 2007e). The southern portion of Dry Lake Valley reflects a more Mojavean influenced plant community containing remnants of a Joshua tree stand in the south (Wildland International, 2007). The central and northern parts of Dry Lake Valley are heavily grazed and have relatively large burned areas resulting in the occurrence of invasive species such as Russian thistle and cheatgrass (Wildland International, 2007). Native dominated habitats still persist though in the more alkali, sandy flats where soils become more basic and rich in clays (Wildland International, 2007). Some of these sandy areas support unique assemblages of vegetation and a few rare species (Wildland International, 2007). Great Basin big sagebrush, rubber rabbitbrush, and pinyon-juniper comminutes begin to dominate the more northern reaches of Dry Lake Valley as the plant communities transition from Mojave Desert to typical Great Basin vegetation (Wildland International, 2007).

4.2.1 Federal and State Sensitive Species and Sensitive Habitats

Four Springs of Interest were identified and included in BIO-WEST's (2007) aquatic surveys in Dry Lake Valley: Meloy, Fence, Bailey, and Coyote Springs (Figure 4). Three of the four springs appear to be mountain block springs and are located in the northern portion of Dry Lake Valley (BIO-WEST, Inc., 2007). The remaining spring system of interest, Coyote Spring (Figure 5), is privately owned and has been highly modified to divert flow into concrete stock tanks (BIO-WEST, Inc., 2007). No fish species and/or potential habitat was observed in any of these spring systems (BIO-WEST, Inc., 2007). Sada (2005) surveyed several spring systems in Dry Lake Valley in June 1992 and only found the Flag springsnail (*Pyrgulopsis breviloba*), which is not listed as a state or Federal sensitive species, in the Meloy Spring (NNHP, 2004b). No state protected or BLM sensitive invertebrates or amphibians were observed in these springs.

Coyote Spring was studied for seasonal bat activity during the years 2005 and 2006 (O'Farrell, 2006). A total of 14 species were recorded at Coyote Spring. These species are not state protected, but all 14 are BLM sensitive. Coyote Spring appears to provide suitable habitat for foraging and drinking (O'Farrell, 2006).

Three sensitive plant species have been recorded in Dry Lake Valley (Wildland International, 2007). These are Eastwood's milkweed (*Asclepias eastwoodiana*), Parish's phacelia and Blaine's fishhook cactus (*Sclerocactus blainei*) (Wildland International, 2007). These are not federally or state protected species, but all of them are BLM sensitive species. Based upon their habitat requirements (NNHP, 2001), none of these plant species are groundwater dependent.

Species such as the Western Burrowing Owl (*Athene cunicularia hypugea*), a state protected species, Ferruginous Hawk (*Buteo regalis*), a BLM sensitive species, pronghorn antelope and wild horses were also observed within Dry Lake Valley during survey periods (Wildlands International, 2007; GBBO 2007b). Mule deer and elk are also known to utilize the northern portion of the valley. Pygmy rabbits have not been observed in Dry Lake Valley, but surveys have confirmed probable sign of pygmy rabbits in the northeastern portion of Dry Lake Valley (SNWA, 2007c; Hime and Drohan, 2003). The northern portion of Dry Lake Valley also contains yearlong habitat for Greater Sage Grouse, however, the preferred habitat for leks is limited and no leks have been documented in the valley (SNWA, 2007c).

