QA: N/A

TRW Environmental Safety Systems Inc.

Environmental Baseline File for Biological Resources

Civilian Radioactive Waste Management System

Management & Operating Contractor

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U.S. Geological Survey

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Prepared for:
U.S. Department of Energy
Yucca Mountain Site Characterization Office
P.O. Box 30307
North Las Vegas, Nevada 89036-0307

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Management & Operating Contractor

Environmental Baseline File for Biological Resources

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March 1999

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P.O. Box 30307
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Civilian Radioactive Waste Management System
Management & Operating Contractor

Environmental Baseline File for Biological Resources

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March 1999

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FIGURES

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TABLES

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ACRONYMS AND ABBREVIATIONS

ACEC	Areas of Critical Environmental Concern
BLM	Bureau of Land Management
CRWMS	Civilian Radioactive Waste Management System
DOE	U.S. Department of Energy
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FWS	U.S. Fish and Wildlife Service
ITS	intermodal transfer station
M&O	Management and Operating Contractor
NDOW	Nevada Division of Wildlife
NNHP	Nevada Natural Heritage Program
NTS	Nevada Test Site
NWPO	Nevada Nuclear Waste Project Office
NWTRB	Nuclear Waste Technical Review Board
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
YMP	Yucca Mountain Site Characterization Project

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1. INTRODUCTION

This Environmental Baseline File describes the biological resources that may be affected by the construction, operation and monitoring, and closure of a geologic repository at Yucca Mountain, Nye County, Nevada (hereafter referred to as the proposed action). This repository would be constructed for the disposal of spent nuclear fuel and high-level radioactive waste, as described by the U.S. Department of Energy (DOE) (60 FR 40164). The purpose of this Environmental Baseline File is to provide information that may be needed during the development of the Environmental Impact Statement (EIS) to evaluate the potential effects of the proposed action on biological resources.

This document is organized into six chapters. The first is an introduction. The second chapter is a review of studies and descriptions of biological resources that could provide information for evaluating the effects of the proposed action. The third chapter describes the biological resources in areas that may be affected by the proposed action. The fourth chapter identifies and discusses opposing views and conflicting opinions about past and proposed methods for evaluating effects of the proposed action on biological resources. The fifth chapter identifies data not currently available that may be needed to complete the EIS. The final chapter lists the references.

Chapters are organized based on four regions of influence (i.e., areas that may be affected by the proposed action). These are: Yucca Mountain (Figure 1-1), the region surrounding Yucca Mountain (Figure 1-1), regional springs and riparian areas associated with the deep-carbonate groundwater basin (Figure 1-1), and proposed transportation corridors and intermodal transfer stations within Nevada (Figures 1-2 and 1-3). Subsection 3.1 contains a description of these areas and the activities that may affect biological resources in these areas.

This document has 15 appendices. Appendix A is a list of the scientific names of all plant and animal species mentioned in this document. Appendix B is a list of invertebrate taxa found at Yucca Mountain. Appendices C and D contain summaries of the land cover types along the transportation corridors and intermodal transfer stations. Appendices E through O are lists of biological resources within or near the proposed rail corridors, heavy-haul routes, and intermodal transfer stations.

Color maps of various sizes were also created in support of this document (Table 1-1). Some of these maps are not included with this report, but are available through the Civilian Radioactive Waste Management System Management and Operating Contractor (CRWMS M&O) Technical Data Management organization.

One goal of this Environmental Baseline File is to provide sufficient information about biological resources that might be considered by DOE during development of the EIS. A preliminary, subjective analysis was conducted during the development of this Environmental Baseline File to identify all regions within which biological resources may be affected; however, the probability and severity of the impact on biological resources within these regions were not formally evaluated. These evaluations are to be conducted for the EIS. During these evaluations, some of the potential impacts considered in this Environmental Baseline File may be proven to be unlikely or inconsequential; thus, those impacts and the resources potentially affected may not be included in the EIS.

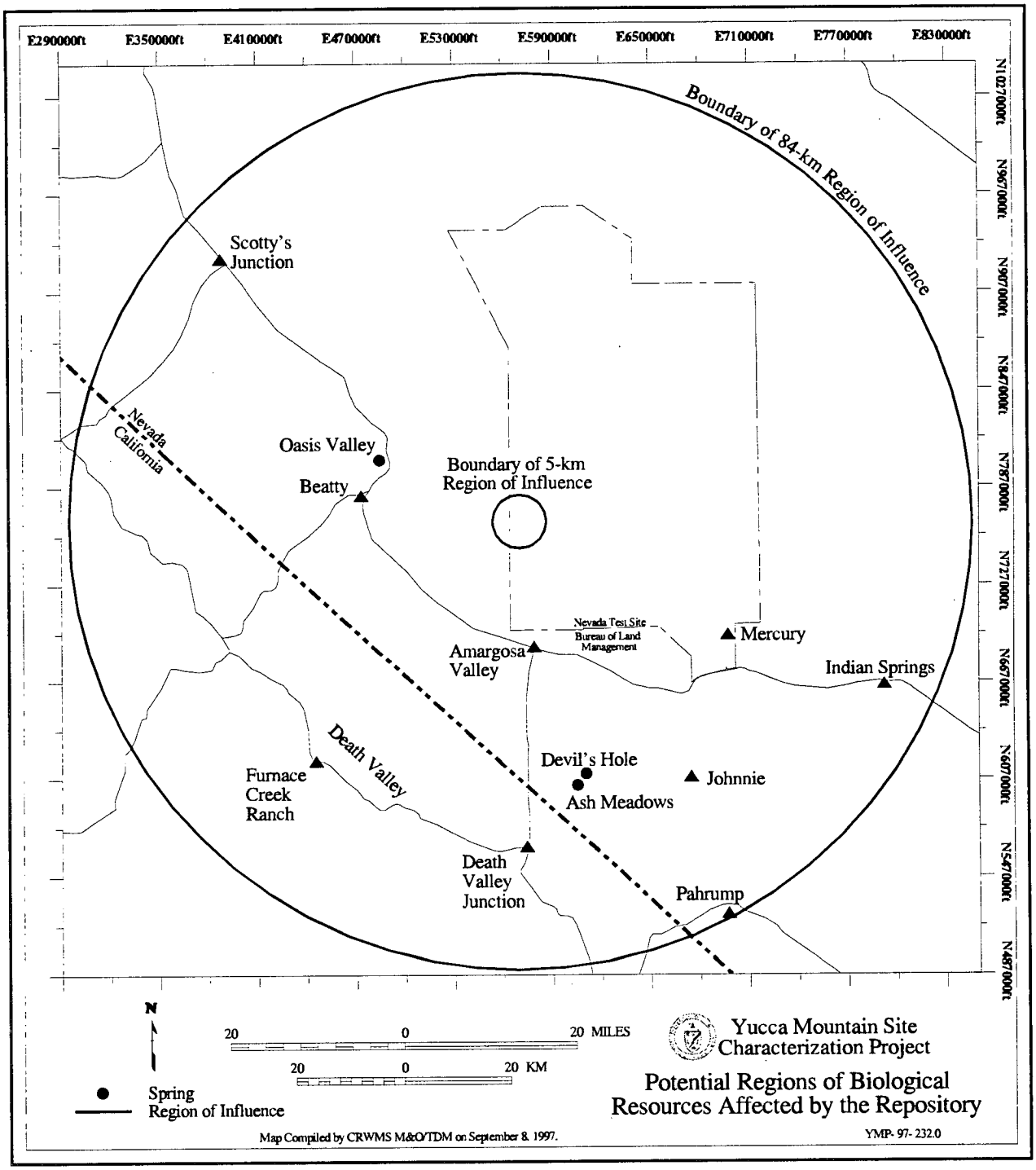

Figure 1-1. Location of Three of Four Regions of Influence Considered in this Report: The 5-km Region at Yucca Mountain, the 84-km Region Surrounding Yucca Mountain, and Springs Fed by the Deep Regional Groundwater Aquifer

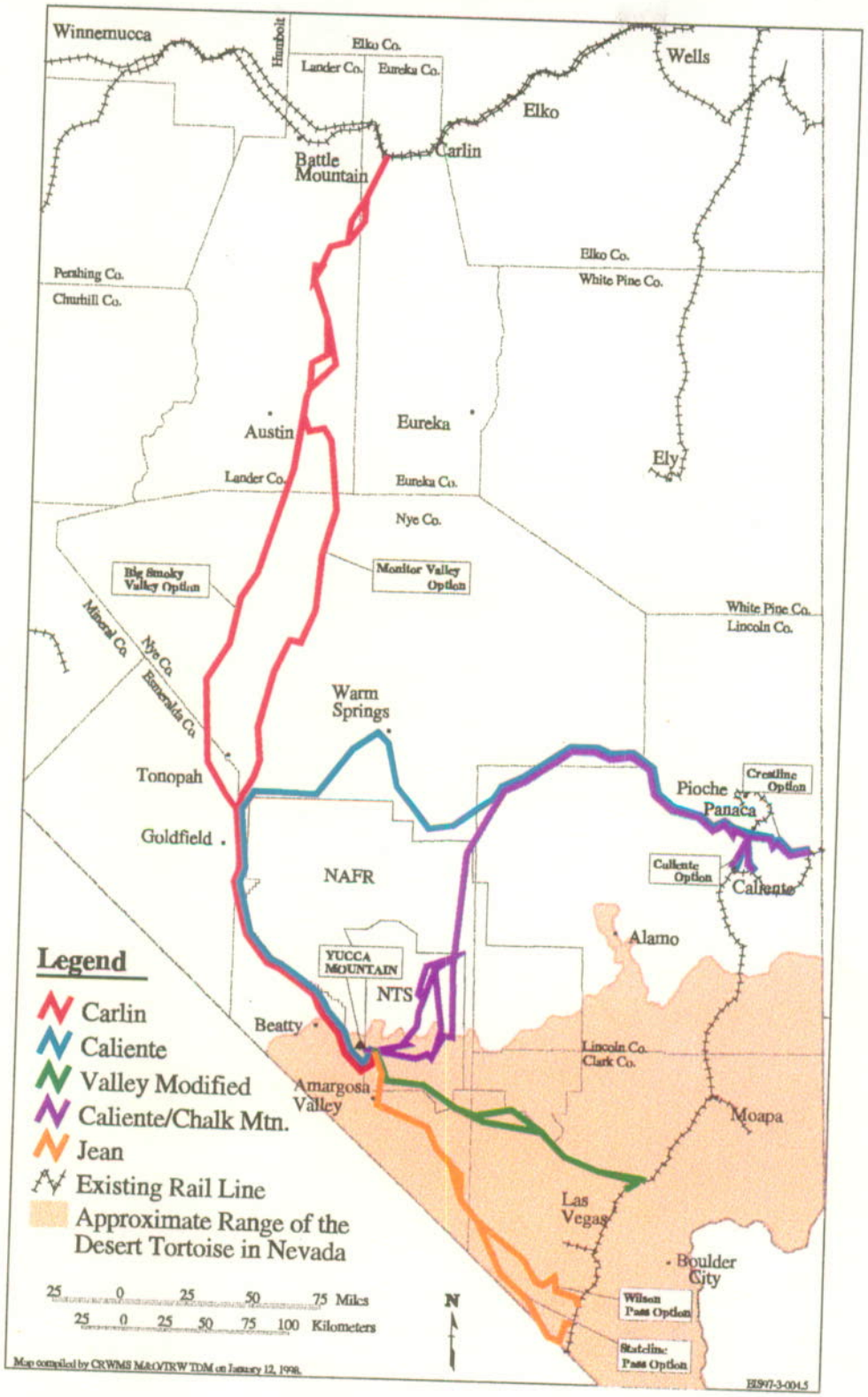

Figure 1-2. Rail Corridors Within Nevada Being Considered for Transporting Spent Nuclear Fuel and High-Level Radioactive Waste to Yucca Mountain

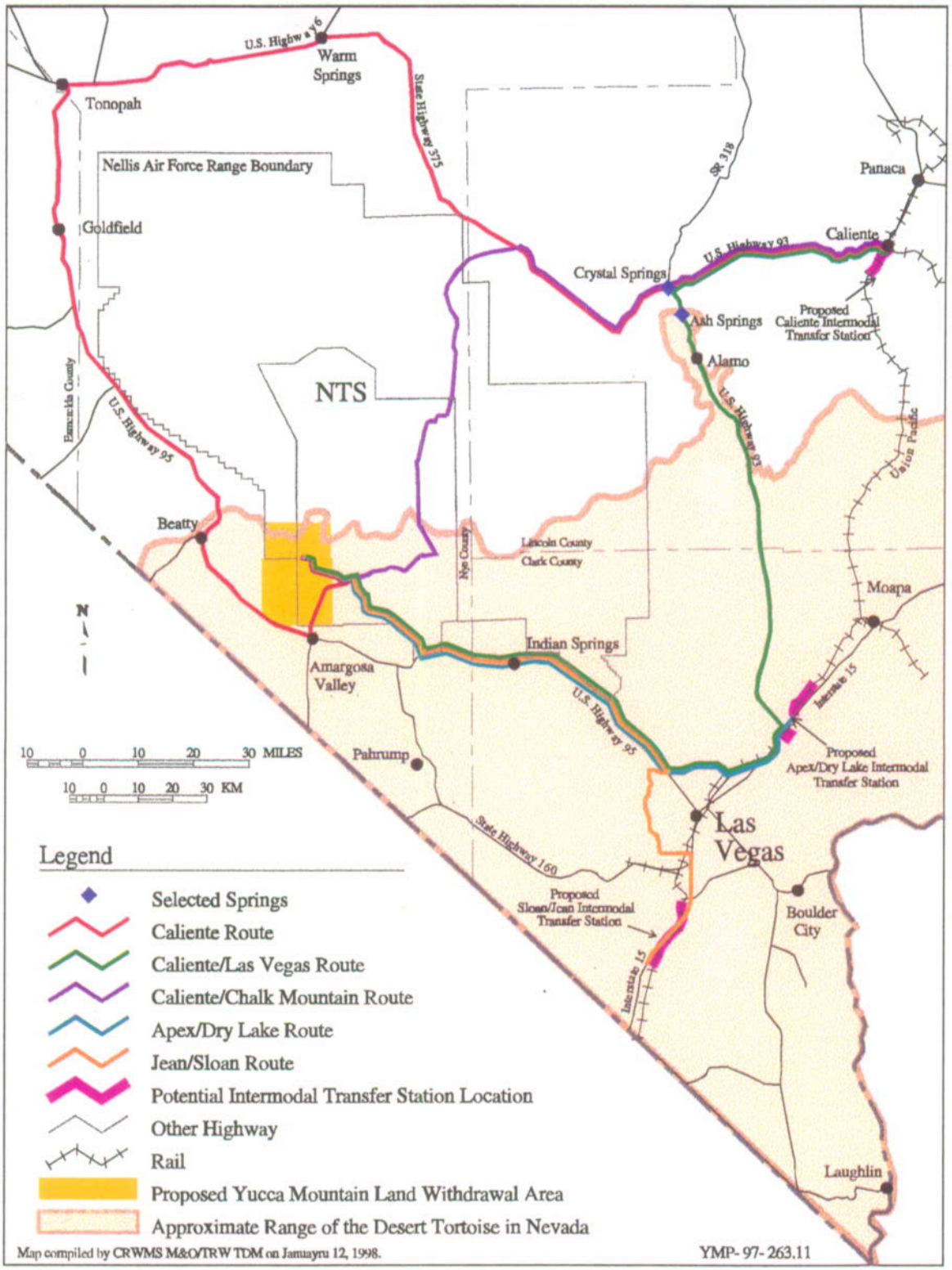

Figure 1-3. Heavy-Haul Routes and Intermodal Transfer Stations Within Nevada Being Considered for Transporting Spent Nuclear Fuel and High-Level Radioactive Waste to Yucca Mountain

Table 1-1. Maps Created in Support of the Environmental Baseline File for Biological Resources

Map Number(s)	Map Title
YMP-97-059	Nevada Land Cover Types and Potential Rail Corridors[1]
YMP-97-204	Land Cover Types Within the 84-km Circle Surrounding Yucca Mountain[2]
YMP-97-066 through -083 and -087 through -088	Biological Resources Within 5 km of Potential Rail Corridors (20 maps)[3]
YMP-97-250 through -261	Biological Resources Within 1 km of Potential Heavy-Haul Routes and Intermodal Transfer Stations (12 maps)[3]

[1]CRWMS M&O 1999h
[2]CRWMS M&O 1999d
[3]Attachment 1, Maps of Biological Resources Along Transportation Corridors and Intermodal Transfer Stations (CRWMS M&O 1999g)

2. BACKGROUND

This section includes brief reviews of relevant studies, reports, and other descriptions of the biological resources in the four regions of influence. Studies for which final reports or publications have been written are described in less detail than studies without published results.

2.1 YUCCA MOUNTAIN

The first two subsections contain information on biological resources at Yucca Mountain collected during two periods, the 1981–1985 site investigations (Subsection 2.1.1) and the 1989-1997 site characterization (Subsection 2.1.2). Information that may be useful for evaluating the effects of thermal loading on biological resources is described in Subsection 2.1.3, and information on wetlands is discussed in Subsection 2.1.4.

2.1.1 Information Obtained During Site Investigations, 1981–1985

A review of literature describing the biological resources at Yucca Mountain and the surrounding region was conducted in 1981 and 1982 (Collins et al. 1981, 1982). The ecological setting of the area was described, vertebrate species known to occur in the area were listed, and ten "sensitive" species that may occur at Yucca Mountain were identified. Based on that literature review, a conclusion was made that sufficient baseline information was available to assess the potential impact on a regional scale, but site-specific information was needed to evaluate the impact of disturbances at Yucca Mountain. Field investigations were therefore initiated in 1982 to describe the species composition within areas to be disturbed, search for "species of concern" (i.e., candidates for listing under the Endangered Species Act [ESA], game species, or other protected species), assess the impact of site investigations, evaluate fire potential, collect information on the disease-vector potential of common vertebrates and their ectoparasites, and document sources of free-standing water at Yucca Mountain. The results of this work, which are summarized below, are reported by Medica et al. (1981), Collins et al. (1983), O'Farrell and Collins (1983, 1984), Collins and O'Farrell (1985), and EG&G Energy Measurements (EG&G/EM 1991a).

Transects were walked throughout Yucca Mountain from 1981-1984 to search for species of concern and water sources, identify other easily detected vertebrate species in the area, and describe major vegetation associations at Yucca Mountain. Additional measurements of vegetation were taken in 1983 to develop a map of vegetation associations and assess range-fire potential. Rodents were live trapped at seven locations during 1982–1984 to describe rodent species composition and evaluate disease vectors. Preactivity surveys were conducted during 1981-1985 at all sites to be disturbed to identify species of concern and evaluate the potential impact of the disturbances.

Two ESA candidates, the desert tortoise and the redspined fishhook cactus, were found at Yucca Mountain (the desert tortoise has since been listed as threatened, and the cactus has been dropped from consideration). Desert tortoises were found throughout the area at a low to very low level of relative abundance. Redspined fishhook cacti were found at relatively high densities on rocky ridges. Other species of concern found at Yucca Mountain include mule deer, wild burros, bobcats, kit foxes, raptors, Gambel's quail, mourning doves, and other migratory birds.

No springs or other sources of permanent, free-standing water were found. The only free-standing water was found after rain in shallow solution holes in the exposed flat rocks on the top of ridges.

Eleven species of rodents were captured. Few ectoparasites were observed on them. Nine other species of mammals, 8 species of lizards, 3 species of snakes, and 35 species of birds were observed.

Six vegetation associations were identified and mapped by walking transects throughout the area during 1982. A somewhat different classification of four vegetation associations was developed in 1983 based on measurements of vegetation along the rodent trapping lines. The risk of range fires was considered relatively high in most years because of the abundance of dry annual vegetation.

2.1.2 Information Obtained During Site Characterization, 1989–1997

Additional studies of the biota at Yucca Mountain were initiated in 1989 to better describe the terrestrial ecosystem, evaluate the impact of site characterization activities on biological resources, and develop methods to mitigate that impact (YMP 1992). These studies can be separated into three groups: vegetation, animal populations, and sensitive species. Annual summaries of work conducted for these studies are found in EG&G/EM (1991b, 1992, 1993, 1994, 1995b) and CRWMS M&O (1996c).

2.1.2.1 Flora

Vegetative cover, density, and production were measured on sampling plots throughout Yucca Mountain from 1989 through 1997 to evaluate the effects of site characterization activities and better characterize the composition of the plant community. A revised map of vegetation associations at Yucca Mountain has been developed. In addition, studies were conducted to improve the effectiveness of land reclamation techniques.

Effects of Site Characterization–Because little was known about the sensitivity of Mojave Desert vegetation to the indirect effects of construction (i.e., factors other than land clearing, such as dust and altered water runoff patterns), a study was conducted to determine if site characterization activities impacted Yucca Mountain vegetation (CRWMS M&O 1999j). Site characterization activities had no major or catastrophic effects on vegetation, but slightly increased the cover, production, and richness of vegetation on 4-ha treatment plots adjacent to site characterization activities as compared to control plots. At a finer resolution, comparing distances from 10 to 175 m from disturbances, site characterization had either no effect or slightly reduced vegetative cover. This research also quantitatively described the plant communities at Yucca Mountain during a climatically variable six-year period (Schultz and Ostler 1995a, 1995b; CRWMS M&O 1996b).

Mapping of Vegetation Associations–Yucca Mountain has a diverse flora. During 1989–1994, 186 plant species were identified in the Yucca Mountain area (CRWMS M&O 1996b, Appendix F). Additional species were identified during 1997-1998 (CRWMS M&O 1999a). Niles et al. (1995) found 372 species in the greater Yucca Mountain area, which included nearby springs, limestone mountains, and Quaternary volcanic soils not found on Yucca Mountain. Four maps

of vegetation associations at Yucca Mountain were made prior to 1997 that used similar classifications (Beatley 1976, pp. 10–11; O'Farrell and Collins 1984, p. 7; Environmental Science Associates, Inc. 1990, p. 34; EG&G/EM 1995a). Each successive map increased the accuracy of association boundaries, but all four relied on a subjective, visual classification based on the presence or absence of a few easily recognized species. To support a quantitative classification of vegetation at Yucca Mountain and to determine the degree to which species aggregate in discernible, co-occurring assemblages, more than 259 landform units distributed throughout 173 km^2 were sampled in 1997 (CRWMS M&O 1999a). Nine vegetation associations were identified and mapped (CRWMS M&O 1999a). Associations were grouped into two vegetation formations, reflecting the presence of species from the Mojave and Great Basin deserts at Yucca Mountain. Similar work was done at Little Skull Mountain to the east of Yucca Mountain in 1998 (CRWMS M&O 1999a).

To create a map of vegetation associations within the proposed land withdrawal area surrounding Yucca Mountain (CRWMS M&O 1998i), information from the CRWMS M&O (1999a) map was combined with a statewide map of land cover types (Utah State University 1996). Because the Yucca Mountain map was developed at a finer scale than the statewide map, some vegetation associations were combined to match the statewide classification system (Table 2-1).

Revegetation–Several studies were conducted to determine the feasibility of revegetating disturbed land at Yucca Mountain. Vegetation on drill pads, borrow areas, cutslopes, and other construction sites of different ages were compared to vegetation on undisturbed areas to describe natural plant succession on the disturbed sites (Angerer et al. 1994; Gabbert et al. 1995). The natural return to predisturbance canopy cover, regardless of species composition, might take as little as 20 years, an estimate Angerer et al. (1994) described as "optimistic," or may take hundreds of years. CRWMS M&O (1999i) reported the outcome of 11 experiments comparing various reclamation alternatives. Factors investigated included fencing, mulching, seeding (method and rate), topsoil (depth, layering, mixing, and source), water harvesting, transplantation, and irrigation (timing, frequency, and amounts). Reclamation trials at Yucca Mountain have emphasized differences in establishment rates among seeded species. Species that establish easily from direct seeding were identified, and other species that require dormancy-breaking treatment were targeted for additional study (Angerer et al. 1994; Blomquist and Lyon 1995; CRWMS M&O 1999i). Study results have also indicated that irrigation may be needed to improve seeded plant emergence and survival during drought years. The scarcity of topsoil in deserts has provided incentive for topsoil stockpiling during site characterization, a practice that may reduce soil viability. The effects of topsoil stockpiling on viability have been studied, and a report summarizing the results is being prepared.

2.1.2.2 Fauna

Studies were conducted from 1989 through 1997 to identify species of vertebrates found at Yucca Mountain and evaluate the impact on selected species or groups of species. Invertebrates were sampled during 1991 and 1992.

Table 2-1. Relationship Between Vegetation Associations Identified at Yucca Mountain (CRWMS M&O 1999a) and Land Cover Types Classified for Nevada (Utah State University 1996)

Vegetation Associations–Yucca Mountain	Land Cover Types–Nevada
Coleogyne ramosissima	Blackbrush
Ambrosia dumosa	Creosote–Bursage
Ambrosia dumosa–Larrea tridentata	Creosote–Bursage
Larrea tridentata–Ephedra nevadensis	Creosote–Bursage
Ephedra nevadensis–Ambrosia dumosa	Mojave Mixed Scrub
Menodora spinescens	Mojave Mixed Scrub
Artemisia tridentata	Sagebrush
Ambrosia dumosa–Atriplex confertifolia	Salt Desert Scrub
Eriogonum fasciculatum–Ericameria teretifolia	Spiny hopsage

Vertebrates–Terrestrial vertebrate species were studied during 1989–1997 to describe the populations and communities at Yucca Mountain and to examine the impact of site characterization activities on these animals. Information was collected on mammals, reptiles, birds, and invertebrates, but most work was done on desert tortoises (see Subsection 2.1.2.3), rodents, and lizards. In addition, lists of species have been compiled for reptiles (CRWMS M&O 1998d), mammals (Table 2-2), and birds (CRWMS M&O 1998f) observed at Yucca Mountain.

Rodents were studied using mark-recapture techniques on eight 3.8-ha plots from 1989 through 1994 and on four 3.8-ha plots from 1995 through 1997. Fourteen species were captured. At middle and higher elevations, the most common rodents were Merriam's kangaroo rats and long-tailed pocket mice; at lower elevations, the most common rodents were Merriam's kangaroo rats and little pocket mice. Abundance of rodents fluctuated greatly during this study. Evidence of the impact on these species from site characterization activities was limited to loss of habitat, as no evidence of an indirect impact was noted (CRWMS M&O 1997a, 1998b).

Lizards and snakes were captured from 1991 to 1995 using a variety of sampling techniques. Sampling was conducted throughout Yucca Mountain, but most was conducted within the three major low-elevation habitat types in and around Midway Valley. Twenty-seven (possibly 28) species of reptiles were observed. The most commonly captured lizards were side-blotched lizards and western whiptails, and the most commonly captured snakes were coachwhips and longnose snakes. The desert tortoise (ESA threatened) and western chuckwalla (former ESA candidate) were common in some areas. Effects of site characterization activities on populations of side-blotched lizards were evaluated by comparing changes in the number of animals of this species on control and treatment plots. Numbers declined about equally over time on both types of plots; therefore, there was no evidence of an impact due to site characterization activities (CRWMS M&O 1998c, 1998d).

Table 2-2. Mammals Seen at Yucca Mountain (CRWMS M&O 1999f)

Order Chiroptera: Bats	
Family Vespertilionidae: Vespertilionid Bats	
Myotis californicus-ciliolabrum	California or western small-footed myotis
Myotis thysanodes	fringed myotis
Myotis volans	long-legged myotis
Lasiurus cinereus	hoary bat
Pipistrellus hesperus	western pipistrelle
Antrozous pallidus	pallid bat
Family Molossidae: Free-tail Bats	
Tadarida brasiliensis	Mexican free-tail bat
Order Lagomorpha: Lagomorphs	
Family Leporidae: Hares and Rabbits	
Sylvilagus audubonii	desert cottontail
Sylvilagus nuttallii	mountain cottontail
Lepus californicus	black-tailed jack rabbit
Order Rodentia: Rodents	
Family Sciuridae: Squirrels	
Ammospermophilus leucurus	white-tailed antelope squirrel
Spermophilus tereticaudus	round-tailed ground squirrel
Family Geomyidae: Pocket Gophers	
Thomomys bottae	valley pocket gopher
Family Heteromyidae: Heteromyid Rodents	
Chaetodipus formosus	long-tailed pocket mouse
Perognathus longimembris	little pocket mouse
Perognathus parvus	Great Basin pocket mouse
Dipodomys deserti	desert kangaroo rat
Dipodomys merriami	Merriam's kangaroo rat
Dipodomys microps	chisel-toothed kangaroo rat
Family Muridae: Rats, Mice, and Voles	
Reithrodontomys megalotis	western harvest mouse
Peromyscus crinitus	canyon mouse
Peromyscus eremicus	cactus mouse
Peromyscus maniculatus	deer mouse
Peromyscus truei	pinyon mouse
Onychomys torridus	southern grasshopper mouse
Neotoma lepida	desert woodrat
Mus musculus	house mouse
Order Carnivora: Carnivores	
Family Canidae: Coyotes and Foxes	
Canis latrans	coyote
Vulpes velox (macrotus)	kit fox
Family Mustelidae: Mustelids	
Mustela frenata	long-tailed weasel
Taxidea taxus	badger
Spilogale gracilis	western spotted skunk
Family Felidae: Cats	
Lynx rufus	bobcat
Puma (Felis) concolor	mountain lion
Order Perissodactyla: Odd-toed Ungulates	
Family Equidae: Horses	
Equus asinus	wild burro
Order Artiodactyla: Even-toed Ungulates	
Family Cervidae: Deer	
Odocoileus hemionus	mule deer

A study was conducted during 1990–1995 to monitor changes in the abundance of lagomorphs and to evaluate whether these species were abundant enough to be collected for studies of radionuclide body burdens. During 1992, 1993, and 1994, lagomorphs were numerous, but during 1990, 1991, and 1995, abundance was low, and collection would have been difficult and expensive. Jackrabbit populations on the east and west sides of Yucca Mountain generally fluctuated in synchrony, and the correlation between precipitation and lagomorph abundance was high (CRWMS M&O 1996a).

Scent-station surveys were conducted during 1990–1992 to estimate relative abundance of predator species (EG&G/EM 1992, pp. 62–63; 1993, pp. 64–66). Kit foxes and coyotes were recorded most often. Western spotted skunks, badgers, long-tailed weasels, bobcats, and mountain lions were also recorded. Visits to scent stations were very low throughout the study. Additional information on the relative abundance of predators at Yucca Mountain was collected during lagomorph surveys (CRWMS M&O 1996a).

Surveys for bats were conducted at Yucca Mountain and elsewhere on the Nevada Test Site (NTS) during 1991–1993 to document the presence of the spotted bat, a candidate for ESA listing at that time. Seven (possibly eight) species of bats were captured near Yucca Mountain, but spotted bats were not captured or detected. Based on a literature review, nine other bat species may also occur in the area (CRWMS M&O 1998j).

A study of Gambel's quail was conducted during 1992–1993 to determine if quail could be collected regularly at Yucca Mountain to evaluate radionuclide body burdens. Quail were captured and marked with colored leg bands, and radio transmitters were attached to some. Data were collected on the number, sex, and age of quail captured and marked. In addition, survival, movement patterns, and nesting activity of radiomarked quail were monitored. A report summarizing this work is being prepared.

A database of birds observed by Yucca Mountain Site Characterization Project biologists has been maintained since January 1993. One-hundred and twenty species were observed at Yucca Mountain and the surrounding area. Twenty-two species regularly nest in the area. An additional twenty species were identified that may nest there occasionally. Most species were either transient or occasional visitors (CRWMS M&O 1998f).

Invertebrates–Surveys of invertebrates were started in 1991 to identify the most common invertebrate taxonomic groups, develop a reference collection, and evaluate the efficacy of several trapping techniques for sampling different invertebrate groups (EG&G/EM 1992, pp. 20-26). Invertebrates were sampled using light traps, pitfall traps, and Berlese funnel extraction. In 1992, new studies were initiated to measure the effect of distance from disturbance on invertebrate abundance and the relationships between invertebrates and specific host plants. These studies were conducted for only one year because of difficulties obtaining a statistically sufficient sample size. Appendix B is a list of invertebrate taxa captured during these studies.

Black-light traps were used for two consecutive nights in 16 study plots, four in each of four habitat associations (EG&G/EM 1992, pp. 20–26). Soil and litter samples were collected from these 16 plots, and invertebrates were extracted using Berlese funnels. Pitfall traps were used on

two plots, one in each of the creosotebush-burrobush and creosotebush-wolfberry-spiny hopsage vegetation associations. Each plot had 32 16-ounce plastic cups (traps) set in four lines, 10 m apart, that were open for 48 hours. Sweep-netting and opportunistic sampling were used to collect species not captured using the three sampling methods. Representative specimens within each taxonomic group were preserved.

Using black-light traps, specimens representing at least 45 families and 11 orders were captured (EG&G/EM 1992, pp. 21–22). Invertebrates were most numerous in the lower elevation creosotebush-burrobush and creosotebush-wolfberry-spiny hopsage vegetation associations. Butterflies and moths (order Lepidoptera) were the most abundant, followed by ants, bees, and wasps (Hymenoptera) and beetles (Coleoptera).

Invertebrates representing nine orders were collected from soil and litter samples (EG&G/EM 1992, pp. 23–24). The most common invertebrates captured using this method were mites and ticks. Of these specimens, 63 percent were collected on the creosotebush-wolfberry-spiny hopsage plots. Blackbrush and creosotebush-wolfberry-spiny hopsage vegetation associations had approximately the same abundance of invertebrates, while the fewest number were found in the creosotebush-burrobush plots.

Specimens from 15 orders were collected using pitfall traps (EG&G/EM 1992, pp. 23–25). The majority of organisms captured were Hymenoptera (mostly ants). Most of the animals captured were ants (order Hymenoptera), but spiders (Arachnida) and springtails (Collembola) were also common. Approximately three times as many invertebrate specimens were captured in pitfall traps on the creosotebush-wolfberry-spiny hopsage plot than on the plot in the creosotebush-burrobush association.

2.1.2.3 Special Status Species

Studies were conducted during 1989–1997 to collect additional data on the distribution, status, and ecology of species of special status at Yucca Mountain. These special status species include animals and plants that are, or were, classified as endangered, threatened, proposed, or candidates for listing under the ESA (50 CFR 17.11; 61 FR 7596–7613) or are otherwise protected under State of Nevada regulations (NAC Section 503), the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, or the Wild Free-Roaming Horses and Burros Act of 1971.

Special Status Plant Species–Beatley (1976) surveyed the flora of the NTS and surrounding region and described rare species. Beatley did not list any species known to occur at Yucca Mountain as rare and deserving special protection. Extensive searches by Blomquist et al. (1995) and Niles et al. (1995) confirmed that no ESA endangered, threatened, proposed, or candidate plants occurred in the vicinity of Yucca Mountain. No such plant species were found during more than 165 preactivity surveys conducted at Yucca Mountain during 1989–1996 (CRWMS M&O 1996b, p. 43). In addition, biologists working at Yucca Mountain on other studies did not observe any special status plant species other than several species of cacti and yucca that are protected from commercial collecting by the State of Nevada.

Desert Tortoise–The only resident animal species at Yucca Mountain protected under the ESA is the desert tortoise. The Mojave population of this species was listed as endangered in 1989 and reclassified as threatened in 1990 (55 FR 12178–12191). Desert tortoises are also classified as threatened by the State of Nevada (NAC Section 503.080). As a result of Federal protection for this species, the Yucca Mountain Site Characterization Project Office, in conjunction with formal Section 7 consultation with the U.S. Fish and Wildlife Service (FWS), initiated a desert tortoise monitoring program (Rautenstrauch, Cox et al. 1991; CRWMS M&O 1999b). The goals of this program were to assess and monitor the potential effects of site characterization activities on desert tortoises, evaluate and develop mitigation methods for minimizing the impact, and develop a better understanding of the status and ecology of the desert tortoise population at Yucca Mountain. To meet these goals, 211 tortoises were radiomarked and monitored at Yucca Mountain and a nearby unimpacted control area beginning in 1989 (CRWMS M&O 1999b). In addition, surveys were conducted prior to all ground-disturbing activities, and tortoises that could have been harmed were radiomarked, monitored, and relocated if necessary. Surveys for common ravens, a predator of small tortoises, were conducted during 1991–1995 (CRWMS M&O 1998h). The amount of desert tortoise habitat disturbed was also monitored (CRWMS M&O 1999e).

Field data collection efforts for the desert tortoise monitoring program were completed in September 1995, and final reports or publications for a number of these studies have been completed. Reports or publications on the following topics have been written: diet (CRWMS M&O 1995), distribution and abundance (EG&G/EM 1991a; Rautenstrauch, Brown et al. 1994; CRWMS M&O 1997d; Rautenstrauch and O'Farrell 1998), hibernation behavior (CRWMS M&O 1997b; Rautenstrauch, Rager et al. 1998), burrow use (CRWMS M&O 1997c), health and disease monitoring (Lederle et al. 1997; CRWMS M&O 1998g), survival (CRWMS M&O 1998e), efficacy of relocating tortoises away from construction sites (CRWMS M&O 1998a), effects of site characterization activities on desert tortoises (CRWMS M&O 1999b), and effects of site characterization activities on the abundance of ravens (Holt and Mueller 1994; CRWMS M&O 1998h). Reports on the following topics are being written: movement patterns (see also Rautenstrauch and Holt 1994; Holt and Rautenstrauch 1995), behavior of hatchlings, growth, and fecundity.

In addition, the Nevada Nuclear Waste Projects Office (NWPO) estimated the abundance of tortoises in and around Midway Valley in 1989 (Karl 1989).

Other Special Status Animal Species–The peregrine falcon (ESA endangered) and bald eagle (ESA threatened) have been observed on the adjacent NTS (Castetter and Hill 1979; Greger and Romney 1994a, p. 161), but they are migrant species and do not nest in the area. Between 1989 and 1996, no sightings of these two species were reported at Yucca Mountain. Golden eagles (protected under the Bald and Golden Eagle Protection Act) are commonly seen in the Yucca Mountain area. During surveys for common ravens, golden eagles were the third most common large bird sighted (CRWMS M&O 1998h). Similar sightings have been made on the adjacent NTS (Greger and Romney 1994a, p. 161). The mountain plover, an ESA candidate species, is an uncommon transient in the region (Alcorn 1988, p. 137) that has not been reported at Yucca Mountain.

With the exception of Gambel's quail, chukar, and greater roadrunners, which are nonmigratory, all bird species occurring at Yucca Mountain are protected by the Migratory Bird Treaty Act. CRWMS M&O (1998f) lists bird species found at Yucca Mountain and CRWMS M&O (1998h) includes counts of raptors seen during surveys for ravens.

Surveys for bats were conducted during 1991–1993 at Yucca Mountain and elsewhere on the NTS. Two species (long-legged myotis and fringed myotis) captured at Yucca Mountain were ESA candidates until 1996 (61 FR 7596–7613). Twenty-seven individuals of a third species (western small-footed myotis, also a former ESA candidate) may have been captured, but this species was difficult to differentiate from the California myotis. Spotted bats, which are considered threatened by the State of Nevada (NAC Section 503.030) and were ESA candidates until 1996, were neither seen nor heard (unlike most other bats, this species can be heard by humans) at Yucca Mountain, but were detected about 50 km north in higher-elevation regions of the NTS (CRWMS M&O 1998j).

No surveys for wild horses or burros have been conducted at Yucca Mountain. Wild burros were observed during lagomorph surveys on the west side of Yucca Mountain (CRWMS M&O 1996a) and are common in Crater Flat. They were seen on the main crest of Yucca Mountain at least twice during 1994–1995. Approximately 60 wild horses are present on the northern portion of the NTS (Greger and Romney 1994a, pp. 150–159), but none were sighted in the Yucca Mountain area during 1981–1985 or 1989–1997.

Animals classified as game by the State of Nevada (NAC 503.020 and 503.045) occur in the region, including Gambel's quail, chukar, mourning doves, American coots, waterfowl, mule deer, mountain lions, and desert and mountain cottontail. Bobcats and kit foxes are the only state-designated furbearers (NAC 503.025) that occur in the area. Most of these species are found in very low abundance at Yucca Mountain. Waterfowl generally are restricted to open water, such as the man-made ponds near Yucca Mountain, and are rarely seen except during migratory periods. Mule deer are rarely seen near Yucca Mountain, but are common on the northern half of the adjacent NTS (Giles and Cooper 1985). During site characterization, lagomorph surveys were conducted (CRWMS M&O 1996a) and a Gambel's quail study focusing on survival, movements, and nesting activity was conducted in 1992 and 1993. Bighorn sheep and pronghorn occur on the adjacent Nellis Air Force Range (U.S. Department of the Air Force 1998, pp. 3.8-31 through 3.8-32), but are rare or absent on the NTS (O'Farrell and Emery 1976, p. 58) and have not been seen at Yucca Mountain.

2.1.3 Thermal Loading

The placement of radioactive waste in a geologic repository will result in the heating of rock and soil above the repository over a long period, a phenomenon described as thermal loading. Thermal loading is of concern from a repository performance viewpoint because it may affect the properties of the surrounding rock matrix and the long-term integrity of the metal-canister storage system. Various combinations of heat and moisture can change the corrosion rates of storage-system components, thus influencing the metal canister storage capability (NWTRB 1995a, pp. 50–51). Heat generated by radioactive waste could also influence the natural flow of gas and moisture through the soil and rock of the mountain, both deep within the bedrock and at the soil surface (Wu et al. 1995). Increases in temperatures are expected to be

lowest near the soil surface and greatest near the drifts and along fault lines that allow transport of heat. Fault lines and fractures containing water could also serve as conduits of heat to the surface in very localized areas (Wu et al. 1995). Soil biota, vegetation, and animals above the repository could be affected by repository heat. Changes in these ecosystem components could then influence plant growth, plant water use, infiltration rates, mortality, recruitment, and other ecosystem processes.

Models of the impact of waste heat on near-surface soil temperatures indicate that the magnitude of temperature increase will be greatest within the repository footprint on Yucca Mountain (Bodvarsson and Bandurraga 1996; Robinson et al. 1999). Heat flux at the surface is expected to be greatest at the center of the repository and to gradually decrease near the edges, reaching pre-emplacement values approximately 500 m from the perimeter. Near-surface soil temperatures are expected to begin to increase approximately 200 years following waste emplacement and reach a maximum in approximately 900 - 1,000 years (Bodvarsson and Bandurraga 1996; Robinson et al. 1999). Surface temperatures are then projected to gradually decrease and approximately reach pre-emplacement conditions after 10,000 years (Robinson et al. 1999, figure 4-13).

Models of the impact of waste heat on near-surface soil temperatures have produced varying results. Predicted increases have ranged from approximately 10°C at the bedrock-soil interface (Bodvarsson and Bandurraga 1996, p. 510) to 6°C for dry soil at a depth of 2 m (Robinson et al. 1999). Discrepancies between model predictions may be an artifact of the coarse grid-cell size used by Bodvarsson and Bandurraga (1996).

In an attempt to address soil heterogeneity (differences in depth, and water content), Robinson et al. (1999) modeled soil temperature increases at various depths under wet and dry soil conditions. They predicted increases of 0.2, 0.4, and 0.8°C at depths of 0.5 m, 1 m, and 2 m, respectively, for wet soil conditions. At depths of 0.5 m, 1 m, and 2 m, they predicted increases for dry soil of 1.5, 3, and 6°C, respectively; however, these temperature predictions are not well constrained due to uncertainties in the thermal properties of the soil, particularly thermal conductivity, and hence thermal diffusivity (Robinson et al. 1999).