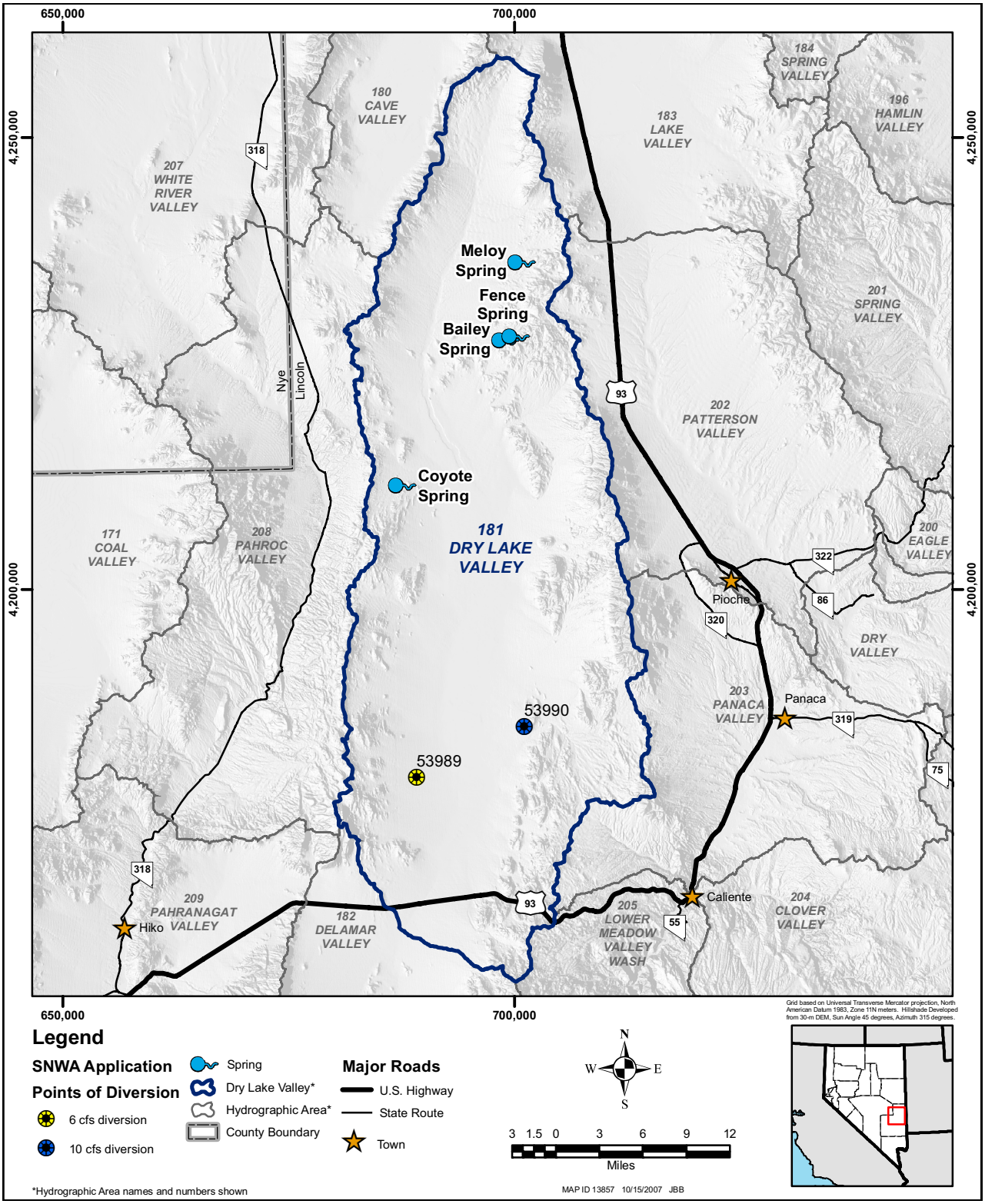

Figure 4
Dry Lake Valley

Figure 5
Coyote Spring Trough

Small mammal surveys conducted by SNWA in 2005-2006 (SNWA, 2007d) detected 12 species of small mammals, of which none depend upon surface water or phreatophytic habitats. The Desert Valley kangaroo mouse (*Microdipodops megacephalus albiventer*), a BLM sensitive species, was found to be abundant but localized in the vicinity of the playa in the southern portion of the valley. This species is highly desert adapted and is found in a mixed salt desert scrub plant community.