Studies of Thermal Loading Effects at Yucca Mountain–In April 1997, a field study was implemented within the proposed repository footprint and on land adjacent to the footprint at a lower elevation. Eight sites were selected along a naturally occurring gradient of temperature and moisture to evaluate the magnitude of temperature variation experienced by plant and soil biota. The goal of the study was to obtain information that could be used to develop inferences about how the ecosystem could change as a result of soil temperature increases induced by thermal loading. Objectives were to compare the natural variation in soil temperature at Yucca Mountain to the soil temperatures predicted by the modeling studies (Bodvarsson and Bandurraga 1996; Robinson et al. 1999); describe biotic and abiotic soil processes across the temperature gradient; examine plant-water stress, plant production and abundance, and species composition across the gradient; and describe the distribution of plant species relative to the soil temperature gradient.

At each site, soil temperature and moisture were measured at depths of 15 and 45 cm, and differences in plant community and ecosystem processes were evaluated. Measurements

included vegetation cover, density, and aboveground biomass production. Soil samples were collected for analysis of mineral nutrients and organic carbon content. Microbial biomass was determined from soil samples collected in June 1997, March 1998, and June 1998. Litter bags were placed on a subset of plots to evaluate temperature effects on decomposition rates. Plant water relations were assessed in May, July, and October 1997, and in March, May, and July 1998. Preliminary results of the study are available in CRWMS M&O (1999c), and conclusions are summarized below.

- The rise in soil temperature is predicted to be gradual and vary with soil moisture content. Soil temperature increases for wet soils are predicted to be minimal and should not affect biological activity at Yucca Mountain; however, very dry soil conditions are common, making it likely that soil temperature increases will be in the range predicted for dry soils for most of a typical year.

- Soil temperatures predicted by Robinson et al. (1999) for dry soil (at depths of 15 and 45 cm) generally are within the range of natural soil temperatures measured.

- Soil microbial populations appeared to be sensitive to increases in soil temperature; however, no relationship between soil nutrients and soil temperature was detected.

- Soil temperature increases at a depth of 2 m are predicted by Robinson et al. (1999) to be high enough that plant growth and productivity may be affected. This could cause indirect effects of soil temperature on microbial activity and nutrient cycling through reductions in plant litter input. Temperature increases at the bedrock surface predicted by Bodvarsson and Bandurraga (1996) exceed the range of natural temperature variation and would likely have profound effects on the ecosystem in areas where soils are shallow.

- Even though predicted temperature increases are gradual, cumulative temperature increases and prolonged drought periods may affect vegetation; however, there is evidence to suggest that some species will persist in xeric microhabitats and others will persist in less affected areas. There may be shifts in species ranges and/or changes in dominance from perennial to annual communities.

A final thermal loading report is being prepared.

Soils–An increase in soil temperatures from subsurface heat could affect ecosystem structure and function over time. Results of several ecosystem models and a limited number of soil heating studies suggest that ecosystem response to increased temperatures may depend strongly on changes in soil processes involving microbial action and nutrient cycling (e.g., Peterjohn et al. 1993; Anderson 1991; Zak et al. 1994). The rates at which these processes occur place important constraints on ecosystems (O'Neill 1994).

Much of the area within the footprint consists of steep, rocky slopes with shallow soils that are generally low in organic matter (YMP 1996, pp. 4-1 through 4-2). Soils and sediments are generally derived from volcanic rocks (primarily volcanic tuffs). Calcic horizons (caliche) typically form at relatively shallow depths (YMP 1996). With time, caliche deposits become

hardened and form a barrier to the downward flux of water (Smith, Monson et al. 1997, p. 18). This often limits root growth to the uppermost soil layers where air temperature has the greatest influence on soil temperatures.

Mean summer air temperatures in the region range from 22 to 32°C, with maximum temperatures reaching as high as 43–49°C (DOE 1996b, pp. 2-3 through 2-5; Rundel and Gibson 1996, p. 47). Long periods of cloudless weather at Yucca Mountain result in high solar loads, which cause high soil surface temperatures, especially during periods of drought. Low humidity and dry soils result in rapid heating and cooling of the soil surface, causing large diurnal temperature fluctuations. Winters are moderately cold, and soil freezing occurs. Mean winter temperatures range from 3 to 10°C (DOE 1996b, pp. 2-3 through 2-5). The minimum recorded temperature at Yucca Mountain is -13.1°C (DOE 1996b, p. 2-4); thus, soil biota at Yucca Mountain must tolerate high variability in diurnal and seasonal temperatures and in seasonal moisture availability. Soils at Yucca Mountain have little organic matter, which helps buffer those perturbations. Due to high variability in precipitation and temperature in desert ecosystems, some microbial species may already be near or at the limits of their physiological tolerances (Whitford 1996). Additional heat input to the system at Yucca Mountain may exceed those tolerance limits and change microbial species composition and ecosystem functions.

Studies of the effects of increased soil temperature in other ecosystems have shown effects on carbon dioxide efflux, nitrogen availability, decomposition rates, and net carbon concentrations in the soil. These effects change over time and with plant species composition (Van Cleve et al. 1990; Peterjohn et al. 1993; McHale et al. 1996). In desert ecosystems, where primary productivity is low, soil organic matter may decrease if elevated soil temperatures stimulate decomposition rates more than the rate of organic matter production. This in turn could result in carbon limitation for the soil microbial community (Zak et al. 1994). Van Cleve et al. (1990) measured a decline in forest floor biomass with increasing soil temperature in Alaska black spruce forests. Consequently, nitrogen and other nutrient concentrations of the forest floor and soil solution were increased, reflecting greater microbial decomposer activity. Similar temperature-induced effects on decomposition and nitrogen availability could occur at Yucca Mountain with increased subsurface temperatures. Primary production in desert ecosystems generally is limited by nutrient availability, particularly nitrogen (Schlesinger et al. 1990); thus, an initial increase in nitrogen availability may stimulate plant growth. Much of the nitrogen, however, may be lost through erosion, ammonia volatilization, nitrification, and denitrification (Peterjohn and Schlesinger 1990; National Science Foundation 1991). Denitrification also increases with soil temperature, resulting in a greater loss of molecular nitrogen and nitrous oxide from soils (National Science Foundation 1991); thus, it is unlikely that an initial increase in available nitrogen would persist (due to depletion of organic nitrogen pools in the soil). Such effects would reduce the amount of nitrogen in soils at Yucca Mountain. The magnitude and direction of change in these soil nutrients and related processes that could be caused by increased soil temperatures are difficult to predict for Yucca Mountain, especially over the long term.

Plant Communities–Over the long term, soil warming may affect plant growth, competitive interactions, plant species composition, and community structure. Increased soil temperatures may cause changes in plant phenology and affect the timing and length of the growing season (Peterjohn et al. 1993). Differential responses of plant species at Yucca Mountain to increased subsurface temperatures are likely to occur, resulting in changes in competitive interactions

among species, which would affect local abundance and distribution of species. Small plants and seedlings can be strongly affected by increased soil temperatures (Nobel and Geller 1987), and most native species have specific soil temperature and moisture requirements for germination (Johnson et al. 1978). A detailed description of current plant communities at Yucca Mountain is provided in a report by CRWMS M&O (1996b).

Changes in community composition or productivity may affect water infiltration and other hydrologic parameters that could affect repository performance. Smith, Herr et al. (1995) studied soil-plant-water relations of six dominant shrubs on three geomorphically distinct surfaces at a site located 13 km west of Yucca Mountain. They concluded that the combined effects of evaporation from soil surfaces and transpiration from leaves used most, if not all, available moisture from precipitation events; thus, the uptake of water by plants influences the amount of water infiltrating into Yucca Mountain. Effects of soil warming beyond the range of natural variability could also affect soil-plant-water relations at Yucca Mountain.

Dominant Plant Species–Plant species found within the repository footprint were described in CRWMS M&O (1996b). To understand mechanisms involved in the response of a species and its influence on community level dynamics, an understanding of individual species growth and physiological responses to elevated soil temperatures is needed. For example, root and shoot growth are sensitive to temperature change, and each species has an optimal temperature for root and shoot growth. When soil moisture is high, many Mojave and Great Basin desert species exhibit rapid rates of root elongation (Wallace and Romney 1972). These rates are temperature dependent and often decrease sharply when subjected to above-optimum soil temperatures (Wallace and Romney 1970; Bowen 1991). Shoot growth responds strongly to changes in root zone temperatures due to effects on transport mechanisms of water and ions, which affect leaf water potential and stomatal behavior (Bassiriad et al. 1991). Most annual species have specific soil temperature and moisture requirements for germination. Tolerance limits and differential responses of species to changes in soil temperature may in turn affect community-level dynamics such as competition and susceptibility to herbivory.

Wallace and Romney (1970) showed that big sagebrush, spiny hopsage, and winterfat decreased growth when soil temperatures were increased from 16 to 28°C; however, creosotebush, desertholly, and burrobush increased growth within this temperature range. It is therefore difficult to predict how an increase in temperatures beyond the normal range of variability at Yucca Mountain would affect plant densities and species composition. Increased soil temperatures may have a greater effect on cold desert species; however, ecophysiological patterns in the warm desert species may also be affected because soil temperature plays an intimate role in the energy budgets of plants.

Desert Tortoise–Desert tortoises lay eggs in nests which they excavate in the soil, and the warm soil provides the thermal energy necessary for successful development of the eggs. The gender of most vertebrates is genetically determined, but some reptiles, including the desert tortoise, exhibit temperature-dependent sex determination (Bull 1980; Janzen and Paukstis 1991; Spotila et al. 1994). This means that nest temperatures affect sex determination. Further, nest temperatures have been shown to influence hatching, growth, and behavior of turtle hatchlings (e.g., Janzen 1993, 1995; Bobyn and Brooks 1994). An increase in soil temperature at Yucca Mountain from thermal loading, or from a combination of thermal loading and global climate

changes, therefore, may directly influence the sex ratio and other aspects of the life history (see Janzen 1994) of the desert tortoise population over the repository footprint.

Constant incubation temperatures of 26.0–30.6°C result in mostly male desert tortoise hatchlings and higher temperatures of 32.8–35.3°C will produce mostly females. Constant incubation temperatures above 35.3°C result in high mortality of eggs, and the hatchlings from eggs incubated at high temperatures are weak and die within 45 days (Spotila et al. 1994). These experimental data do not adequately represent the large fluctuations in incubation temperatures in natural settings. During 1993 (19 nests) and 1994 (12 nests), incubation temperatures were recorded at Yucca Mountain.

2.1.4 Wetlands

An assessment of springs and other wetlands has been conducted for the NTS (Hansen et al. 1997). The nearest spring to Yucca Mountain is Cottonwood Spring, which is on the upper western slope of Fortymile Canyon about 6 km north of Exile Hill. There are no naturally occurring wetlands at Yucca Mountain; however, riparian vegetation occurs at four man-made well ponds near Yucca Mountain on the west side of Jackass Flats. These ponds are briefly described in a report by CRWMS M&O (1998j).

Based on a field inspection in October 1989, the U.S. Army Corps of Engineers determined that some ephemeral washes at Yucca Mountain may be classified as Waters of the United States, as defined in Section 404 of the Clean Water Act. Modifications of these washes during site characterization activities were covered under Nationwide General Permit 26, which allows small modifications of waters above headwaters and of isolated waters and wetlands (U.S. Department of the Army, Correspondence from Robert W. Junnell, Chief, Regulatory Unit 2, Sacramento District Office, Corps of Engineers to Glen Doyle, Nevada Operations Office, DOE. Letter Number 1989000128, November 15, 1989, NNA.19891214.0008).

2.2 REGION SURROUNDING YUCCA MOUNTAIN

2.2.1 Flora

Beatley (1976, pp. 23–79), O'Farrell and Emery (1976, pp. 34–43), Niles et al. (1995, pp. 8–12), and DOE (1996a, pp. 4-136 through 4-138) provide general descriptions of the environment and biological resources on the NTS and the region surrounding Yucca Mountain. Vegetation in the region is dominated by Mojave Desert plant communities below 1,200 m and by communities composed of Mojave and Great Basin desert floras at higher elevations and has been described in detail by Beatley (1969, 1974a, 1974b, 1975, 1976). Areas containing communities dominated by white fir occur in the Spring Mountains and in the central Belted Range (Beatley 1976, pp. 68–70), and higher elevation areas in the Spring Mountains contain stands of ponderosa pine, limber pine, white fir, and Great Basin bristlecone pine (USDA 1996, pp. III-53a). The vegetation in the region surrounding Yucca Mountain was described by the Nevada and California Gap Analysis projects. A digital map of land cover types (CRWMS M&O 1999d) in the area surrounding Yucca Mountain has been developed based on data obtained from Utah State University (1996) for Nevada and the University of California (1994) for California.

Appendix C contains a description of the land cover types that occur within the region surrounding Yucca Mountain.

Previous plant ecology research conducted on the NTS, including that from Rock Valley, has recently been integrated into a thorough description of ecological research on the NTS (Rundel and Gibson 1996). In addition, DOE (1992) summarizes studies done on the NTS to evaluate the impact of radiation on plants and animals. Plant succession in the Mojave Desert was studied in an abandoned mining town about 28 km east of Yucca Mountain (Wells 1961; Webb and Wilshire 1980). These studies of succession show that the return to predisturbance floristics and structure will take about 100 years and will vary with the severity of disturbance.

2.2.2 Fauna

Vertebrates–Vertebrate animal communities in the region surrounding Yucca Mountain are typical of the northern Mojave and southern Great Basin deserts. Alcorn (1988) describes the birds of Nevada, and Hayward et al. (1963) describe birds observed on the NTS. Norris and Schreier (1982) compiled a checklist of 346 birds observed at Death Valley National Park.

The most extensive work on the mammals of Nevada was published by Hall (1995). Jorgensen and Hayward (1965) and Medica (1990) describe the mammals that occur on the NTS. A checklist created by the Death Valley Natural History Association (undated) includes 51 species of mammals that occur at Death Valley National Park.

Linsdale (1940) lists the reptiles of Nevada, and Tanner and Jorgensen (1963) describe the reptiles known to occur on the NTS. Tanner and Jorgensen (1963, p. 7) state that no amphibians have been recorded on the NTS; however, distribution maps by Stebbins (1985, pp. 67, 74, and 81) suggest that a few (e.g., Great Basin spadefoot toad, red-spotted toad, and Pacific treefrog/chorus frog) may occur there. The checklist created by the Death Valley Natural History Association (undated) includes 5 species of amphibians and 36 species of reptiles that occur in Death Valley National Park. Of these, only the desert tortoise is ESA-listed. A population of neotenic tiger salamanders has been introduced into Specie Spring on the northeast edge of the Bare Mountains.

Invertebrates–O'Farrell and Emery (1976, pp. 44–47) list the reports that describe invertebrates found on the NTS.

2.2.3 Special Status Species

The Nevada Natural Heritage Program (NNHP) maintains a database listing the locations of rare, threatened, endangered, and special status species throughout Nevada (NNHP 1997). In California, a database listing the locations of rare, threatened, endangered, and special status species (Natural Diversity Data Base) is maintained by the Natural Heritage Division of the California Department of Fish and Game (1997). In addition to these databases, individual land management agencies (e.g., Bureau of Land Management [BLM], Forest Service, FWS, and Death Valley National Park) also maintain lists of special status plant and animal species found on lands under their jurisdiction. Most of the Federally-endangered or threatened species in the Yucca Mountain area are located in the vicinity of the Ash Meadows National Wildlife Refuge.

The status of plant species on the NTS and surrounding areas that were considered candidates for listing under ESA is thoroughly reviewed in Blomquist et al. (1995). In addition, Niles et al. (1995) reported additional former candidate species found in the Bare Mountain area west of Yucca Mountain. During 1993–1995, The Nature Conservancy conducted plant surveys on the Nellis Air Force Range, with emphasis placed on classifying community types and finding locations of special status plant species (DOD 1994, 1995, 1996).

The only resident animal species in the region surrounding Yucca Mountain that is protected under the ESA and is not associated with springs in Oasis Valley, Ash Meadows, or Death Valley is the desert tortoise. Desert tortoises are also classified as threatened by the states of Nevada and California. The northern limit of the range of the desert tortoise is approximately 10 km north of Yucca Mountain (Rautenstrauch, Brown et al. 1994). The desert tortoise is found in suitable habitat to the south, east, and west of Yucca Mountain, generally at elevations below 1,600 m. Tortoises throughout the area are found in relatively low abundance (Karl 1981, 1989; Schneider et al. 1985; EG&G/EM 1991a; CRWMS M&O 1997d; Rautenstrauch and O'Farrell 1998).

The peregrine falcon (ESA endangered) and bald eagle (ESA threatened) have been observed in the region surrounding Yucca Mountain and on the NTS (Castetter and Hill 1979; BLM 1998, p. 3-35; Greger and Romney 1994a, p. 161), but they are migrant species and do not nest in the area. Golden eagles are commonly seen in the region surrounding Yucca Mountain (e.g., on the NTS; Greger and Romney 1994a, p. 161); however, golden eagles only nest in the more northern counties of Nevada (Alcorn 1988). During common raven surveys at Yucca Mountain and Bare Mountain, golden eagles were the third most common large birds sighted (CRWMS M&O 1998h). The mountain plover, a former ESA candidate species, is considered an uncommon transient in the region (Alcorn 1988, p. 137).

Steen et al. (1997) summarize information on the distribution of eight special status animal species (chuckwalla, western burrowing owls, and six bat species) on the NTS.

Hunted game species represent potential pathways of radionuclides to humans. Hunting is not allowed on the NTS or on Nellis Air Force Range. There are opportunities for hunting both mammal and bird game species on land managed by the BLM in Crater Flat and elsewhere in the region. The Nevada Division of Wildlife (NDOW) conducts wildlife surveys in areas accessible to their staff (personal communication, M. Cox, NDOW, February 18, 1997, MOL.19990111.0161 to MOL.19990111.0162). Yearly reports, available from the NDOW, detail results of that agency's survey efforts and of harvest levels. These reports include the Federal Aid Reports; Big Game Status and Quota Recommendations; and upland game, furbearers, waterfowl, and mountain lion status reports. The BLM also periodically surveys huntable wildlife populations, and results of those surveys may appear in Resource Management Plans. Species potentially hunted in the area surrounding Yucca Mountain include elk, mule deer, bighorn sheep, pronghorn, black-tailed jackrabbits, desert and mountain cottontails, waterfowl, chukar, Gambel's quail, and mourning doves.

Information on the distribution and relative abundance of horses and burros in the area surrounding Yucca Mountain is available in BLM Resource Management Plans (BLM 1979, pp. 2-42 through 2-45; BLM 1980, Map 8 and Table 5; BLM 1994a, Appendices 10A and 10B,

Maps 18 and 19; BLM 1998, Tables 2-9 and 3-22, and Map 2-1), or the Spring Mountains National Recreation Area General Management Plan (USDA 1996, pp. III-67 through III-69). Some of these plans are not current, and some populations have been reduced through trapping or roundup efforts, and local resource managers should be consulted for current information. Information about horses on the NTS is included in Greger and Romney (1994a, pp. 150–159).

2.3 SPRINGS AND RIPARIAN ZONES IN THE REGIONAL GROUNDWATER BASIN

2.3.1 Ash Meadows Region

The Ash Meadows region is located about 65 km south of Yucca Mountain (Figure 1-1) at the southern end of the Amargosa Valley. The area is characterized by springs, meadows, riparian vegetation, and saline soils. The Ash Meadows area is considered an important biological resource because it provides habitat for species that were more common in that region during Pleistocene pluvial periods and because it is a rare source of water for wildlife in this arid region. Biological resources at Ash Meadows are protected under two jurisdictions. The National Park Service controls a small area around Devils Hole as part of Death Valley National Park. The FWS manages Ash Meadows National Wildlife Refuge.

Devils Hole is a spring in the mouth of a limestone cave located near the eastern edge of Ash Meadows National Wildlife Refuge (Figure 1-1). The Devils Hole pupfish is endemic to Devils Hole. Various aspects of the natural history of this species have been summarized (Minckley and Deacon 1975; Soltz and Naiman 1978; FWS 1990).

The Devils Hole pupfish was listed as a federally endangered species in 1967. The Recovery Plan for the Endangered and Threatened Species of Ash Meadows, Nevada (FWS 1990) identifies critical habitat, threats to the species (primarily exotic species and lowering water levels), and additional research conducted on this species. A general reference on desert fishes (Naiman and Soltz 1981) describes evolution, natural history, and conservation of many desert fish, including the Devils Hole pupfish.

Thirty-two extant species are endemic to Ash Meadows (FWS 1990). These include 1 plant and 4 fish species that are listed as endangered; 6 plant and 1 insect species that are threatened; and 4 plant, 1 mammal, 2 insect, and 13 snail species that are former ESA candidates (FWS 1990). One endemic fish is known to be extinct (FWS 1990). Descriptions of the natural history, reasons for decline, critical habitat, references to research, and research needs for these species are detailed in FWS (1990).

Water-level monitoring at Ash Meadows is conducted by the U.S. Geological Survey (USGS) (Dudley and Larson 1976), and population sizes of special status species are monitored by FWS personnel. A library of reports and published articles is maintained at Ash Meadows at Refuge Headquarters. In addition, species lists (e.g., birds, mammals, reptiles, and amphibians) are maintained and updated. The Nature Conservancy recently published a checklist of the vascular plants at Ash Meadows (The Nature Conservancy 1996).

2.3.2 Death Valley

Death Valley National Park is a large federal reserve (1.3 million ha) located in eastern California and south central Nevada (Figure 1-1). The eastern edge of the park is located approximately 35 km southwest of Yucca Mountain. The park headquarters is located at Furnace Creek approximately 60 km southwest of Yucca Mountain.

The eastern edge of Death Valley is generally bounded by the rugged Amargosa Range (composed of the Grapevine, Funeral, and Black mountains). Many springs occur in and along the west side of these mountains. Springs in the Grapevine Mountains are too far north to receive water flowing under or near Yucca Mountain (D'Agnese et al. 1997, p. 65). Some springs in the Funeral and Black Mountains may be fed by the deep carbonate aquifer below Yucca Mountain, and Death Valley is the regional discharge for groundwater in that aquifer (DOE 1996a, Paragraph 4.1.5.2; Johannesson et al. 1996; Bedinger and Harrill 1998, Figure 2 and pp. 18–22). Johannesson et al. (1996) observed chemical similarities between the ground waters of the NTS and Yucca Mountain regions and ground waters of the regional carbonate aquifer that discharges at Ash Meadows and Death Valley, suggesting that these waters mix.

The springs in Death Valley provide habitat for many animal species. The Death Valley Natural History Association (undated) provides a checklist that includes six species of fish, two of which (both pupfish) occur in springs in Death Valley proper. The Salt Creek pupfish occurs in Salt Creek in the center of Death Valley, and the Cottonball Marsh pupfish occurs in Cottonball Marsh on the eastern edge of Death Valley. Soltz and Naiman (1978) describe these and other fishes in the region and review information on their ecology and conservation. Hershler (1985) conducted a survey of springs in the Death Valley region and reports on the diversity of snail species encountered, including several new species. The Death Valley Natural History Association checklist includes 5 species of amphibians and 36 species of reptiles. Bradley and Deacon (1971) surveyed the small mammals at Saratoga Springs (extreme southern end of Death Valley) and report on the ecology and habitat preferences of 20 species. While this spring may be beyond the influence of Yucca Mountain groundwater, the species composition of the small mammal community was likely representative of springs farther north. At Saratoga Springs, they recorded six species of rodents and six species of bats, none of which are threatened, endangered, or have other special status. Although no big-eared bats (a former ESA candidate) were found, they are most likely found near open water in Death Valley. Two ESA endangered species of birds, the southwestern willow flycatcher and least Bell's vireo occur at some springs in Death Valley. A third species that occurs in riparian areas in Death Valley, the California yellow-billed cuckoo, is listed as endangered under the California ESA of 1984 (U.S. National Park Service 1998).

2.3.3 Oasis Valley

Oasis Valley is located approximately 26 km west-northwest of Yucca Mountain (Figure 1-1) and extends southward from the town of Springdale for approximately 15–20 km to the town of Beatty. Most of the Oasis Valley region is administered by the BLM, but much of the land along the Amargosa River and many of the springs are privately held (BLM 1994a).

Springs and the Amargosa River in Oasis Valley provide habitat for several special status species, and the BLM has designated 198 ha (13 units averaging more than 15 ha each) as Areas of Critical Environmental Concern (ACEC) (BLM 1994a, Appendices 16 and 17, Map 27). Two former ESA candidates, the Amargosa toad and an undescribed subspecies of speckled dace, the Oasis Valley speckled dace, are restricted to Oasis Valley. Considerable monitoring has been done in the Oasis Valley area for the Amargosa toad since the early 1980s (Maciolek 1983; Hoff 1996; Clemmer 1995; Stein 1996). The valley also provides habitat for a former Category 2 plant species, the Funeral Mountain milkvetch, and the threatened desert tortoise. Other special status species that use Oasis Valley water include mule deer, bighorn sheep, and wild horses and burros (BLM 1994a, pp. 3.4 through 3.5, Maps 12 and 13). Migrant birds, including listed species, probably use water sources in the area.

2.4 TRANSPORTATION CORRIDORS

Potential rail corridors (Figure 1-2), heavy-haul routes (Figure 1-3), and intermodal transfer stations (Figure 1-3) in the State of Nevada lie primarily on lands managed by the BLM; thus, the most comprehensive descriptions of the biological resources within and near these corridors are BLM-produced documents, including Wilderness Reports, Resource Management Plans (and their precursors), associated EISs, and supplemental information provided by BLM personnel. Other sources of information are EISs and other reports written by or for other agencies (e.g., DOE and U.S. Air Force), databases of biological resources maintained by state and Federal agencies, and publications summarizing the distributions and ranges of plant and animal species in Nevada (e.g., Linsdale 1940; Alcorn 1988; Hall 1995).

For each BLM Resource Area (including Nellis Air Force Range), plans and an associated EIS have been developed (Table 2-3). Each management plan describes the natural resources found in a Resource Area, including game and protected species. Each plan also describes a proposed management strategy for the area, as well as several alternative strategies. Comparable information on natural resources on the NTS is found in the EIS for that site (DOE 1996a). Supplemental information on biological resources on BLM-managed land has been obtained during conversations between CRWMS M&O and BLM personnel.

Additional information on the location of sensitive biological resources in Nevada has been compiled by several organizations. In addition to the Resource Management Plans, some BLM District Offices maintain databases of sensitive species vulnerable to collection. The NNHP maintains a database of rare and sensitive species found in Nevada (NNHP 1997) and a similar database is available for California (California Department of Fish and Game 1997). The information in these databases is obtained from many sources, including state and federal agency biologists, university personnel, private consultants, and publications.

Information on ESA threatened, endangered, proposed, and candidate species within Nevada is available from NNHP (1997), the Nevada field office of the FWS, documents in Table 2-3, and other documents described above. The most wide-ranging ESA-listed species within or near the transportation corridors is the desert tortoise. Bury et al. (1994) discusses the distribution of desert tortoises in the eastern Mojave Desert, including Nevada. BLM (1992b, Table 3-13) categorizes desert tortoise habitat in the region into three classes of relative importance, and BLM (1992b, pp. 3-32 through 3-35 and Map 3-12; 1994b, pp. 3-15 through 3-20; BLM 1998,

Table 2-3. Transportation Corridors and Facilities, BLM Resource Areas and Other Federal Land-Management Areas Within Which Corridors and Facilities are Located, and Documents Describing Biological Resources Within Each Area

Transportation Corridor/Station	Resource Area(s)	Documents[1]
Caliente Rail Route	Caliente	*Caliente Environmental Statement, Proposed Domestic Livestock Grazing Management Program: Final* (BLM 1979)
	Schell	*Draft and Final Schell Grazing EIS* (BLM 1982a, b)*Schell Resource Area Decision Summary and Record of Decision* (BLM 1983b)
	Tonopah	*Proposed Tonopah Resource Management Plan (RMP) and EIS* (BLM 1994a)
Caliente-Chalk Mountain Rail Route	Caliente	*Caliente Environmental Statement, Proposed Domestic Livestock Grazing Management Program: Final* (BLM 1979)
	Schell	*Draft and Final Schell Grazing EIS* (BLM 1982a, b) *Schell Resource Area Decision Summary and Record of Decision* (BLM 1983b)
	Tonopah	*Proposed Tonopah RMP and EIS* (BLM 1994a)
	Nellis Air Force Range	*Nellis Air Force Range Resource Plan and EIS* (BLM 1989, 1990, 1992a)
		An Inventory for Rare, Threatened, Endangered, and Endemic Plants and Unique Communities on Nellis Air Force Bombing and Gunnery Range (DOD 1994, 1995, 1996)
		Renewal of the Nellis Air Force Range Land Withdrawal Draft Legislative EIS (U.S. Department of the Air Force 1998)
Carlin Rail Route	Elko	*Draft Elko Resource Area RMP and EIS* (BLM 1985)
		Final Elko Proposed RMP and Final EIS Elko Resource Area (BLM 1986)
		Elko RMP Record of Decision (BLM 1987b)
	Shoshone-Eureka	*Draft Shoshone-Eureka RMP and EIS* (BLM 1983a)
		Shoshone-Eureka RMP EIS: Final (BLM 1984)
		Draft Shoshone-Eureka RMP Amendment (BLM 1987a)
	Tonopah	*Proposed Tonopah RMP and EIS* (BLM 1994a)
Jean Rail Route	Stateline	*Draft Stateline RMP and EIS* (BLM 1992b)
		Supplement to the Draft Stateline RMP and EIS (BLM 1994b)
		Proposed Las Vegas RMP and Final EIS (BLM 1998)
Valley Modified Rail Route	Las Vegas	*Draft Stateline RMP and EIS* (BLM 1992b)
		Supplement to the Draft Stateline RMP and EIS (BLM 1994b)
		Proposed Las Vegas RMP and Final EIS (BLM 1998)
Apex/Dry Lake Heavy Haul Route	Las Vegas	*Draft Stateline RMP and EIS* (BLM 1992b)
		Supplement to the Draft Stateline RMP and EIS (BLM 1994b)
		Proposed Las Vegas RMP and Final EIS (BLM 1998)
		Northern and Western Las Vegas Beltway: Tier 1 Final EIS and Corridor Location Study (FHA 1996)

Table 2-3. Transportation Corridors and Facilities, BLM Resource Areas and Other Federal Land-Management Areas Within Which Corridors and Facilities are Located, and Documents Describing Biological Resources Within Each Area. (Continued)

Transportation Corridor/Station	Resource Area(s)	Documents[1]
Caliente Heavy Haul Route	Caliente	*Caliente Environmental Statement, Proposed Domestic Livestock Grazing Management Program: Final* (BLM 1979)
	Tonopah	*Proposed Tonopah RMP and EIS* (BLM 1994a)
Caliente-Chalk Mt. Heavy Haul Route	Caliente	*Caliente Environmental Statement, Proposed Domestic Livestock Grazing Management Program: Final* (BLM 1979)
	Nellis Air Force Range	*Nellis Air Force Range Resource Plan and EIS* (BLM 1989, 1990, 1992a)
		An Inventory for Rare, Threatened, Endangered, and Endemic Plants and Unique Communities on Nellis Air Force Bombing and Gunnery Range (DOD 1994, 1995, 1996)
		Renewal of the Nellis Air Force Range Land Withdrawal Draft Legislative EIS (U.S. Department of the Air Force 1998)
Caliente-Las Vegas Heavy Haul Route	Las Vegas	*Draft Stateline RMP and EIS* (BLM 1992b)
		Supplement to the Draft Stateline RMP and EIS (BLM 1994b)
		Proposed Las Vegas RMP and Final EIS (BLM 1998)
		Northern and Western Las Vegas Beltway: Tier 1 Final EIS and Corridor Location Study (FHA 1996)
	Tonopah	*Proposed Tonopah RMP and EIS* (BLM 1994a)
Sloan/Jean Heavy Haul Route	Las Vegas	*Draft Stateline RMP and EIS* (BLM 1992b)
		Supplement to the Draft Stateline RMP and EIS (BLM 1994b)
		Proposed Las Vegas RMP and Final EIS (BLM 1998)
		Northern and Western Las Vegas Beltway: Tier 1 Final EIS and Corridor Location Study (FHA 1996)
Apex/Dry Lake Intermodal Transfer Station	Las Vegas	*Draft Stateline RMP and EIS* (BLM 1992b)
		Supplement to the Draft Stateline RMP and EIS (BLM 1994b)
		Proposed Las Vegas RMP and Final EIS (BLM 1998)
Caliente Intermodal Transfer Station	Caliente	*Caliente Environmental Statement, Proposed Domestic Livestock Grazing Management Program: Final* (BLM 1979)
Sloan/Jean Intermodal Transfer Station	Las Vegas	Draft Stateline RMP and EIS (BLM 1992b)
		Supplement to the Draft Stateline RMP and EIS (BLM 1994b)
		Proposed Las Vegas RMP and Final EIS (BLM 1998)

[1] The following documents describing biological resources on the NTS were examined for all rail and heavy-haul routes:

EIS for the NTS and Off-site Locations in the State of Nevada (DOE 1996a)
Candidate Species Surveys (Blomquist et al. 1995)

pp. 3-35 through 3-40) further discuss the abundance and management of desert tortoises on land in Nevada managed by that agency. Karl (1980) describes the abundance of desert tortoises in parts of Clark County and Karl (1981). Schneider et al. (1985) describe the abundance of this species in parts of Lincoln and Nye counties. EG&G/EM (1991a), Rautenstrauch, Brown et al. (1994), and Rautenstrauch and O'Farrell (1998) discuss the distribution and abundance of desert tortoises on the NTS. Karl (1989) and CRWMS M&O (1997d) describe the abundance of tortoises at Yucca Mountain. Critical habitat of desert tortoises and other threatened or endangered species is described in the Code of Federal Regulations (50 CFR 17.95).

Databases maintained by Utah State University (1996) and the University of California (1994) contain information on the vegetative land cover types within Nevada and California, respectively. A digital map of these land cover types within and near the proposed transportation corridors and stations has been developed (CRWMS M&O 1999h). Appendix C contains a description of the land cover types that occur within or near the transportation corridors and stations and Appendix D lists the proportion of the land cover types within each potential route and station.

There is no comprehensive source of information on the wetlands within or near the proposed transportation corridors and stations. The FWS maintains a National Wetlands Inventory, and the maps for most of Nevada have been completed; however, these maps are the result of interpretation of low-resolution aerial-photographs and may not be reliable for small wetlands in arid environments. Also, most of these maps have not been ground verified; thus, additional information must be used to identify potential wetlands within proposed corridors and stations. The USGS (1998) has produced a database of water resources within Nevada, but this database does not indicate whether wetlands are present. Some BLM Resource Management Plans identify "riparian areas" that may contain wetlands, but these documents do not specifically identify wetlands. Potential wetlands (i.e., springs, perennial streams, and riparian areas) along rail corridors were visited by CRWMS M&O biologists during 1997, and general information on vegetation, soils, and water at these sites was recorded (Riparian Habitat/Wetland Characterization Field Notes, J.E. Reilly and J.K. Smith, July 15, 1997, through August 12, 1997, MOL.19990208.0224).

3. CURRENT UNDERSTANDING OF AFFECTED RESOURCES

This chapter includes a justification for considering each of the four regions of influence discussed in this report (Subsection 3.1), a list of the suggested receptors that may be considered during the evaluation of impact (Subsection 3.2), and a description of the biological resources in each of the regions (Subsection 3.3).

3.1 REGIONS OF INFLUENCE

The proposed action may affect biological resources in four regions. No analyses were conducted during the development of this Environmental Baseline File to evaluate the likelihood that the impact discussed below would occur; therefore, it may be determined that part of the potential impact is unlikely, and thus some of these regions of influence may not be considered in the EIS.

3.1.1 Yucca Mountain

Biological resources at Yucca Mountain may be affected during the construction, operation, and post-closure phases of the proposed action. Clearing areas for construction of aboveground repository support facilities will result in habitat destruction, and biota adjacent to cleared sites may be indirectly affected by the loss or modification of habitat. During the construction and operation phases, plants and animals adjacent to the repository and support facilities may be affected by operational activities and human presence. After the repository has been closed, heat from decaying radioactive material may cause changes in surface soil temperature and moisture above the repository, which may affect biological resources in that area. In addition, biological resources at and near Yucca Mountain may be exposed to radiation released during the operation and post-closure phases.

With the exceptions of radiation releases, which are discussed in Subsection 3.1.2, these potential effects will be limited to the region above the repository and adjacent to support facilities. Heat at the soil surface should extend laterally from the repository footprint no more than about 500 m (Robinson et al. 1999, p. 19). Current plans are to construct support facilities only within 5 km of the repository; therefore, this region of influence is defined as an area of 5-km radius centered on the north portal of the Exploratory Studies Facility (Figure 1-1).

3.1.2 Region Surrounding Yucca Mountain

Biological resources in the region surrounding Yucca Mountain may be exposed to radiation if there is an accidental release during handling, packaging, or storage of waste during the operational phase. These biological resources also may be affected after closure of the repository if radiation (e.g., ^{14}C) leaks from the repository into the atmosphere. The likelihood and spatial extent of this potential impact is currently unknown; therefore, the U.S. Nuclear Regulatory Commission's (NRC 1976) standard 80-km-radius (50-mile) region surrounding nuclear facilities was chosen as the region of influence to be examined for this report. For most analyses of the regional impact surrounding Yucca Mountain, an additional 4 km traditionally has been added to this region to include the population center of Pahrump. To be consistent with other analyses (e.g., socioeconomic), an 84-km-radius area (22,167 km^2) is considered as the region of influence in this Environmental Baseline File (Figure 1-1).

3.1.3 Springs and Riparian Zones Within the Regional Groundwater Basin

Biological resources dependent upon springs and riparian zones in the region may be affected during construction, operation, and closure if groundwater withdrawals cause a decrease in water levels at those springs. These resources also may be affected by groundwater contamination after closure.

Biological resources that depend on some springs in the region may also be affected if increases in human populations in communities surrounding Yucca Mountain (due to increased employment at Yucca Mountain) lead to increases in groundwater consumption. For example, some springs in Oasis Valley near Beatty (Figure 1-1) currently are not used because high concentrations of fluoride make it uneconomical to treat and sell that water; however, an increase in human populations and concurrent increase in the demand for water may make the treatment and sale of that water economically viable. This may result in a lower water table or other modifications to the springs or their outflows.

This region of influence is therefore defined as springs, their associated outflows, and riparian zones that are within the same regional groundwater flow system and south of Yucca Mountain and springs near communities surrounding Yucca Mountain that may be affected by increases in human populations. Three areas having such springs meet these conditions: Ash Meadows (including Devils Hole), Death Valley, and Oasis Valley (Figure 1-1).

3.1.4 Transportation Corridors

Plants and animals may be killed, injured or have their habitat disturbed if new rail lines or transfer stations are constructed or if existing rail lines or roads are modified. Animals living adjacent to new rail lines or heavy-haul routes may also be affected if those facilities or associated fences disrupt movement patterns. In addition, biological resources adjacent to transportation corridors and facilities may be affected if accidents during transportation result in radiation releases.

The proposed heavy-haul routes and intermodal transfer stations are associated with existing highways or rail lines; thus a 1- km-wide zone was chosen as the region of influence for these proposed routes and stations. To account for possible modifications in the proposed rail corridors, a larger zone of 5 km along each side of potential rail corridors was selected as the region of influence for rail corridors.

3.2 SELECTION OF RECEPTORS

For all regions, sufficient information generally is available to evaluate potential effects on species of special status having legal or administrative protection. Species of special status include endangered, threatened, proposed, or candidate species classified under the ESA and species protected under State of Nevada laws and regulations, the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, or the Wild Free-Roaming Horses and Burros Act. BLM considers most species protected under the laws listed above as sensitive, as well as species that were listed as ESA Category 1 and 2 candidates prior to February 1996 (Instructional Memorandum No. NV-96-019, Nevada Sensitive Species List, from A.J. Morgan, BLM State

Director–Nevada, to BLM District Managers–Nevada,. MOL.1999.0315.0096; 61 FR 7457–7463; 61 FR 7596–7613; BLM 1998, p. B-2). Species of special status may require special consideration (e.g., additional permits or enhanced mitigation) if the proposed action is implemented. In addition, many special status species are rare, endemic, or have a restricted range, and therefore their long-term viability may be more vulnerable than more common or widespread species. Game species may also be pathways of radionuclides to humans.

In addition to protected biological resources, sufficient information should be available to select and evaluate receptors useful for understanding effects of the proposed action on biological resources and biodiversity (Council on Environmental Quality 1993; DeLong 1996). Selection of those receptors should be, at a minimum, based on the following criteria:

- The geographic scale at which the impact may occur and the appropriate, matching level of biological organization or scale (e.g., population, community, landscape) (Noss 1990).
- The potential impact of the proposed actions and the biological resources most likely affected by that impact.
- The availability and quality of data on biological parameters of appropriate scale.
- Species and communities that are unique, rare, or of limited distribution because effects on these resources may have a greater impact on biodiversity.

The following subsections identify the geographic scale and the biological receptors that may be useful for evaluating the impact within each region of influence.

3.2.1 Yucca Mountain

With the exception of the releases of radionuclides, which are discussed in Subsection 3.2.2, the potential impact on biological resources at Yucca Mountain will occur at a small geographic scale; thus, the impact that may occur during the construction and operation phases could be evaluated at the same relatively small scale by considering the populations and communities that occur in that region. Comprehensive information is available on the composition and structure of the vegetation associations at Yucca Mountain; therefore, potential changes in the distribution, species composition, diversity, and successional status of vegetation associations at Yucca Mountain could be considered to evaluate the impact on the plant species and communities occurring in this region. Information is also available on small mammals and lizards and changes in the species composition and relative abundance of these common vertebrates could be used to evaluate the impact on the animal species and community there. Sufficient information is available on the relative abundance, population dynamics, and behavior of desert tortoises at Yucca Mountain to conduct a thorough analysis of the potential impact on that species, the only ESA-listed species resident at Yucca Mountain. Sufficient information is also available to evaluate the potential impacts on species considered sensitive by the BLM that occur on land at Yucca Mountain managed by that agency (e.g., chuckwalla, western burrowing owl, and some bat species).

As discussed in Subsection 2.1.2.3, an increase in soil temperatures from subsurface heat could affect several aspects of ecosystem structure and function (e.g., soil processes, plant community structure, and individual plant species) over both long and short time periods. Soil attributes and processes that integrate several aspects of ecosystem function and are most likely to be impacted by increased soil temperature could be considered as receptors to evaluate the impact on soil. Attributes for which information is available include soil water status, microbial community, and organic carbon pools. Specific attributes that can be used for monitoring these receptors are soil moisture, biomass of soil microbes, and litter decomposition rates. Several attributes of the plant communities at Yucca Mountain could also be evaluated, including species diversity, plant cover and density, plant productivity, leaf area index, community-level transpiration, and photosynthetic rates of dominant species. Attributes that could be used to evaluate and model the impact on individual plant species are changes in above ground biomass accumulation and leaf water potentials and transpiration rates. The effects of thermal loading on desert tortoises can be examined by evaluating the long-term consequences of changes in sex ratios of hatchlings. Information on the availability of data on these potential receptors and attributes is included in Subsection 2.1.2.3.

Construction of a repository may also cause the modification of washes classified as waters of the United States, as defined in Section 404 of the Clean Water Act. This impact could be evaluated by determining the types of disturbances to occur within those washes and the size of the disturbances. No wetlands occur within 5 km of Yucca Mountain; thus, no evaluation of impact on wetlands, as required in Executive Order 11990 (42 FR 26962-26963), Protection of Wetlands, is needed.