4.3 Delamar Valley

Delamar Valley is situated in Lincoln County between the South Pahroc Range to the west and the Delamar Mountains to the east. Dry Lake Valley lies directly north of Delamar Valley. It is difficult to define the boundary between the two valleys as there are no pronounced geographic features distinguishing the two basins. The U.S. Highway 93 is considered the line separating the two basins. As in Dry Lake Valley, there are no perennial streams in Delamar Valley.

No phreatophytic plant communities occur in this valley (SNWA, 2007e). Delamar Valley represents a vegetatively diverse area supporting a variety of native taxa (Wildland International, 2007). There are a number of Mojavean elements to the vegetation composition including a dense stand of Joshua trees at the northern end of the valley (Wildland International, 2007). However, the dominant plant communities are Mojave Mid-Elevation Mixed Desert Scrub and Inter-Mountain Basins Mixed Salt Desert Scrub (Wildlands International, 2007).

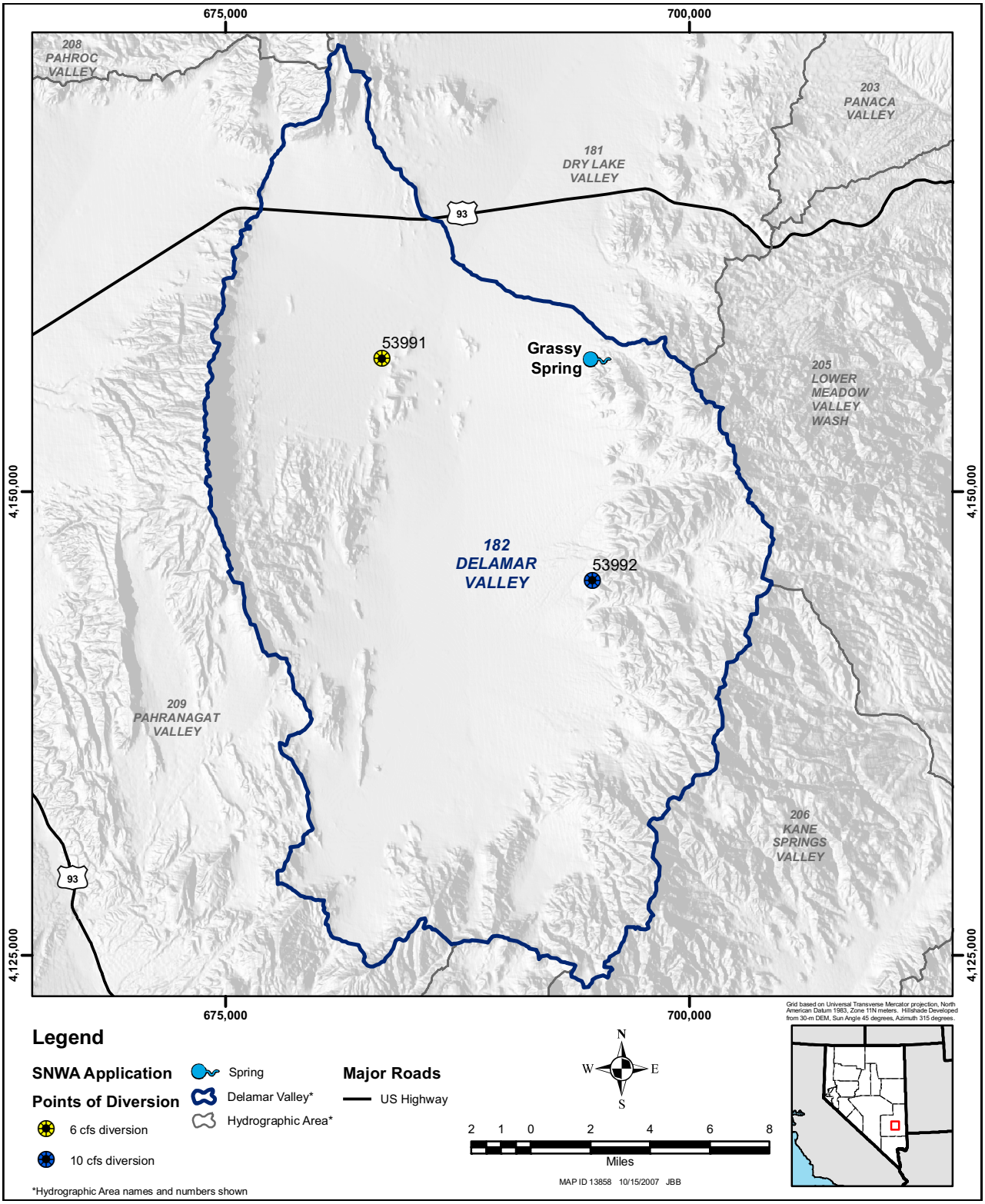

Figure 6
Delamar Valley

4.3.1 Federal and State Sensitive Species and Sensitive Habitats

Grassy Spring, located in the northeastern corner, was the only Spring of Interest identified in Delamar Valley (Figure 6). This spring system has been highly modified for stock watering, as BIO-WEST, Inc. (2007) described it as a small piped spring head that empties into a cattle pond (Figure 7). No springsnails were collected or observed during the surveys by BIO-WEST, Inc. nor did Sada (2005), who conducted a more extensive survey of springs in Delamar Valley, find or observe any springsnails in this valley or any other notable aquatic species. BIO-WEST, Inc. (2007) further determined that this system did not represent suitable fish habitat.

Figure 7
Grassy Spring

Fifteen BLM sensitive bat species were recorded at Grassy Spring, which appears to be used solely as a water source (O'Farrell, 2006).

No state protected or BLM sensitive plant species were found in Delamar Valley (Wildlands International, 2007), and no suitable habitat exists for Greater Sage Grouse or pygmy rabbit. A small population of pronghorn is present in the valley floor.