3.2.2 Region Surrounding Yucca Mountain

The release of radionuclides may have a diffuse effect over a large area; thus, consideration of the distribution, relative abundance, and rarity of biotic communities within the region would be useful for evaluating these potential large-scale effects. Because release of radionuclides may cause the loss of plants and animals from some areas, unique, rare, or endemic species within the region should also be identified. Most of those rare species have special status, and information on these species within the region is available (see Subsection 2.2).

3.2.3 Springs and Riparian Zones in the Regional Groundwater Basin

Changes in groundwater quantity or quality could have a localized impact on the plants and animals dependent upon those springs and riparian zones; thus, the composition of the communities dependent upon these water sources could be used to evaluate the potential impact. In addition, the abundance and population dynamics of rare species of limited distribution could be evaluated to better understand the impact on those sensitive species.

3.2.4 Transportation Corridors

Biological resources along corridors may be affected by development and use of transportation corridors. The type and severity of the impact will depend upon which transportation method(s) and route(s) are selected. The impact may result from activities associated with construction of new rail lines, expansion or upgrade of existing highways along heavy-haul routes, and

construction of intermodal transfer stations. Construction activities will result in localized habitat loss along the routes and facilities and disruption of movement patterns of the few highly-mobile terrestrial animal species adjacent to the transportation routes.

Resources found along all proposed transportation corridors, regardless of transportation method, may also be affected by an accident resulting in a spill. An accidental release of radionuclides and the associated remediation actions would likely affect biological resources in a small area near the accident.

The loss of a small amount of habitat or a few individuals, either due to construction or an accident, would not likely affect the long-term viability of common or widely-distributed species; however, for rare species or unique communities, any loss of habitat or individuals could lead to significant population declines, resulting in an overall loss of regional biodiversity. Because most unique or rare biological resources known to exist are protected by various state or federal laws, regulations, or policies, data pertaining to these resources generally are available from land and resource management agencies.

During the development of this report, a formalized process was developed by DOE and its EIS contractor to select the best alignments within five potential rail corridors. As part of that process, biological resources possibly constraining the placement of the alignments were identified, and the importance of each one was ranked as low, moderate, or high (Table 3-1). Resources considered included springs, riparian areas, and other wetlands; other unique or rare habitats or communities; and locations where protected and other special status species occur. The resources that meet those criteria comprise a useful list of potential biological receptors along transportation corridors and facilities requiring construction activities; therefore, the same criteria were used throughout this Environmental Baseline File for the identification and categorization of important biological receptors along and adjacent to potential transportation corridors and facilities.

3.3 BIOLOGICAL RESOURCES

3.3.1 Yucca Mountain

Yucca Mountain lies in a transition zone between the northern Mojave and southern Great Basin deserts in a region with rugged mountain ranges and broad valleys. The location being studied for the geologic repository is a long ridge of volcanic origin oriented north to south and ranging in elevation from approximately 950 m in Jackass Flats to 1,500 m at the top of the ridge. Vegetation is dominated by Mojave Desert plant communities below approximately 1,200 m and by transitional plant communities of the Mojave and Great Basin deserts at higher elevations (Beatley 1976, pp. 29-52). Terrestrial vertebrate species typically associated with the Mojave Desert dominate the fauna at Yucca Mountain, with some influence from the Great Basin Desert.

3.3.1.1 Flora

The primary determinants of the geographic range of the flora in the vicinity of Yucca Mountain are elevation and latitude. Yucca Mountain lies at the approximate latitude where the higher-elevation Great Basin Desert of northern Nevada meets the lower-elevation Mojave Desert of southern Nevada and California (Beatley 1976, pp. 10-11; Utah State University 1996).

Table 3-1. Important Biological Resources Identified Along and Adjacent to Transportation Corridors and Facilities

Resource Constraint Number and Category[1]	Constraint Level	Resource or Impact
1.1.1 Streams and Lakes	High	None
	Moderate	Lengthy crossings or paralleling of perennial streams and lakes
	Low	None
1.1.3 Springs	High	Direct physical disturbance to spring/seep source or surface pools
	Moderate	Other effects on resource utilization by wildlife or humans
	Low	None
2.1.1 Unique Terrestrial Habitats	High	None
	Moderate	Unique, unprotected terrestrial habitat
	Low	None
2.1.2 Riparian/Wetland Communities	High	Jurisdictional wetlands[2]
	Moderate	Riparian Habitat
	Low	None
2.1.3 Protected Areas	High	A. Proposed or Designated Critical Habitat for threatened or endangered species. B. Some areas designated as Areas of Critical Environmental Concern for biological resources, if special restrictions exist. C. Wilderness Area or Wilderness Study Area. D. Long-term study plots for desert tortoise or other threatened or endangered species.
	Moderate	A. Areas designated as Crucial Habitat for special status species. B. Some areas designated as Areas of Critical Environmental Concern for biological resources.
	Low	Areas designated as habitat or migratory corridors for special status or game species.
2.2.1 Federal Threatened and Endangered Species and Associated Habitats	High	A. Areas of known occurrence of endangered, threatened, or proposed species of restricted distribution and abundance. B. Areas designated as Critical Habitat for ESA-listed species.
	Moderate	A. Areas of likely but not documented occurrence of endangered, threatened, or proposed species B. Areas of known occurrence of endangered, threatened, or proposed species of wide-ranging distribution (e.g., desert tortoise).
	Low	Areas of possible but not likely habitat for endangered, threatened, or proposed species.

Table 3-1. Important Biological Resources Identified Along and Adjacent To Transportation Corridors and Facilities (Continued)

Resource Constraint Number and Category[1]	Constraint Level	Resource or Impact
2.2.2 Other Special Status Species and Associated Habitats	High	Areas identified as important or crucial for species listed as sensitive, protected, or threatened/endangered by the state of Nevada or California.
	Moderate	A. Areas of known occurrence of species identified as candidates for listing as threatened or endangered. B. Areas of known occurrence of BLM sensitive species. C. Areas of known occurrence of state sensitive, protected, or threatened/endangered species.
	Low	A. Areas identified as year-round, seasonal, or important habitat for species listed as game by the state of Nevada. B. Areas designated as Herd Management Areas. C. Areas of possible occurrence of special status species

[1] The numbers used to identify resource constraint categories are from a list of all criteria used to select and evaluate rail alignments.
[2] Jurisdictional wetlands were not identified for this report.

Vegetation on the NTS and surrounding region was described by Beatley (1976, pp. 23-79). Collins et al. (1982, 1983) used Beatley's (1976, pp. 10-11) classification scheme to identify and map four vegetation associations at Yucca Mountain. Characteristics (species composition, percent cover, production, etc.) of these four associations, described below, were studied during 1989-1997 (CRWMS M&O 1996b).

At the lowest elevations, below approximately 1,035 m, the creosotebush-white burrobush association (often referred to as the LA or *Larrea-Ambrosia* vegetation association), occurs on generally flat (slope = 0–2 percent), sandy, alluvial soils. Creosotebush and white burrobush are the dominant perennial shrubs.

At middle elevations, between approximately 1,035 and 1,310 m, the creosote-wolfberry-spiny hopsage (LLG or *Larrea-Lycium-Grayia*) association occurs on the upper portions of alluvial fans (slope = 4-6 percent) and on rocky slopes. Creosotebush is the dominant species. Nevada jointfir, white burrobush, and littleleaf ratany are subdominants in this association, and Anderson's wolfberry and spiny hopsage are uncommon. This vegetation association is also characterized by an abundance of winter annuals such as foxtail brome and bristly fiddleneck.

At middle and upper elevations, above approximately 1,100 m, the blackbrush association (COL or *Coleogyne*) occurs on the upper portions of alluvial fans with moderate slopes and few rocks (slope = 3-5 percent), and it occurred in higher areas on flat ridge tops. At the middle elevations, this association is intermediate between the LA and LLG associations, and blackbrush shared dominance with Nevada jointfir and white burrobush. At the higher elevations, this association is dominated by blackbrush interspersed with several species of rabbitbrush and jointfir.

Also at higher elevations, above approximately 1,310 m, the wolfberry-spiny hopsage association (LG or *Lycium-Grayia*) occurs on ridge tops and on higher, steeper, and rockier slopes (slope = 6-10 percent). Anderson's wolfberry, spiny hopsage, Nevada jointfir, Eastern

Mojave buckwheat, and a variety of shrubs from higher and lower elevations share dominance in this association.

Although these vegetation associations appear relatively homogeneous at the landscape scale and may be described in simple terms, each is actually a mosaic of sub-associations consisting of the dominant shrubs, as well as less dominant shrubs, forbs, and grasses as described in detail by Beatley (1976, pp. 23-79), O'Farrell and Collins (1984), and CRWMS M&O (1996b). This smaller-scale variation within vegetation associations is often related to microtopographic features such as washes, hillsides, or rock outcrops or to differences in soil characteristics (e.g., soil depth or presence of desert pavement).

A total of 186 plant species have been identified at Yucca Mountain; 64 of these are perennial species (CRWMS M&O 1996b, Appendix F). None of these species are endemic to Yucca Mountain or the surrounding region. The percent cover of plants in the four vegetation associations of Collins et al. (1983) ranged from 15 to 28 percent during 1989-1995. Cover on 48 4-ha plots ranged from 7 to 45 percent during the same period. Plant density ranged from 62 individuals per 100 m^2 in the LLG vegetation association to 139 individuals per 100 m^2 in the LG association. Net annual aboveground primary production, averaged across all plots, ranged from 0.72 kg per ha in 1989 to 479 kg per ha in 1992. Major trends and patterns in plant abundance during 1989-1994 were related to three factors: precipitation (which fluctuated between wet and dry years), vegetation association, and plant life form (annual, shrub, or perennial herb) (CRWMS M&O 1996b).

The impact of site characterization activities on vegetation was monitored on 24 treatment and 24 control sites at Yucca Mountain during 1989-1995. Based on a before-after-control-impact experimental design, site characterization activities were marginally, but significantly associated with increased cover, production, and species richness. The cover and production of vegetation on control plots exceeded treatment plots before impact, but treatment plots exceeded control plots during impact; furthermore, differences between treatment and control plots increased gradually and cumulatively, as site characterization activities progressed. It was also determined, however, that in two vegetation associations, plant cover decreased during the study on transects nearest to roads (CRWMS M&O 1999j).

The four-association classification of vegetation at Yucca Mountain was revised (CRWMS M&O 1999a), and nine vegetation associations have been identified which define patterns of vegetation more finely than Beatley (1976, pp. 10–11).

3.3.1.2 Fauna

Yucca Mountain has a complex fauna composed of vertebrate and invertebrate species generally associated with the Mojave Desert. In addition, the faunal community includes some species associated with the Great Basin Desert and many migratory species. Many species are common, but others are rare at Yucca Mountain; one is Federally listed as threatened, and some are designated by government agencies as species of special status. No vertebrate species found at Yucca Mountain are endemic to Nevada.

Mammals–Thirty-six species of mammals (Table 2-2) have been recorded at Yucca Mountain using a variety of methods, including intensive small mammal trapping to determine demographic patterns (CRWMS M&O 1997a) and background radionuclide body burdens (EG&G/EM 1994, pp. 58-63), mist netting of bats (CRWMS M&O 1998j), scent-station track methods (EG&G/EM 1992, pp. 62-63), and spotlight surveys (CRWMS M&O 1996a). None of these species are unique to the transition zone between the two deserts.

At least seven (and possibly eight) species of bats were captured at Yucca Mountain. California myotis and western small-footed myotis were difficult to separate in the field; both should occur there (CRWMS M&O 1998j).

Three species of lagomorphs have been recorded at Yucca Mountain. Black-tailed jack rabbits occur primarily on middle and lower elevation flats. Mountain cottontails occur at higher elevations, and desert cottontails are present on the valley floors. Populations fluctuate in response to rainfall; in dry years, lagomorphs are quite rare (CRWMS M&O 1996a).

Except for coyotes, which are commonly observed, canid and ungulate species are uncommon or rare at Yucca Mountain. Few observations were recorded for seven species of carnivores (two canids, three mustelids, and two felids) and two species of ungulates (Table 2-2).

Seventeen species of rodents have been documented (Table 2-2), and the population sizes of 11 species were estimated during 1989-1994 (CRWMS M&O 1997a). Most species occur at all elevations, although some occur only at higher (e.g., great basin pocket mouse) or lower (e.g., desert kangaroo rat and little pocket mouse) elevations. Rodents are the most abundant terrestrial mammal species at Yucca Mountain, and populations generally fluctuate in response to rainfall.

Small mammal populations at Yucca Mountain were monitored during 1989–1995 to evaluate the indirect impact due to site characterization activities (CRWMS M&O 1998b). Animal abundance fluctuated over time but generally fluctuated in synchrony, and differences in population sizes on control and treatment plots were small. Two species, little pocket mice and canyon mice, showed no impact-related changes in population size. Changes were detected in population sizes of long-tailed pocket mice and Merriam's kangaroo rats that may have been influenced by site characterization activities; however, these patterns were probably due to natural factors such as carrying capacity; habitat differences between plots; and demographic stochasticity in survival, reproduction, and sex ratios. No species became extinct, nor were any introduced species detected (CRWMS M&O 1998b).

Reptiles–From 1991 to 1995, density and species composition of reptile populations at Yucca Mountain were examined using mark-release-recapture and a variety of other sampling techniques in four vegetation associations (CRWMS M&O 1998d). These efforts documented the presence of 27 reptilian species (12 lizards, 14 snakes, 1 tortoise). The most abundant lizards were side-blotched lizards and western whiptails, and the most abundant snakes were the coachwhip and longnose snakes. The three most intensely studied habitat types appeared to contain different species assemblages. The LLG vegetation association appeared to have the highest species richness (20 species), followed by LA (16), and COL (15).

The indirect impact of the site characterization activities on reptile populations was assessed by analyzing changes in the abundance of side-blotched lizards (CRWMS M&O 1998c). Statistical analyses were applied to data from 1,618 individuals captured from 1993 to 1995 on eight 1-ha plots. Population sizes differed between successive sampling periods, but unexpectedly, populations declined almost linearly from March 1993 to May 1995. The number of lizards on four treatment plots adjacent to various disturbances was compared with the number of lizards on four control plots far from any disturbance. Results of these analyses, supported by other data, provided evidence that abundance trends in side-blotched lizards did not significantly differ on treatment and control plots, and therefore, there was no evidence for an added effect due to site characterization activities.

Birds–Although there have been no formal efforts to quantify the Yucca Mountain avifauna, biologists have recorded avian sightings on the NTS since 1959 (Hayward et al. 1963) and at Yucca Mountain since 1982 (O'Farrell and Collins 1983, pp. 22-24). A report by CRWMS M&O (1998f) summarized the observations made at Yucca Mountain in an area bounded by Cane Spring to the east, the well pond in Crater Flat to the west, U.S. Highway 95 to the south, and upper Fortymile Canyon to the north. The authors recorded a diverse assemblage of 120 transient and resident species. These species included various desert species that were expected (e.g., black-throated sparrow, rock wren, and northern mockingbird), as well as water birds and warblers attracted to ponds and riparian vegetation during migration (e.g., great-blue heron, green-winged teal, and Wilson's warbler) and 15 species of raptors (e.g., golden eagle, prairie falcon, and long-eared owl). Black-throated sparrows were the most common residents, and mourning doves were seasonally common. Both of these, in addition to at least 20 other species (total of 22) are believed to regularly nest in the area (e.g., barn owl, Gambel's quail, and common raven).

The effects of site characterization activities on the abundance of ravens (Holt and Mueller 1994; CRWMS M&O 1998h) were assessed by monitoring the abundance of ravens at Yucca Mountain and a relatively undisturbed control area during 1991-1995. The magnitude of differences in the relative abundance of ravens between Yucca Mountain and the control areas did not change over time, indicating that site characterization activities during that period did not result in an increase in raven abundance in the Yucca Mountain area. Increases over time on Yucca Mountain and control routes were consistent with regional increases in raven abundance in the Mojave Desert. Twelve species of raptors were recorded during the surveys, but at much lower frequencies than ravens. The most common raptor was the red-tailed hawk.

Invertebrates–Invertebrates are important components of the desert ecosystem that affect primary production, decomposition, and nutrient cycling through consumption of plant tissues and detrital material, and in turn, provide food for many vertebrate species. Little information on invertebrates is available for the Yucca Mountain area; however, a pilot study was undertaken to assess the invertebrate communities in the vicinity of Yucca Mountain (EG&G/EM 1992, pp. 20-26). The primary objectives of that study were to identify the most common invertebrate taxonomic groups, develop a reference collection, and evaluate the efficacy of several trapping techniques for sampling invertebrates. A variety of sampling methods, including black-light traps, soil and litter sampling, Berlese funnels, pitfall traps, and sweep netting, were used on 16 study plots. A total of 34,454 invertebrate specimens, representing at least 18 orders and 53 families were collected (Appendix B). Butterflies (Lepidoptera, n = 10,717), bees and ants

(Hymenoptera, $n = 10{,}315$), and beetles (Coleoptera, $n = 8{,}864$) were the most abundant invertebrates collected.

3.3.1.3 Special Status Species

No plant species classified by the BLM (Instruction Memorandum NV-96-019, from State Director, Nevada, to District Managers, Nevada, March 20, 1996, MOL.19990315.0096) as sensitive or under the ESA as threatened, endangered, proposed, or candidates were found during searches in the vicinity of Yucca Mountain (Blomquist et al. 1995; Niles et al. 1995). No such plant species were found during more than 165 preactivity surveys conducted during 1989-1996 prior to ground-disturbing activities at Yucca Mountain (CRWMS M&O 1996c, p. 43). In addition, biologists working on other studies at Yucca Mountain did not observe any special status plant species other than several species of cacti and yucca, which are protected by the State of Nevada from commercial collection and are widespread throughout the area.

The only resident animal species at Yucca Mountain that is currently protected under the ESA is the desert tortoise (FWS 1997). The Mojave population of this species was listed as endangered in 1989 and reclassified as threatened in 1990. Numerous transect surveys conducted during 1981-1989 indicated that tortoises were distributed throughout the Yucca Mountain area and densities were reported to be from about 4 to 20 tortoises per km^2 (Karl 1989; EG&G/EM 1991a). A large number of tortoises were observed and marked during site characterization (1989-1995) and the distribution of these observations was mapped in a 117-km^2 area (CRWMS M&O 1997d). These data confirmed earlier observations that desert tortoises were widely distributed throughout the area. Two areas (13 and 15 km^2) where intensive tortoise research was conducted during 1989-1995 were identified, and the number of marked tortoises within these areas was tallied to determine the minimum population size. The minimum density of adult tortoises found in these areas was 10 and 12 tortoises per km^2, which was similar to results reported from earlier surveys (CRWMS M&O 1997d). These density estimates are similar to most other areas in southern Nevada near Yucca Mountain, yet are lower than many estimates of tortoise density in the Mojave Desert in California, where densities of greater than 75 per km^2 have been reported (FWS 1994, p. 38).

Potential direct and indirect impacts of site characterization activities on desert tortoises were monitored during 1992–1995. During that time, 110 ha of desert tortoise habitat were disturbed, and an additional 14.1 ha were fenced, excluding tortoises from using that area. Four tortoises were killed by vehicles on roads at Yucca Mountain. Twenty-eight tortoises and two nests were relocated out of areas to be disturbed. No effects of indirect impact were detected in the eight response variables measured (CRWMS M&O 1999b). One additional tortoise has been killed on a road and one tortoise has been relocated at Yucca Mountain since 1995.

Two or three species of bats were captured infrequently at Yucca Mountain (long-legged myotis, fringed myotis, and possibly western small-footed myotis) (CRWMS M&O 1998j) that are classified as sensitive species by the BLM. Spotted bats, which are classified as sensitive by the BLM and threatened by the State of Nevada, were not seen or heard at Yucca Mountain.

Two other BLM sensitive species, western burrowing owl and western chuckwalla, occur at Yucca Mountain. Burrowing owls are found infrequently in lower-elevation areas throughout

Yucca Mountain and the NTS (Steen et al. 1997). Western chuckwallas are locally common and widely distributed throughout the Yucca Mountain area, primarily in rocky areas. Fifty-one observations of this species were recorded in the vicinity of Yucca Mountain between April 1993 and June 1995 (CRWMS M&O 1998d, pp. 22-23).

Other special status species occurring at Yucca Mountain include Gambel's quail, chukar, and mourning doves. These game species are common and widespread, but population levels are strongly influenced by rainfall. Preliminary analysis of movement patterns of radiomarked Gambel's quail at Yucca Mountain suggest that most individuals are associated with water sources and that the likelihood of moving out of the immediate area is small.

Mule deer are rarely seen in the Yucca Mountain area but are more abundant to the north on the mesas of the NTS (Giles and Cooper 1985; Greger and Romney 1994b, pp. 219–225). Furbearers (mountain lion, bobcat, and kit fox) are rare in the Yucca Mountain area. Only two observations of a mountain lion have been recorded at Yucca Mountain. Bobcats are more frequently seen, but only two were observed during spotlight surveys. Kit foxes were also observed on spotlight surveys. They were widely distributed, and the frequency of sightings was positively correlated with lagomorph population trends (CRWMS M&O 1996a).

Burros have been observed occasionally on Yucca Mountain and occur in low numbers to the west of Yucca Mountain in Crater Flat.

3.3.2 Region Surrounding Yucca Mountain

The 84-km-radius region surrounding Yucca Mountain is located in the physiographic region known as the Basin and Range Province, which is an area of alternating mountain ranges and adjacent basins. The basins often contain ephemeral lakes called playas and may contain water during exceptionally wet years. Located within this region are several unique areas, including part of Death Valley National Park, which contains the lowest point in the United States, and Ash Meadows National Wildlife Refuge, a wetland area which is home to many threatened and endangered plants and animals.

3.3.2.1 Flora

Vegetation in the region surrounding Yucca Mountain is strongly influenced by elevation, water availability, soil properties, and other factors such as slope exposure. This region has a wide range of elevations and has vegetation characteristic of Mojave, Great Basin, and montane communities. Mojave Desert plant communities dominate the landscape in the southern part of the region at elevations below approximately 1,200 m. Creosotebush is the most commonly encountered shrub species there. Depending upon microclimate, soil type, and elevation, creosotebush is codominant with a number of other species, including shadscale saltbush, white burrobush, spiny hopsage, jointfir, and wolfberry. In the northern portion of the region and at elevations above 1,500 m, Great Basin communities occur and are dominated by sagebrush, with codominants including shadscale saltbush, winterfat, and blackbrush. Above 1,800 m, pinyon and juniper woodlands begin, codominant with sagebrush. At higher elevations, communities dominated by white fir occur in the Spring Mountains and in the central Belted Range (Beatley 1976, pp. 68–70), and stands of ponderosa pine, limber pine, white fir, and Great Basin

bristlecone pine occur on the highest elevation areas in the Spring Mountains (USDA 1996, pp. 53a).

The vegetation in the region surrounding Yucca Mountain is described on a landscape scale by the Nevada and California Gap Analysis projects. A digital land cover type map (CRWMS M&O 1999d) of the area surrounding Yucca Mountain has been developed based on data obtained from Utah State University (1996) and the University of California (1994). Different methods were used to classify land cover types in each state (Appendix C); therefore, there are differences in resolution on the map.

That portion of the region surrounding Yucca Mountain within Nevada is dominated by five land cover types that cover more than 90 percent of the area: salt desert scrub (26 percent), blackbrush (21 percent), creosote-burrobush (18 percent), sagebrush (16 percent), and Mojave mixed scrub (10 percent). In California, there are five dominant land cover types covering more than 92 percent of the area: Mojave creosotebush scrub (50 percent), Mojave mixed woody scrub (19 percent), shadscale saltbush scrub (13 percent), dry salt flat (6 percent), and dunes and sand fields (4 percent).

3.3.2.2 Fauna

The region surrounding Yucca Mountain has a diverse assemblage of animal life, including aquatic species associated with springs (see Subsection 3.3.3) and many terrestrial species adapted to high temperatures and low water availability.

Common mammals found in the region surrounding Yucca Mountain (Jorgensen and Hayward 1965; Medica 1990; Hall 1995) include coyotes, jackrabbits, several species of kangaroo rats, pocket mice, deer mice, woodrats, ground squirrels, and bats. Also seen are bighorn sheep, mule deer, elk (in the Spring Mountains), and pronghorn (in northern areas).

Numerous reptiles are found in the region surrounding Yucca Mountain (Tanner and Jorgensen 1963; Death Valley Natural History Association Undated), including the threatened desert tortoise. The most common reptiles seen in the area are side-blotched lizards and whiptail lizards. Less common are leopard and Mojave black-collared lizards and the chuckwalla. Snakes are also common, including the coachwhip, gopher snake, and sidewinder.

Because of low water availability, there are few amphibians in the region; however, in the northern portions of this region, spadefoot toads may be found, and leopard frogs and tree frogs may be found in areas with permanent moisture. Also of note is the Amargosa toad, which is found along the Amargosa River in and near Beatty, Nevada (Stein 1996; see also Subsection 3.3.3.3).

Birds are common through the region surrounding Yucca Mountain, and more than 50 species nest in the area (Hayward et al. 1963; Alcorn 1988). Although not common, the most conspicuous birds observed include ravens, red-tailed hawks, and golden eagles. Also seen are Gambel's quail, chukar, and mourning doves, all of which are locally common. Nesting passerines include black-throated sparrows, sage sparrows, Le Conte's thrasher, and mockingbirds.

Invertebrates are common in the region surrounding Yucca Mountain but are poorly studied. Some of the most conspicuous invertebrates are harvester ants, darkling beetles, and grasshoppers.

3.3.2.3 Special Status Species

Data obtained from NNHP (1997) and California Department of Fish and Game (1997) are the best available information for determining the distribution of special status species in the area surrounding Yucca Mountain.

In the Nevada portion of this region, there are five endangered (four animals, one plant) and eight threatened (two animals, six plants) species given Federal protection under the ESA. With the exception of the threatened desert tortoise, which is widespread in the southern half of the region surrounding Yucca Mountain (Bury et al. 1994), all of the listed species occur in the Ash Meadows area (approximately 40 km south of Yucca Mountain, see Subsection 3.3.3.3).

The northern range of the desert tortoise is approximately 10 km north of Yucca Mountain (Rautenstrauch, Brown et al. 1994), and this range extends farther north in the Oasis Valley to the west of Yucca Mountain. This species is found in suitable habitat to the south, east, and west of Yucca Mountain, generally at elevations below 1,600 m. Tortoises throughout the area are found in low abundance (Schneider et al. 1985; Karl 1981, 1989; Bury et al. 1994; CRWMS M&O 1997d; Rautenstrauch and O'Farrell 1998).

Seventy-five special status species (excluding game species) have been found within the Nevada portion of the region (NNHP 1997). These include species that are given special status by BLM, the State, or other agencies. These species are generally rare or have restricted ranges. In many cases, knowledge of these species is a reflection of the intensity of field work conducted in these areas. For example, as a result of recent surveys, numerous occurrences were recorded of 12 former Category 1 and 2 candidate plant species present on the adjacent NTS (Blomquist et al. 1995), three species in the Bare Mountain area west of Yucca Mountain (Niles et al. 1995), and five species on the Nellis Air Force Range (DOD 1994, 1995, 1996). Even though there has been extensive field work done in the area, few locations of special status species have been found near Yucca Mountain. Only four special status species (desert tortoise plus three BLM sensitive species) have been recorded within 10 km of the Exploratory Studies Facilities, and only nine additional locations of special status species (all BLM sensitive species) have been found within 20 km.

Thirty-five special status species have been found within the California portion of the region (California Department of Fish and Game 1997). These include the threatened desert tortoise, one ESA-listed endangered plant, and one threatened plant. Both plants are located along Carson Slough, the southward flowing outlet of the Ash Meadows springs. Game species are protected by state agencies and are potentially important pathways for radionuclides. Elk are hunted in the Spring Mountains southwest of Yucca Mountain. Bighorn sheep are hunted in the Desert National Wildlife Range to the east of Yucca Mountain, in the Spring Mountains, and on several areas adjacent to the Nellis Air Force Range north of Yucca Mountain. In general, bighorn sheep inhabit most of the higher elevation areas surrounding Yucca Mountain (personal communication, M. Cox, NDOW, February 18, 1997, MOL.19990111.0161 to

MOL.19990111.0162), including the Pintwater Range (estimated 140 individuals), Spotted Range (40), Last Chance Range (140), Specter Range (80), Pahute Mesa (100), Bare Mountain (65), Quartz Mountains (small numbers), and Spring Mountains in Nevada and the Amargosa and Panamint ranges in California. Management agencies (e.g., NDOW and FWS) have actively promoted bighorn sheep populations by developing water sources in some areas. Mule deer are hunted in the region surrounding Yucca Mountain, although abundance of deer is low throughout most of the region. Probably the largest concentration of mule deer in the area occurs on the NTS, where Giles and Cooper (1985) estimated the population to be between 1,500 and 2,000 animals. Chukar, mourning doves, and Gambel's quail are hunted in the region, although hunting pressure historically has been low, and abundance of these animals is dependent upon rainfall and the availability of water from springs, seeps, and man-made water developments (personal communications, M. Cox, NDOW, February 18, 1997, MOL.19990111.0161 to MOL.19990111.0162 and D. Racine, California Department of Fish and Game, December 12, 1997, MOL.19990111.0175 to MOL.19990111.0176).

Mountain lions are rare but widespread in the mountain ranges surrounding Yucca Mountain. Coyotes, bobcats, kit foxes, and possibly gray foxes are also present in the region surrounding Yucca Mountain. No detailed information is available on the distribution or abundance of these species.

Several species of bats that were considered candidates for ESA listing prior to 1997 have been recorded in the region north of Yucca Mountain (CRWMS M&O 1998j; Steen et al. 1997). There are many old mines in the mountain ranges surrounding Yucca Mountain that provide nesting and roosting sites for several species of bats. Bats are also frequently seen near open water, such as springs and watering tanks. Aside from the work done on the NTS and at Yucca Mountain (e.g., Jorgensen and Hayward 1965; CRWMS M&O 1998j; Steen et al. 1997), Ramsey (1995) investigated the bat fauna in the Spring Mountains, and Hall (1995, pp. 127-169) summarizes observations of bats elsewhere in Nevada.

Horses are present in the northern portions of the region surrounding Yucca Mountain on the NTS and the Nellis Air Force Range. Approximately 60 horses reside on the NTS, primarily on Pahute and Rainier mesas (Greger and Romney 1994a, pp. 150–159). In the past, there were more than 2,000 wild horses on the Nellis Air Force Range (BLM 1990, p. 22). Burros, which are rare at Yucca Mountain, occur in low numbers to the west in Crater Flat and to the south in Amargosa Valley.

BLM herd management areas within the 84-km region surrounding Yucca Mountain include the Chicago Valley herd management areas near Death Valley Junction, California (BLM 1980, Table 5, and Map 8) and the Bullfrog (BLM 1994a, Map 19) and Johnnie (BLM 1998, Map 2-1) herd management areas in Nevada. Two additional herd management areas, Amargosa and Ash Meadows, are retained as administrative units by BLM but do not contain any horses or burros (BLM 1998, Map 2-1). In addition, there are recognized horse and burro populations in the Spring Mountain Natural Resource Area, administered by the U.S. Forest Service (USDA 1996, pp. III-67 through III-69). In the northern portion of the region surrounding Yucca Mountain, the Nevada Wild Horse Range is located on Nellis Air Force Range (BLM 1990, Map 8).

3.3.3 Springs and Riparian Zones in the Regional Groundwater Basin

A number of springs and several riparian areas occur in the region potentially affected by the proposed action. Springs and riparian zones are susceptible to two possible impacts: alteration of flow and contamination of aquifers feeding water to the springs. Alteration of groundwater flow could occur due to increases in water withdrawals to support operations during repository construction or during repository operation. Groundwater flow could also be altered indirectly by increased human populations near Yucca Mountain (e.g., Beatty and Amargosa Valley) resulting from additional jobs provided by the Yucca Mountain Site Characterization Project (YMP). Following closure of a repository, contamination of groundwater could occur due to corrosion and leakage of waste packages.

Desert oases thought to be fed by the regional deep groundwater aquifer of the Death Valley regional groundwater flow system occur primarily in three areas: Ash Meadows at the southern end of the Amargosa Valley; Death Valley along the western base of the Amargosa Range (Grapevine and Funeral Mountains); and Oasis Valley, generally between the towns of Beatty and Springdale, Nevada.

Ash Meadows has at least 47 named springs, several additional pools, a marsh, a lake, and three reservoirs (FWS 1990). Some of these springs produce warm water with temperatures exceeding 32°C.

Some of the springs along the eastern edge of Death Valley are thought to be fed by water from the deep carbonate aquifer after it flows beneath the Amargosa Range. The Amargosa Range is composed of three mountain ranges: the Grapevine and Funeral mountains to the north and the Black Mountains to the south. There are two primary areas where water from the deep aquifer discharges. To the north, near Scotty's Castle, the Grapevine Springs discharge on the western edge of the Grapevine Mountains. Farther south, at the southern end of the Funeral Mountains, three large springs discharge in the Furnace Creek area: Nevares (Cow Creek), Texas, and Travertine springs (the source of Furnace Creek). Nevares Spring provides domestic water for personnel living in Death Valley. Texas and Travertine springs provide water for developments (lodge, golf course, campgrounds, restaurants, etc.) in the Furnace Creek Ranch area. All surface flow is diverted at Texas Spring. Springs in the Black Mountains probably are not associated with the deep aquifer.

Oasis Valley, generally between the towns of Beatty and Springdale, Nevada, contains numerous springs fed by the Pahute Mesa groundwater basin, and some of these springs feed the Amargosa River (Soltz and Naiman 1978, p. 31). The only part of the Amargosa River where water always flows is a 2–3 km stretch through the town of Beatty. Farther upstream, the river flows only during winter and spring, but isolated pools and ponds persist throughout the year. The Amargosa River disappears into permeable sands about 4 km south of Beatty, and the channel normally remains dry for about 80 km (Soltz and Naiman 1978, pp. 31–34). Dozens of springs provide permanent water to pools and marshes in the bottom of Oasis Valley (Clemmer 1995, p. 4). In addition, at least two other major springs in Oasis Valley (Crystal and Indian springs) are located 3–5 km away and 150–200 m above the valley floor and are isolated from the river by open desert (Maciolek 1983, p. 7).

3.3.3.1 Flora

Generally, there are four plant associations found in areas with springs and riparian zones in the area, based on the Nevada Gap Analysis Project (Utah State University 1996): lowland riparian, wetlands, mesquite, and ash (see Appendix C). Many species found in these areas (especially submergent and emergent species) are obligate hydrophytes and are especially susceptible to alteration of groundwater flow.

Oasis Valley–Lowland riparian and wetland associations are found in Oasis Valley. Lowland riparian occurs in areas receiving abundant water. In this association, the principal trees include Fremont's cottonwood and black cottonwood, and principal shrubs include fivestamen tamarisk, velvet ash, desert willow, and mesquite. The wetland association is described as low elevation areas with principal species including cattail, bullrush, burreed, common reed, pondweed, and sedge.

Ash Meadows and Amargosa River–All four associations are present at Ash Meadows or along the Amargosa River. The mesquite and lowland riparian associations appear in scattered blocks where the groundwater level of the Amargosa River is approximately 5–20 m below the surface. The mesquite association is defined as shrubland dominated by mesquite trees and shrub species, including fivestamen tamarisk, Torrey's saltbush, and creosotebush. The ash association, which is unique to Ash Meadows, is dominated by velvet ash, screwbean mesquite, and Emory's baccharis.

Death Valley–All four of the plant associations are found at the springs and riparian areas within Death Valley. The wetland association is found on the golf course at Furnace Creek.

3.3.3.2 Fauna

Spring-dependent aquatic vertebrates and invertebrates are important components of the ecosystem and may be negatively affected by decreases in water level or quality. Current threats to these aquatic species include human activities that affect their generally small and unique desert habitats. Many of these habitats have been physically altered by earth-moving activities such as construction of impoundments, stream diversion or channelization, or changes in thermal regimes. Many of these habitats have also been biologically altered by the introduction of competitive or predatory non-native fishes (e.g., mosquitofish and sailfin mollies), amphibians (bullfrog), and invertebrates (crayfish). Introduction of non-native species and minor changes to the small springs and streams result in large changes in fish abundance (Minckley and Deacon 1968; Soltz and Naiman 1978; pp. 65–71; FWS 1990, pp. 27–30). Populations of spring-dependent animals are protected within the boundaries of Ash Meadows National Wildlife Refuge and Death Valley National Park (including Devils Hole); however, those in Oasis Valley generally are not protected because the springs are under private ownership.

Invertebrates–A number of invertebrate species depend on springs in the region. These include naucorid bugs, riffle beetles, various species of springsnails, and the introduced crayfish.

Fish–Spring-using resident fish include speckled dace in Oasis Valley (Oasis Valley speckled dace) and Ash Meadows (Ash Meadows speckled dace), as well as two species (three subspecies) of pupfish at Ash Meadows (including Devils Hole) and two species of pupfish in

Death Valley. These fishes are further described in the following paragraph on sensitive species. Non-native fish occurring in the region include the mosquitofish, black bullhead, sailfin molly, and largemouth bass (48 FR 40178-40186).

Amphibians–Amargosa toads, Pacific treefrogs (also known as Pacific chorus frogs), and the introduced bullfrog occur throughout Oasis Valley (Clemmer 1995). At Ash Meadows, western, Woodhouse, and red-spotted toads occur. Five species of amphibians occur in Death Valley, four of which occur in the region potentially affected by the proposed activity. At Furnace Creek, native red-spotted toads are common, native Pacific treefrogs are present, introduced western toads are locally abundant, and introduced bullfrogs are present. Pacific treefrogs are present in springs at Scotty's Castle.

Other Vertebrates–Mammals, reptiles, and birds also use water at the springs. While the survival of these species is not directly dependent on these waters, the presence or absence of these species in this region, whether or not they are present, and the size of the populations is influenced by the presence of water.

Common spring-using resident mammals include white-tailed antelope squirrels, coyotes, kit foxes, mice, and in some areas, burros and wild horses. Common spring-using resident birds include mourning doves, house finches, and spotted towhees.

Transient and Migrant Species–Common spring-using transient vertebrates (e.g., bats and neotropical migrant birds) are important seasonal components of the desert-springs ecosystem and may be negatively affected by lowered water levels or water quality. Springs are important to these groups because they provide resting places during migration and because some species spend the winter on bodies of water in the region. Spring-using transient species (as a group) are easy to monitor, have been studied elsewhere, and their response to environmental change can be predicted.

Spring-using transient animals in this region fall into two categories. One group migrates to the area to spend a season (winter or summer) on or around the springs and ponds. Common animals in this group include some species of waterfowl (e.g., American coots, ruddy ducks, and pied-billed grebes) that winter on ponds and various species of passerines that nest around the springs during spring and summer (e.g., northern orioles, common yellowthroats, and Wilson's warblers). The other group passes through the region en route to points farther north during the spring or farther south during the fall. Common migrants include the neotropical migrants (e.g., warblers and tanagers), hawks, and passerines (e.g., sparrows, thrushes, and swallows).

Populations of common spring-using transients are protected within the boundaries of Ash Meadows National Wildlife Refuge and Death Valley National Park while they are in those jurisdictions, and they are generally protected under state (hunting, protected species) and federal regulations (Migratory Bird Treaty Act).

3.3.3.3 Special Status Species

Ash Meadows–There are eight species of endemic plants at Ash Meadows. Of these, seven were proposed for listing as endangered (48 FR 46590–46598); however, in the final rule, six were listed as threatened (Springloving centaury, Ash Meadows milkvetch, nakedstem sunray,

King's mousetail, Ash Meadows gumweed, and Ash Meadows blazingstar), while only the seventh was listed as endangered (Amargosa alkaliplant) (50 FR 20777–20814). The eighth endemic plant, the orchid Ash Meadows ladiestresses, is considered sensitive. One other species, Tecopa bird's beak, while not endemic to Ash Meadows, is also considered sensitive. Critical habitat for the seven listed plant species was defined (50 FR 20777–20814), and the entire area is protected in the National Wildlife Refuge.

Desert springs in the region potentially affected by the proposed action provide habitat for several species of native and introduced fishes. Ash Meadows (including Ash Meadows National Wildlife Refuge and Devils Hole) provides habitat for four endemic and endangered fishes. These include three taxa (two species, but three subspecies) of pupfish (Devils Hole pupfish, Warm Springs pupfish, and Ash Meadows Amargosa pupfish) and one species of dace (Ash Meadows speckled dace). Habitat destruction and alteration that threatened these species has been halted, but the survival of some of the species is threatened by introduced fishes including mosquitofish, sailfin molly, and largemouth bass (FWS 1990).

The natural habitat of the Devils Hole pupfish is restricted to a single limestone cave on the eastern edge of Ash Meadows (FWS 1990). The size of the population has been studied since at least 1967 (Soltz and Naiman 1978, pp. 45–63). The population size has varied in response to changes in water level due to pumping for irrigation (Soltz and Naiman 1978, Figure 45). Chernoff (1985) published a population model that accurately simulated known population size fluctuations. A Recovery Plan for this species is in place; irrigation pumping has stopped; and 21,760 acres surrounding Devils Hole have been identified as essential habitat (FWS 1990).

The Warm Spring pupfish occurs in six small springs (including School, Indian, Mexican, and Scruggs springs) in a 2.6-km^2 area (Miller and Deacon 1973; FWS 1990). Each of the springs where this fish occurs is isolated, and water-flow rates are less than 4.5 liters per minute (Dudley and Larson 1976; FWS 1990). At School Spring, the population size ranged from 136 to 231 fish when measured in November of 1972, 1973, and 1974. A recovery plan has been in place since 1976 and was updated in 1990 (FWS 1990).

The Ash Meadows Amargosa pupfish occurs in 10 springs on the Ash Meadows refuge and in a pond west of the refuge. The springs in which this species occurs vary in size from Crystal Pool (15 m wide, 6 m deep, 238 liters per second) to Five Springs (no pool, 0.9 liters per second). Population sizes in two pools were estimated in 1982 and 1983 (FWS 1990). In June 1982, population sizes in Jackrabbit and Big springs were estimated at 568 and 1,189, respectively, and in July 1983, sizes were estimated at 1,189 and 1,822, respectively. This species was designated as endangered in 1983, and critical habitat was defined (48 FR 40178-40186).

The Ash Meadows Amargosa speckled dace occurs in four springs (Bradford, Big, Tubbs, and Jackrabbit springs) and their outflows. In 1982 and 1983, population sizes in these springs were estimated to be between 0 and 35, but no estimates were made in the outflows. The total population was estimated at 500 individuals. This species was designated as endangered in 1983, and critical habitat was defined (48 FR 40178–40186).

Historically, the Ash Meadows poolfish was present, but rare, in the larger springs at Ash Meadows. The last specimen was collected in 1948, and it is now believed to be extinct (Soltz and Naiman 1978, p. 24).

Ash Meadows provides habitat for the endemic and threatened Ash Meadows naucorid bug, as well as habitat for riffle beetles and springsnails. The Ash Meadows naucorid is restricted to places where swift water flows over clean rocks and pebbles at Point of Rocks Spring (FWS 1990, p. 22). Because of habitat loss, the Ash Meadows naucorid was listed as threatened (50 FR 20777-20814), and critical habitat was defined (FWS 1990, p. A-6). While not listed as threatened or endangered, the Devils Hole riffle beetle is endemic to Devils Hole spring and is considered a species of special concern by FWS. One other species of riffle beetle and several species of springsnails are also endemic to Ash Meadows (Hershler and Thompson 1987; FWS 1990, pp. 10-11; Shepard 1992). Another species of springsnail, *Throne variegate*, inhabits springs in the Amargosa River drainage from Ash Meadows south to Saratoga Spring (Hershler 1989).