5.0 POTENTIAL EFFECTS TO SENSITIVE SPECIES AND HABITATS FROM GROUNDWATER PUMPING

The following discussion relies upon the SNWA report entitled, "Part C: Water Related Effects Analysis Associated with Water Right Applications in Cave, Dry Lake and Delamar Valleys, Nevada," to evaluate potential effects from development of SNWA applications 53987 through 53992 upon sensitive biological resources in Cave, Dry Lake, and Delamar Valleys. This hydrological analysis utilizes the Theis equation, where appropriate, and an analysis of the physical geology of the springs of interest to derive simulated changes in aquifer elevations and expected impacts to these springs. Table 5-1 lists the springs evaluated and the expected effect found by SNWA (2007e) from the proposed groundwater pumping.

Table 5-1
Sensitive Environmental Areas, Listed by Valley

Name	Location		Elevation (ft-amsl)	Application Number of Nearest Proposed Pumping Well	Distance from Spring to Nearest Proposed Pumping Well (ft)	Expected Effect from Pumping
	UTM Easting[a] (m)	UTM Northing[a] (m)				
Cave Valley						
Unnamed Spring at Parker Station	687,827	4,282,583	6,514	53988	84,448	highly unlikely
Cave Spring	691,761	4,279,249	6,488	53988	77,259	highly unlikely
Dry Lake Valley						
Meloy Spring	700,888	4,236,201	6,178	53990	168,522	highly unlikely
Fence Spring	700,139	4,228,221	6,277	53990	142,373	highly unlikely
Bailey Spring	699,080	4,227,795	6,090	53990	141,096	highly unlikely
Coyote Spring	687,693	4,211,513	5,224	53990	97,937	highly unlikely
Delamar Valley						
Grassy Spring	695,124	4,157,193	5,783	53991	38,317	highly unlikely

[a]North American Datum of 1983, Zone 11

5.1 Cave Valley

The Parker Station spring and Cave Valley Spring are located in the northern portion of Cave Valley and near the mountain block/alluvial interface. These springs are likely perched and are derived from local precipitation (SNWA, 2007e). Given the local nature of these springs, the perched geology, and the fact that they are over 450 ft higher in elevation than the highest SNWA point of diversion (POD)

and more than 14 mi from the nearest POD, it was found by SNWA (2007d) that it is highly unlikely that any effect to discharge will occur in these springs.