Another FWS species of special concern is the Ash Meadows montane vole, a subspecies of the widespread montane vole, but none have been recorded since 1933. During the 1933 surveys by Russell and Davis, "by persistent trapping, a small series was obtained" (Hall 1995, p. 549), suggesting that this vole was uncommon (at least in that year). It has not been collected since 1933 (FWS 1990, p. 14).

Oasis Valley–Oasis Valley harbors one endemic fish, the Oasis Valley Speckled Dace. During surveys conducted from 1990 to 1994, Clemmer (1995) reported that Oasis Valley speckled dace were always common in permanent waters of the Amargosa River (in Beatty). At the Amargosa River Narrows south of Beatty, dace were "abundant" in 1990 and 1992, but not seen in 1991, 1993, or 1994. They apparently move into the area during times of high water and perish during the summer when water temperatures increase and water levels drop. At Robert's Field, 13 km NE of Beatty, Oasis Valley speckled dace occurred in the deeper pools and creeks, and on the Revert property, they were found in the deeper isolated pools (Clemmer 1995).

Populations of Amargosa toads have been monitored in Oasis Valley since the early 1980s (Maciolek 1983). More recent surveys have been conducted by Stein (1996). Amargosa toads are endemic to wet areas in Oasis Valley, including the Amargosa River and associated springs, plus at least two isolated springs (Crystal and Indian springs). Determining the population size and multi-annual trends has been difficult because of individual-specific idiosyncratic behavior (Hoff 1996). For example, these toads are reported to forage in "shifts," where juveniles come out early and retreat before adults emerge (they are cannibalistic), then some adults come out to forage early in the evening while others come out late. These problems combine to make population enumeration or population estimates (mark-recapture) of questionable value. Population estimation using other methods is also difficult. These toads are not vocal; therefore, call counts, typically used to estimate population sizes in frogs, cannot be used. In addition, not all females in a population breed every year; therefore, estimates based on egg-mass counts cannot be used. Despite these difficulties, population monitoring of the Amargosa toad and other frogs (tree frogs and introduced bullfrogs) in the region continues (e.g., Stein 1996).

Death Valley–Riparian areas and springs in Death Valley also provide habitat for endemic naucorids, riffle beetles, and springsnails. An endemic naucorid, *Ambrysus funebris*, occurs only in its type locality at Nevares Spring (Cow Creek), on the east side of Death Valley (La Rivers 1948). When described (La Rivers 1948), this species was only known from the spring source downstream to the municipal water intake. Similar to the Ash Meadows naucorid, this species is restricted to swift water flowing over clean gravel (La Rivers 1948). At least two other riffle beetles occur at springs near Furnace Creek (Shepard 1990, 1992). *Microcylleopus fomicoideus* is known only from Travertine Springs, and *Microcylleopus similis* occurs in Travertine, Nevares, and two other (Grapevine and Saratoga) springs in Death Valley, and it occurs in Indian, Point of Rocks, and Big springs in Ash Meadows (Shepard 1990). A number of species of springsnails occur in Death Valley (Hershler 1989). One of these, *Throne robusta*, is endemic to Nevares and Travertine springs, while two others, *T. margae* and *T. rowlandsi*, are endemic to the Grapevine Springs near Scotty's Castle.

Area Wide–Additional species of special status associated with springs and riparian areas include endemic plants and animals, game, other species using the springs for water that would not be able to exist in the area without these water sources, and threatened or endangered migratory species that move through the area using the springs for stopover points. Hunted game species using these water sources represent potential pathways of radionuclides to humans.

Burros use some springs as sources of water throughout the year, as do Gambel's quail, chukar, and mourning doves. Furbearers, including mountain lions, kit foxes, and (potentially) gray foxes, also use springs as a water source. There is no information available on the frequency of use patterns by these species of these spring areas.

If present in the area, the endangered peregrine falcon, the threatened bald eagle, and the protected golden eagle are likely attracted to these areas because the large variety of wildlife that rely on springs for water and cover provide a readily available source of prey. Again, there are no available data on the frequency of spring use by these species.

Desert tortoises are not generally found in the vicinity of the springs and wet areas surrounding them, but are most likely present in the creosotebush community in the peripheral areas of Ash Meadows National Wildlife Refuge. The populations of desert tortoises found in these areas are most likely continuous with the population found at Yucca Mountain.

Formerly, there were horses in the Ash Meadows area, but they were removed in 1985, and efforts have been taken to ensure they do not return (e.g., fencing of some springs).

3.3.4 Transportation Corridors

Important biological resources (see Table 3-1) were identified within 5 km of five potential rail corridors (Figure 1-2) and within 1 km of five potential heavy-haul routes and three intermodal transfer stations (Figure 1-3). These resources were identified from a search of the NNHP (1997) and California Department of Fish and Game (1997) (Jean rail corridor only) databases; examination of a USGS database of water resources within Nevada (USGS 1998); review of documents listed in Subsection 2.4 (Table 2-3); and meetings and conversations with personnel from the BLM, FWS, and NDOW. If only draft versions of BLM Resource Management Plans

were available, protected areas and management strategies identified in the preferred alternative were used to identify protected areas or resources and constraint levels. Fifty-four springs, perennial streams, and BLM-designated riparian areas were visited in 1997 by CRWMS M&O biologists to determine if those sites contain wetlands (Riparian Habitat/Wetland Characterization Field Notes, J.E. Reilly and J.K. Smith, July 15, 1997, through August 12, 1997, MOL.19990208.0224). Fifteen locations where sensitive species were observed before 1990 (NNHP 1997) were visited in 1997 to ensure that the sites still had suitable habitat for the species (Sensitive Species Confirmation Field Notes, D.L. Rakestraw and J.E. Reilly, July 15, 1997, through August 12, 1997, MOL.19990208.0226).

Appendices E through O contain lists of important biological resources in or near the routes and facilities. Attachment 1 contains maps showing the location of those resources.

The proportion of each transportation corridor and facility within land cover types (described in Appendix C) was determined from the map of Utah State University (1996) and is summarized in Appendix D. The length of transportation corridor centerlines, and the area of intermodal transfer facilities, within land cover types was calculated.

3.3.4.1 Potential Rail Corridors

Caliente Rail Corridor–The Caliente rail corridor begins along one of three alternate routes near the town of Caliente in Lincoln County. The corridor proceeds west from Meadow Valley Wash toward Mud Lake, south of Tonopah. At Mud Lake, the Caliente corridor merges with the Carlin corridor and proceeds south to Yucca Mountain.

Between Caliente and Mud Lake, the corridor crosses Dry Lake, Coal, Garden, Sand Spring, Railroad, Reveille, Stone Cabin, and Ralston valleys. The elevations of these valleys range from 1,400 to 1,800 m. The Caliente corridor also crosses the Highland, Seaman, Golden Gate, and Kawich ranges. Along this portion of the corridor, the vegetation is typical of the Great Basin Desert. Land cover types from Caliente to Sand Spring Valley are primarily sagebrush (50 percent) and salt desert scrub (47 percent). From Sand Spring Valley to Mud Lake the land cover types are similar, with salt desert scrub (65 percent) and sagebrush (33 percent) covering a majority of the corridor (Appendix D).

At Mud Lake (south of Tonopah), the Caliente corridor merges with the Carlin corridor and proceeds south along the western boundary of the Nellis Air Force Range, passing through Stonewall Flat, Sarcobatus Flat, and Beatty Wash (in Oasis Valley). This portion of the corridor is relatively flat, with elevations ranging from 900 to 1,550 m and vegetation typical of the Great Basin Desert. Land cover types are primarily salt desert scrub (73 percent), Mojave mixed scrub (10 percent), hopsage (9 percent), and sagebrush (8 percent) (Appendix D).

From Beatty Wash to Yucca Mountain, the corridor passes through a transition zone between the Mojave and Great Basin deserts in Crater and Jackass flats. Elevations range from 900 m to 1,300 m, and dominant land cover types are creosote-burrobush (59 percent), Mojave mixed scrub (22 percent), and salt desert scrub (19 percent) (Appendix D).

Important Biological Resources–Seventy-seven important biological resources were documented within 5 km of the primary Caliente corridor, including the Mud Lake to Yucca Mountain

section (Appendix E; Attachment 1, plates 6-12 and 18). Thirty-two of these resources are located within the corridor, or are springs or riparian areas within 400 m of the corridor.

The only resident threatened or endangered species found within the Caliente rail corridor is the desert tortoise, which occurs along the southern end of the corridor from about Beatty Wash to Yucca Mountain (Bury et al. 1994). This area is not critical habitat for desert tortoises (50 CFR 17.95, pp. 385–392), and the abundance of desert tortoises in this area is low in relation to other areas within the range of this species in Nevada (Karl 1981; Rautenstrauch and O'Farrell 1998). The only other threatened or endangered species near the corridor is the Federally-threatened (State of Nevada protected, NAC 503.067) Railroad Valley springfish, which has been introduced into Warm Springs (about 3 km north of the corridor in Hot Creek Valley) (FWS 1996, p. 20).

Four other species classified as sensitive by the BLM have been found within the corridor (NNHP 1997). Unnamed subspecies of the Meadow Valley Wash speckled dace and Meadow Valley Wash desert sucker have been found in Meadow Valley Wash north of Caliente. Nevada also classifies the Meadow Valley Wash desert sucker as sensitive (NAC 503.067). Welsh's catseye has also been found along the Caliente secondary corridor, about 7.5 km north of Caliente. In the Beatty area, the Nevada sanddune beardtongue has been found on sandy soils 10 km north of Springdale. A number of bats classified as sensitive by the BLM may also occur along the corridor, and the southern end of the corridor is within the range of the chuckwalla.

The Caliente rail corridor crosses several areas designated as game habitat (BLM 1979, pp. 2-27 through 2-36; BLM 1994a, Maps 9 through 13). The corridor crosses crucial bighorn sheep winter habitat in the Cedar Range (approximately 13 km west of Crestline) and year-round habitat east of Goldfield. The Cedar Range is also mule deer crucial winter habitat, and the corridor crosses mule deer use areas in or near the Chief Mountains, Delamar Mountains, Worthington Mountains/Quinn Canyon Range, Reveille Range, and Kawich Range. The corridor crosses pronghorn habitat in Sand Spring, Railroad, Reveille, Stone Cabin, and Ralston valleys, and from Mud Lake to Stonewall Mountain. Portions of the Caliente secondary corridor in Meadow Valley (within 400 m of springs, seeps, or stock tanks) are within crucial habitat for quail. Meadow Valley Wash north of Caliente is classified as habitat for waterfowl.

At least six springs or groups of springs and three streams are within 400 m of the corridor (BLM 1994a, Maps 14 and 15; USGS 1998). These areas might be wetlands, as defined in the Clean Water Act; however, no formal wetlands delineation has been conducted along the corridor. The primary corridor and the Crestline secondary corridor cross Meadow Valley Wash south of Panaca. The Caliente secondary corridor crosses and is adjacent to that wash north of Caliente, and there is an unnamed spring within this secondary corridor. The Crestline secondary corridor passes within about 300 m of Miller Spring. There is an unnamed spring about 50 m from the primary corridor at the north end of the North Pahroc Range. Black Spring is less than 50 m from the primary corridor at the north end of the Kawich Range. The corridor crosses the White River east of the Seaman Range and parallels the river for approximately 25 km. This 25-km portion of the river was surveyed in August 1997 and found to be mostly dry with some standing water in tanks developed for livestock. There is an unnamed spring about 300 m east of the primary corridor between Mud Lake and Oasis Valley. The corridor crosses the upper portion of the Amargosa River in Oasis Valley (that river is classified by the BLM as a riparian area), and

there are a group of springs within and up to 2 km from the corridor in that valley. The corridor also crosses a number of ephemeral streams that may be waters of the United States, as defined in Section 404 of the Clean Water Act.

The Caliente rail corridor also crosses eight BLM-designated wild horse and burro herd management areas (BLM 1979, pp. 2-26 through 2-35; BLM 1994a, Maps 18 and 19). The primary corridor and Crestline secondary corridor cross a wild horse herd management area in the Cedar Range south of Panaca, and the corridor crosses a wild horse management area in the Chief Range west of Panaca. From Sand Spring Valley to Mud Lake, the corridor crosses the Reveille, Stone Cabin, and Saulsbury wild horse herd management areas, and from Mud Lake to Yucca Mountain, the corridor crosses the Goldfield, Stonewall, and Bullfrog wild horse and burro herd management areas.

In addition to the resources found within the corridor, 42 important biological resources were found within 5 km of the corridor. These include one ESA threatened species (the Railroad Valley Springfish); BLM sensitive species; numerous springs and riparian areas; the Amargosa-Oasis Valley ACEC (BLM 1994a, Map 27); and habitat for mule deer, antelope, bighorn sheep, and quail. Many of the sensitive species and springs are in Oasis Valley along the Amargosa River.

Carlin Rail Corridor–The Carlin rail corridor originates at the town of Beowawe in Eureka County and travels south-southwest to U.S. Highway 50, where the corridor splits into two alternates. The primary corridor passes through the Big Smoky Valley, and a secondary corridor goes through Monitor and Ralston valleys. The two alternates merge near Mud Lake (south of Tonopah), where this corridor also merges with the Caliente corridor. Elevations along the Carlin corridor north of Mud Lake range from 1,400 to 2,200 m, with elevations in the Monitor Valley being approximately 200 m higher than in the Big Smoky Valley. The vegetation generally is characterized by Great Basin Desert flora and varies substantially due to the range of elevations encountered. The most common land cover types along the corridor from Beowawe to U.S. Highway 50 are sagebrush (60 percent), salt desert scrub (19 percent), and greasewood (16 percent). The Big Smoky Valley corridor is dominated by salt desert scrub (74 percent) and has comparatively less sagebrush (17 percent) than the Monitor Valley secondary corridor, which is higher in elevation. Along the Monitor Valley secondary corridor, common land cover types include sagebrush (62 percent), salt desert scrub (25 percent), and sagebrush-perennial grass (13 percent) (Appendix D).

At Mud Lake, the Carlin corridor proceeds south along the western boundary of the Nellis Air Force Range, passing through Stonewall Flat, Sarcobatus Flat, and Beatty Wash. This portion of the corridor is relatively flat, with elevations ranging from 900 to 1,550 m and vegetation typical of the Great Basin Desert. Land cover types are primarily salt desert scrub (73 percent), Mojave mixed scrub (11 percent), hopsage (9 percent), and sagebrush (7 percent) (Appendix D).

From Beatty Wash through Oasis Valley and Crater and Jackass flats to Yucca Mountain, the corridor passes through a transition zone between the Mojave and Great Basin deserts. Elevations range from 900 m to 1,300 m, and common land cover types are creosote-burrobush (59 percent), Mojave mixed scrub (22 percent), and salt desert scrub (19 percent) (Appendix D).

Important Biological Resources–One hundred seventy-one important biological resources were documented within 5km of the Carlin corridor, including both the Big Smoky Valley and Monitor Valley corridors (Appendix E and F; Attachment 1; plates 1-6, 11, and 12). Thirty-nine of these are located within the corridor or are springs or riparian areas within 400 m of the corridor.

The only resident threatened or endangered species found within the Carlin rail corridor is the desert tortoise, which occurs along the southern end of the corridor from about Beatty Wash to Yucca Mountain (Bury et al. 1994). This area is not critical habitat for desert tortoises (50 CFR 17.95, pp. 385-392), and the abundance of desert tortoises in this area is low in relation to other areas in the range of the species in Nevada (Karl 1981; Rautenstrauch and O'Farrell 1998).

Three species classified by BLM as sensitive have been documented along the Carlin corridor. A ferruginous hawk (also classified as protected by Nevada) nesting area is located east of Mount Callaghan (personal communication, D. Crimmins and C. Stubbs, BLM Battle Mountain District Office, January 22, 1997, MOL.19990208.0118, MOL.19990208.0119). The San Antonio pocket gopher has been found in Big Smokey Valley northwest of the San Antonio Mountains (personal communication, M. Swinney, BLM Tonopah Field Office, February 14, 1997, MOL.19990208.0113, MOL.19990208.0117, MOL.19990208.0175). The Nevada sanddune beardtongue has been found on sandy soils 10 km north of Springdale (NNHP 1997). A number of bats classified as sensitive by the BLM may also occur along the corridor, and the southern end of the corridor is within the range of the chuckwalla.

The Carlin corridor crosses 18 areas designated as game habitat by the BLM (personal communication, D. Crimmins and C. Stubbs, BLM Battle Mountain District Office, January 22, 1997, MOL.19990208.0118, MOL.19990208.0119; personal communication, M. Swinney, BLM Tonopah Field Office, February 14, 1997, MOL.19990208.0113, MOL.19990208.0117, MOL.19990208.0175; BLM 1983a; Map 3-1; BLM 1994a; Maps 9 through 13). The corridor crosses three sage grouse strutting areas: in Grass Valley east of the Toiyabe Range, at the southeast end of Rye Patch Canyon, and in Monitor Valley, northeast of the Toquima Range. The corridor also crosses one sage grouse nesting area in northern Monitor Valley and two areas of sage grouse habitat north and northeast of Belmont in Monitor Valley. The corridor crosses four areas of year-round pronghorn habitat (Big Smoky Valley, two in Monitor Valley, and from Mud Lake to Stonewall Mountain), one area of pronghorn summer range (south of the Simpson Park Mountains), and one area of pronghorn winter range (Monitor Valley south of Hickison Summit). The corridor crosses three areas of mule deer habitat (spring range in Grass Valley and the north end of Monitor Valley and summer range near the Simpson Park Range), one ungulate migration corridor between the southern Simpson and Toquima ranges, and elk habitat on the eastern slopes of the Monitor Range. The corridor also crosses bighorn sheep habitat east of Goldfield.

Three springs or groups of springs, seven riparian areas, and one reservoir are within 400 m of the Carlin corridor (BLM 1994a, Maps 14 and 15; USGS 1998; personal communication, D. Crimmins and C. Stubbs, BLM Battle Mountain District Office, January 22, 1997, MOL.19990208.0118, MOL.19990208.0119). These areas may be classified as wetlands, as defined in the Clean Water Act; however, no formal wetlands delineation has been conducted along the corridor. Rye Patch Spring is within 100 m of the corridor at the south end of the

Simpson Park Mountains. Seyler Reservoir is 200 m from the corridor in the south end of Big Smoky Valley. The corridor crosses five riparian areas (Skull, Steiner, and Ox Corral creeks, Water and Rye Patch canyons) between Beowawe and Austin (south end of Grass Valley). Two of these (Steiner and Ox Corral creeks) are ephemeral and have little or no riparian vegetation where they are crossed by the corridor. The corridor passes within 200 m of a designated riparian area north of Belmont in Monitor Valley. There is an unnamed spring about 300 m east of the primary corridor between Mud Lake and Oasis Valley. The corridor crosses the upper portion of the Amargosa River (BLM riparian area) in Oasis Valley, and there are a group of springs within and up to 2 km from the corridor in that valley. This corridor crosses a number of ephemeral streams that may be waters of the United States, as defined in Section 404 of the Clean Water Act.

The corridor crosses eight wild horse or wild horse and burro herd management areas: two between Beowawe and Austin (Mount Callaghan and Bald Mountain), one in Big Smoky Valley (Hickison), two in Monitor Valley (North Monitor and Saulsbury), and three between Mud Lake and Yucca Mountain (Goldfield, Stonewall, and Bullfrog) (BLM 1983a, Map 2-4; BLM 1994a, Maps 18 and 19).

An additional 132 resources were identified within 5 km of the corridor. These include the Amargosa-Oasis ACEC (BLM 1994a, Map 27), BLM sensitive species, springs and riparian areas, and habitat for mule deer, antelope, bighorn sheep, and sage grouse.

Caliente-Chalk Mountain Rail Corridor–The Caliente-Chalk Mountain rail corridor follows the same route as the Caliente rail corridor from Caliente to Sand Springs Valley. It begins along one of three alternate routes near the town of Caliente in Lincoln County. Between Meadow Valley Wash and the point where it splits from the Caliente corridor, the Caliente-Chalk Mountain corridor crosses Dry Lake, Coal, Garden, and Sand Spring valleys at elevations ranging from 1,400 to 1,580 m. This portion of the corridor also crosses the Highland, Seaman, Golden Gate, and Worthington mountain ranges at elevations of 1,460 to 1,770 m. After splitting from the Caliente corridor, the Caliente-Chalk Mountain corridor proceeds south through Sand Spring and Emigrant Valleys on Nellis Air Force Range, over Groom Pass, and along several alternative routes on the NTS through Yucca and Jackass flats to Yucca Mountain. The elevations along this portion of the corridor ranges from approximately 1,100 to 1,670 m.

From the beginning of this corridor to about Yucca Flat, the vegetation is typical of the Great Basin Desert. From Yucca Flat to Yucca Mountain, the vegetation is characteristic of the transition between the Mojave and Great Basin deserts. Land cover types from Caliente to Sand Spring Valley are primarily sagebrush (50 percent) and salt desert scrub (47 percent). From Sand Spring Valley to Yucca Mountain, the vegetation cover types are dominated by blackbrush (50 percent), salt desert scrub (31 percent), and sagebrush (9 percent) (Appendix D).

Important Biological Resources–Seventy-nine important biological resources were identified within 5 km of the corridor from Crestline to Yucca Mountain (including secondary corridors) (Appendix G and Appendix E; Attachment 1, plates 8, 9, 10, 12, 18, 19, and 20). Twenty-three of these are located within the corridor or are springs or riparian areas within 400 m of the corridor.

The only resident threatened or endangered species in the Caliente-Chalk Mountain rail corridor is the desert tortoise, which occurs in low abundance on the NTS south of Yucca Flat (Rautenstrauch and O'Farrell 1998). This area is not critical habitat for desert tortoises (50 CFR 17.95, pp. 385–392).