With a depth to water greater than 150 ft in the southern portion of Cave Valley, the greasewood community present there is most likely dependent upon surface water runoff and local precipitation. Therefore, change in the aquifer elevation in the southern portion of the valley is anticipated to have no effect upon this plant community.

Given the results of the hydrological analysis, no effects to Sensitive Biological Resources in Cave Valley are expected to result from the development of SNWA applications 53987 and 53988 (SNWA, 2007e).

5.2 Dry Lake Valley

Meloy, Fence, and Bailey Springs are located in the northern portion of Dry Lake Valley and are described as mountain block springs (BIO-WEST, Inc., 2007). Coyote Spring is located in the central western portion of the valley and it originates from the upper portion of the alluvial fan.

As with the springs in Cave Valley, the available data indicates these four springs are derived from local precipitation and are expected to lack continuity with the alluvial and carbonate aquifers (SNWA, 2007e). Furthermore, the three springs to the north are more than 1,200 ft higher in elevation than the highest SNWA POD and greater than 26 mi from the closest SNWA POD (SNWA, 2007e). Coyote Spring is the closest of these springs to the SNWA PODs, and it is more than 400 ft higher and 18.5 mi from the nearest SNWA POD (SNWA, 2007e). Given the origin and physical geology associated with these springs, and the distance and elevation difference between these springs and the nearest SNWA PODs, it was found that the development of SNWA applications 53989 and 53990 is highly unlikely to result in any effect to the discharge of these springs (SNWA, 2007e). Based on this analysis, no impacts to the Sensitive Biological Resources in Dry Lake Valley are expected to result from the development of these applications.

5.3 Delamar Valley

Grassy Spring is located in the north eastern portion of Delamar Valley at the mountain block/alluvial interface. This spring is in the same fault structure as the POD for application 53992 and a Theis analysis was performed by SNWA (2007d) to evaluate potential effects. The SNWA Theis analysis simulates a 61 ft drawdown in the aquifer (SNWA, 2007e). Nevertheless, due to its localized nature, caldera boundaries, distance from the nearest POD, and a significant difference in elevation between the depth to water at POD 53992 and Grassy Spring, it was found that an effect from the development of SNWA applications 53991 and 53992 to Grassy Spring is unlikely to occur (SNWA, 2007e).

No aquatic BLM sensitive or state sensitive species occur in Grassy Spring, but the cattle pond below the spring provides a water source to 15 BLM sensitive bat species, and likely pronghorn and other wildlife. However, no effect to Sensitive Biological Resources is expected to result from the development of the SNWA applications in Delamar Valley given the results of the SNWA (2007d) hydrologic analysis. Furthermore, due to the highly modified and degraded nature of this system,

mitigating impacts to biological resources associated with Grassy Spring would be as simple as providing an alternative source of water, such as the GWD Project.

6.0 CONCLUSION

SNWA filed an application with the BLM for ROWs for the GWD Project in 2004, and the BLM is currently developing an EIS and BA. The EIS will analyze direct, indirect and cumulative effects resulting from the project on physical, biological, and human environments. BLM may impose terms and conditions after completion of the EIS to "minimize damage" to scenic and aesthetic values and fish and wildlife habitat and "otherwise protect" the environment pursuant to FLPMA. BLM may also impose conservation measures to minimize effects to listed species pursuant to the ESA. These mitigation and conservation measures will minimize impacts of the GWD Project.

Sensitive Biological Resources are present in Cave, Dry Lake, and Delamar Valleys, however most of these resources do not depend upon habitats that are connected to groundwater. For those that do (i.e., spring snails, Greater Sage Grouse and bats), no effect to these resources is expected to result from the development of SNWA applications 53987 through 53992, as it was determined that an effect to the Springs of Interest is highly unlikely (SNWA, 2007).

Based upon the above analysis, the development of applications 53987 through 53992 is environmentally sound.

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