Seven other species classified as sensitive by the BLM have been found within the corridor (NNHP 1997). Unnamed subspecies of the Meadow Valley Wash speckled dace and Meadow Valley Wash desert sucker have been found in Meadow Valley Wash north of Caliente. Welsh's catseye has been found along the Caliente secondary corridor (about 7.5 km north of Caliente). Ripley's springparsley, largeflower suncup, and Beatley's scorpionweed have been found within the corridor and in numerous areas adjacent to the corridor in Yucca Flat. The long-legged myotis has been found in Jackass Flats and other bats classified as sensitive by the BLM may also occur near the corridor. Chuckwalla may also occur in suitable habitat on the NTS.

The Caliente-Chalk Mountain rail corridor crosses nine areas designated as game habitat by the BLM (1979, pp. 2-26 through 2-35; BLM 1994a, Maps 9, 10, and 11). Crucial bighorn sheep winter habitat is found in the Cedar Range (approximately 13 km west of Crestline). The Cedar Range is also crucial winter habitat for mule deer, and the corridor crosses mule deer use areas in or near the Chief Mountains, Delamar Mountains, Worthington Mountains/Quinn Canyon Range, and north of Groom Pass. The corridor crosses pronghorn habitat in Sand Spring and Emigrant valleys. In Meadow Valley along the Caliente secondary corridor, areas within 400 m of springs, seeps, or stock tanks are classified as crucial areas for quail, and portions of this area also are classified as habitat for waterfowl.

At least 3 springs or groups of springs and 2 streams occur within 400 m of the corridor (USGS 1998). These might be wetlands, as defined in the Clean Water Act; however, no formal wetlands delineation has been conducted along the corridor. The primary corridor and Crestline secondary corridor cross Meadow Valley Wash south of Panaca. The Caliente secondary corridor crosses and runs adjacent to that wash north of Caliente and there is an unnamed spring within this secondary corridor. The Crestline secondary corridor passes within about 300 m of Miller Spring. There is an unnamed spring about 50 m from the primary corridor at the north end of the North Pahroc Range. The corridor crosses the White River east of the Seaman Range and parallels the river for approximately 25 km. The corridor also crosses a number of ephemeral streams that may be waters of the United States, as defined in Section 404 of the Clean Water Act.

The Caliente-Chalk Mountain rail corridor also crosses two BLM-designated wild horse or wild horse and burro herd management areas (BLM 1979, pp. 2-42 through 2-43; BLM 1994a, Maps 18 and 19). The primary corridor and Crestline secondary corridor cross a wild horse herd management area in the Cedar Mountains (south of Panaca), and the corridor crosses a wild horse management area in the Chief Range (west of Panaca).

In addition to the resources found within the corridor, 56 important biological resources were found within 5km of the corridor, including one ESA threatened species (the Railroad Valley Springfish); BLM sensitive species; springs or riparian areas; and habitat for mule deer, bighorn sheep, antelope, and quail.

Jean Rail Corridor–The primary corridor for this route begins at Jean in southern Clark County and crosses the Spring Mountains at Wilson Pass. It then proceeds along the west side of the Spring Mountains east of Pahrump and Johnnie, into the Amargosa Valley, Jackass Flats, and to Yucca Mountain. The Stateline Pass secondary corridor starts at Borax Siding (south of Jean) and crosses the southern end of the Spring Mountain at Stateline Pass on the California/Nevada border before joining the primary corridor southeast of Pahrump. This corridor ranges in elevation from 820 m at Jean to 1,500 m at Wilson Pass.

The primary corridor is within the creosote-burrobush (59 percent) and Mojave mixed scrub (21 percent) land cover types at lower elevations, and blackbrush (18 percent) at higher elevations, primarily around Wilson Pass. The Stateline Pass secondary corridor is primarily within the creosote-burrobush (81 percent) and Mojave mixed scrub (15 percent) land-cover types (Appendix D).

Important Biological Resources–A total of 67 important biological resources was documented within or less than 5 km from the Jean rail corridor and Stateline Pass secondary corridor (Appendix H; Attachment 1, plates 13, 14, 16, and 17). Sixteen of these are within the corridor.

The only resident threatened or endangered species in the Jean rail corridor is the desert tortoise. The entire corridor is within the range of this species (Bury et al. 1994). Along most of the corridor, especially the western portions from Pahrump to Yucca Mountain, the abundance of desert tortoises is low (Karl 1980; Rautenstrauch and O'Farrell 1998); however, some areas crossed by the corridor in Ivanpah, Goodsprings, Mesquite, and Pahrump valleys have a higher abundance of tortoises (BLM 1992b, Map 3-13). The corridor does not go through critical habitat for the desert tortoise (50 CFR 17.95, pp. 385–392).

Two subspecies of the pinto beardtongue (BLM sensitive species) have each been found at one location within the first 5 km of the corridor near Jean (NNHP 1997). No other BLM sensitive species have been documented within in the corridor, although chuckwalla, gila monsters, and a number of bat species classified as sensitive probably occur there in suitable habitat.

The Jean rail corridor crosses several areas designated as game habitat by the BLM (1998, Maps 3-7, 3-8, and 3-9). The corridor crosses crucial chukar habitat north of Goodsprings. It crosses crucial quail habitat from north of Goodsprings to the west of Wilson Pass, east of Pahrump, and northeast of Johnnie. Designated mule deer winter habitat is found along the corridor northwest of Goodsprings and northeast of Pahrump. The corridor crosses crucial sheep habitat around Wilson Pass and bighorn winter habitat to the west of Wilson Pass. The corridor crosses a bighorn migration corridor between the Bird Springs Range and the southern end of the Spring Mountains. It crosses a potential migration corridor from winter range in the Devils Hole Hills to historic but currently unoccupied habitat at the northwest end of the Spring Mountains.

The corridor crosses three wild horse and burrow herd management areas: the Red Rock herd management area near Goodsprings (southeast of the Spring Mountains) and the Wheeler Pass and Johnnie herd management areas on the west side of the Spring Mountains (BLM 1998, Map 2-1).

There are no springs or riparian areas within 400 m of the corridor (USGS 1998). The corridor crosses a number of ephemeral streams that may be waters of the United States, as defined in Section 404 of the Clean Water Act.

The 51 biological resources found within 5 km of the corridor include numerous sensitive species; 12 springs; habitat for chukar, quail, mule deer, and bighorn sheep; and 2 ACECs (Stump Spring and Amargosa mesquite).

In addition to the resources identified as important, approximately 0.7 km^2 of the Stateline secondary corridor passes through mesquite bosques (Appendix D). Mesquite bosques are uncommon in southern Nevada and are important for some migratory birds and other species in the region. Though policies protecting these areas have not been established, and the location or quality of these habitats have not been clearly identified, the impact on the bosques should be considered.

Valley Modified Rail Corridor–The Valley Modified rail corridor begins in the northeastern portion of the Las Vegas Valley; crosses along the northern edge of the valley; and then passes through Indian Springs Valley, Mercury Valley, Rock Valley, and Jackass Flats. The elevation of this relatively flat route ranges from 800-1,050 m. This entire corridor is within the Mojave Desert. Most of the corridor is within the creosote-burrobush (79 percent) and Mojave mixed scrub (16 percent) land cover types (Appendix D).

Important Biological Resources–From Apex to Yucca Mountain, 29 important biological resources were identified within 5 km of the corridor (Appendix I; Attachment 1, plates 13, 14, and 15). Six of these resources are within the corridor.

The only resident threatened or endangered species in the Valley Modified rail corridor is the desert tortoise. The entire corridor is within the range of this species (Bury et al. 1994). In general, the abundance of tortoises along this corridor through Las Vegas Valley, Indian Springs Valley, and the NTS is low (BLM 1992b, Map 3-13; Rautenstrauch and O'Farrell 1998). This corridor does not cross areas classified as critical habitat for desert tortoises (50 CFR 17.95, pp. 385–392). The razorback sucker (classified as threatened under the ESA and as protected by Nevada) has been introduced into ponds at Floyd Lamb State Park (4.2 km south of the corridor). The Pahrump poolfish (classified as endangered under the ESA and by Nevada) has been introduced into ponds in Floyd Lamb State Park and into the outflow of Corn Creek Springs. Corn Creek Springs is 4.5 km northeast of the corridor (NNHP 1997; BLM 1998).

Two populations of Parish's scorpionweed and one population of Ripley's springparsley have been found within the corridor (in Rock Valley on the NTS). (Blomquist et al. 1995, Figures 16 and 44; NNHP 1997). No other BLM sensitive species have been documented in the corridor, although chuckwalla, gila monsters, and a number of bat species classified as sensitive probably occur there in suitable habitat.

The Indian Springs secondary corridor crosses the Wheeler Pass wild horse and burrow herd management area south of U.S. Highway 95 around Indian Springs (BLM 1998, Map 2-1).

There are no ACECs within the Valley Modified rail corridor (BLM 1998, Maps 3-7, 3-8, and 3-9), nor are there any springs or riparian areas within 400 m of the corridor (USGS 1998). The

corridor crosses a number of ephemeral streams that may be waters of the United States, as defined in Section 404 of the Clean Water Act.

The 23 important biological resources found within 5 km of this corridor include the two threatened or endangered fishes (razorback sucker and Pahrump poolfish); BLM sensitive species; springs; an ACEC (Rainbow Garden); and habitat for mule deer, bighorn sheep, and quail.

3.3.4.2 Heavy-Haul Routes

Five potential heavy-haul routes have been identified in southern Nevada (Figure 1-3). General descriptions of the routes are given below. Detailed information on the land cover types (described in Appendix C) found along each route are given in Appendix D. Appendices J through M are detailed lists of important biological resources along the routes, and Attachment 1 has maps showing the location of those resources.

Caliente–The Caliente heavy-haul route begins in Caliente in Meadow Valley Wash, one of the few perennially moist areas in this part of the state. The route proceeds west along U.S. Highway 93 and State Route 375 to Rachel. From Rachel, the Caliente route continues along State Highway 375 to Warm Springs, along U.S. Highway 6 to Tonopah, and then along U.S. Highway 95 and Lathrop Wells Road to Yucca Mountain. The Caliente Route passes over the Delamar (elevation 1,890 m) and McKinney (1,950 m) ranges; through Dry Lake, Pahranagat, Tikaboo, Sand Spring, Railroad, Stone Cabin, Ralston, and Oasis valleys; and over Stonewall, Sarcobatus, and Jackass flats. The elevation in the flats and valleys ranges from 790 to 1,550 m. The Caliente route passes through land cover types representative of the Great Basin Desert (salt desert scrub, 49 percent; sagebrush, 14 percent; and juniper, 1 percent), the Mojave Desert (creosote-burrobush, 13 percent; and Mojave mixed scrub, 8 percent), and the transition zone between them (spiny hopsage, 6 percent; blackbrush, 4 percent; and greasewood, 2 percent) (Appendix D).

Important Biological Resources–Fifty-five important biological resources were identified within 1 km of this route (Appendix M; Attachment 1, plates 1 through 9). Of these resources, 36 are within 100 m of the route.

Three threatened or endangered species have been found within 100 m of the Caliente heavy-haul route. The Hiko White River springfish (Federally endangered) occurs in Crystal Springs (FWS 1998, p. 16), which is about 75 m south of State Route 375 near its intersection with U.S. 93. The springs and outflow, which come within about 10 m of State Highway 375, are designated as critical habitat for the Hiko White River springfish (50 CFR 17.95, pp. 415-416). An introduced population of the Railroad Valley springfish (Federally threatened) has been observed in Warm Springs, the outflow of which crosses U.S. Highway 6 (FWS 1996, p. 20). The southern part of the route (along U.S. Highway 95 from Beatty to Yucca Mountain) is within the range of the desert tortoise (Bury et al. 1994). This area is not classified as critical habitat for desert tortoises (50 CFR 17.95, pp. 385-392), and the relative abundance of tortoises in this area is low (Karl 1981; Rautenstrauch and O'Farrell 1998).

Six other species classified as sensitive by BLM have been documented within 100 m of the route (NNHP 1997). The Pahranagat speckled dace is found in Crystal Springs. The Railroad Valley tui chub (also classified as sensitive by Nevada) is found in Twin Spring Slough along State Route 375. The Amargosa toad and the Oasis Valley speckled dace (both also classified as protected by Nevada) are found in the Amargosa River and elsewhere in the Oasis Valley. Townsend's big-eared bats and fringed myotis have been documented near the southern end of the route, and other bats classified as sensitive by the BLM may also occur near the route. Chuckwalla may also occur in suitable habitat along the southern end of the route.

This route crosses eight areas designated as game habitat (BLM 1979, pp. 2-26–2-35; BLM 1994a, Maps 9 through 13). Portions of Meadow Valley Wash are designated important habitat for Gambel's quail and waterfowl. The route crosses mule deer habitat in Newman Canyon, the Pahroc Range, the Pahranagat Range, and northwest of the Groom Range. It also crosses bighorn sheep habitat in the Pahranagat Range and pronghorn habitat northwest of the Groom Range and from west of Sand Spring Valley through Railroad, Stone Cabin, and Ralston valleys.

Nineteen springs or riparian areas located within 400 m of the route may be considered wetlands under Section 404 of the Clear Water Act, although no formal wetlands delineation has been conducted along this route (USGS 1998). The intermodal transfer station is adjacent to Meadow Valley Wash. There is an unnamed spring near U.S. 93 west of Caliente. The outflow of Crystal Spring is about 10 m from State Route 375, and that highway passes within 250 m of Twin and Warm springs and crosses their outflows. Fivemile Spring is about 400 m from U.S. Highway 6 in Stone Cabin Valley. U.S. Highway 95 passes within 400 m of 12 springs or groups of springs in the Oasis Valley and along the Amargosa River and also crosses the Amargosa River at Beatty. This route also crosses a number of ephemeral streams that may be waters of the United States, as defined in Section 404 of the Clean Water Act.

The 19 resources located 100-1,000 m from the route include the Oasis Valley ACEC; springs or riparian areas (most of which are in Oasis Valley); BLM sensitive species; and designated habitat for mule deer, bighorn sheep, and pronghorn.

Caliente-Chalk Mountain–The Caliente-Chalk Mountain heavy-haul route begins at Caliente in Meadow Valley Wash, one of the few perennially moist areas in this part of the state. The route proceeds west along U.S. Highway 93 and State Route 375 to Rachel. From Rachel, the route follows paved and unpaved roads south through the Nellis Air Force Range and the NTS to Yucca Mountain. The route passes over the Delamar Mountains (at an elevation of 1,890 m) and through Dry Lake, Pahranagat, Tikaboo, Sand Spring, and Emigrant valleys (elevations ranging from 1,160 to 1,550 m). This route crosses a variety of land cover types representative of the Great Basin Desert (salt desert scrub, 37 percent; sagebrush, 14 percent; and juniper, 2 percent), the Mojave Desert (creosote-burrobush, 10 percent; and Mojave mixed scrub, 7 percent), and the transition zone between these deserts (blackbrush, 16 percent; and spiny hopsage, 10 percent) (Appendix D).

Important Biological Resources–Twenty-five important biological resources were identified within 1 km of this heavy-haul route, 14 of which were within 100 m (Appendices L and M; Attachment 1, plates 1, 2, 3, and 8).

Two resident threatened or endangered species are found within 100 m of the Caliente-Chalk Mountain heavy-haul route. The Hiko White River springfish (Federally endangered) occurs in Crystal Springs (FWS 1998, p. 16). The springs and outflow, which come within about 10 m of State Highway 375, are designated as critical habitat for the Hiko White River springfish (50 CFR 17.95, pp. 415-416). The part of the route from the northern end of Frenchman Flat to Yucca Mountain is within the range of the desert tortoise (Rautenstrauch, Brown et al. 1994). This area is not classified as critical habitat for desert tortoises (50 CFR 17.95, pp. 385-392), and the relative abundance of tortoises in this area is low (Rautenstrauch and O'Farrell 1998).

Three species classified as sensitive by the BLM have been found within 100 m of this route (NNHP 1997). The Pahranagat speckled dace occurs in Crystal Springs, Ripley's springparsley has been found in numerous locations in Yucca Flat on the NTS, and the fringed myotis has been observed in Fortymile Wash on the NTS. A number of bats classified as sensitive by the BLM may also occur along the route, and the southern end of the route is within the range of the chuckwalla.

This route crosses six areas designated as game habitat (BLM 1979, pp. 2-27–2-36; BLM 1994a, Maps 9 through 13). Portions of Meadow Valley Wash are designated important habitat for Gambel's quail and waterfowl. The route crosses mule deer habitat in four areas: west of Caliente, near Pahroc Summit Pass, in the Pahranagat Range, and in the Groom Range. It also crosses bighorn sheep habitat in the Pahranagat Range.

Three springs or riparian areas located within 400 m of the route may be considered wetlands under Section 404 of the Clear Water Act, including Meadow Valley Wash, an unnamed spring near U.S. 93 west of Caliente, and Crystal Springs and its outflow (USGS 1998). No formal wetlands delineation has been conducted along this route.

The 11 important resources located 100-1,000 m from the route include springs or riparian areas; BLM sensitive species; and designated habitat for mule deer, bighorn sheep, and pronghorn.

Caliente-Las Vegas–The Caliente-Las Vegas heavy-haul route begins at the proposed intermodal transfer station adjacent to Meadow Valley Wash, south of Caliente. The route proceeds along U.S. Highway 93 west to Crystal Springs. From Crystal Springs, the route continues south on U.S. Highway 93 to Interstate 15 and into the northern Las Vegas Valley. The route is along the proposed Northern Beltway around the northern end of Las Vegas Valley to U.S. Highway 95, U.S. Highway 95 to Mercury, and Jackass Flats Road to Yucca Mountain. The route passes over the Delamar Mountains (at an elevation of 1,890 m), through Dry Lake Valley and over the Pahroc Summit Pass to Crystal Springs. From Crystal Springs to Yucca Mountain, the route passes through Pahranagat, Coyote Springs, Las Vegas, Indian Springs, Mercury, and Rock valleys and ranges in elevation from approximately 700 to 1,200 m. The land cover types along the route are typical of the Mojave Desert, (creosote-burrobush, 62 percent; and Mojave mixed scrub, 16 percent), with smaller proportions representative of the Great Basin Desert (salt desert scrub, 6 percent; sagebrush, 5 percent; and juniper, 2 percent) (Appendix D).

Important Biological Resources–Forty-four important biological resources were identified within 1 km of the Caliente/Las Vegas heavy-haul route (Appendix M; Attachment 1; plates 1, 2, 8, 9, 10, 11, and 12). Of these resources, 27 are within 100 m of the route.

Three resident threatened or endangered species have been found within 100 m of the Caliente-Las Vegas heavy-haul route. The section of the route from about Alamo to Yucca Mountain is within the range of the threatened desert tortoise (Bury et al. 1994). A section of U.S. Highway 93 (approximately 100 km from Maynard Lake south to about 6 km north of I-15) is critical habitat for the desert tortoise (50 CFR 17.95, pp. 385-392). The relative abundance of desert tortoises along the remainder of the route through Las Vegas Valley, Indian Springs Valley, and the NTS is low (BLM 1992b, Map 3-13; Rautenstrauch and O'Farrell 1998). The White River springfish (Federally endangered and Nevada protected) is found in Ash Springs (in northern Pahranagat Valley less than 100 m from U.S. Highway 93) (FWS 1998, pp. 12-14). The route crosses the outflow of Ash Springs, which is designated critical habitat for the White River springfish (50 CFR 17.95, pp. 416-417). The Pahranagat roundtail chub (Federally and Nevada protected) has been found in Ash Springs, the outflow, and throughout Pahranagat Creek, but now is restricted to an approximately 3.5-km length of Pahranagat Creek and approximately 2.5 km of irrigation ditch in the area (FWS 1998, pp. 11-12).

Nine other species classified as sensitive by BLM have been documented within 100 m of the route (NNHP 1997). The Pahranagat speckled dace is found in Ash Springs. The Pahranagat pebblesnail, Pahranagat naucorid, and the grated throne are found in Ash Springs, and the Pahranagat Valley montane vole has been observed near the route in Pahranagat National Wildlife Refuge. In addition, pinto beardtongue has been found along U.S. 93 north of I-15, Ripley's springparsley and Parish's scorpionweed have been found adjacent to Jackass Flats Road in eastern Rock Valley, and the fringed myotis has been observed near Yucca Mountain in Fortymile Wash. A number of other bats classified as sensitive by the BLM may also occur along the route, and most of the route south from Pahranagat Valley is within the range of the chuckwalla and gila monster.

Seven springs, streams, or lakes located less than 400 m from the route might be classified as wetlands under Section 404 of the Clean Water Act, including Meadow Valley Wash, Ash Springs and its outflow, unnamed springs on U.S. 93 west of Caliente and near Maynard Lake, Upper and Lower Pahranagat lakes and their associated marshes, and Maynard Lake. This route also crosses a number of ephemeral streams that may be waters of the United States, as defined in Section 404 of the Clean Water Act.

The route crosses eight areas designated as game habitat (BLM 1979; pp. 2-26 through 2-35; BLM 1998, Maps 3-7, 3-8, and 3-9). Portions of Meadow Valley Wash and Pahranagat Valley are designated important habitat for Gambel's quail and waterfowl, and areas along U.S. Highway 93 north of I-15 are designated crucial quail habitat. U.S. Highway 93 crosses mule deer habitat west of Caliente and around Maynard Lake, two bighorn sheep migration routes, and crucial bighorn sheep habitat north of the U.S. Highway 93 and I-15 junction.

The 17 resources located 100-1,000 m from the route include springs and riparian areas, BLM sensitive species, and bighorn sheep winter habitat.

Sloan/Jean–The Sloan/Jean heavy-haul route begins in southern Nevada at the proposed intermodal transfer station on Interstate 15 near Sloan or Jean. The route proceeds along I-15 into Las Vegas Valley and along the proposed Western Beltway through the west side of Las Vegas Valley to U.S. Highway 95. From there, the route follows U.S. Highway 95 to Mercury and Jackass Flats Road to Yucca Mountain. Elevations along the route range from about 700 to 1,200 m. The land cover types along the route are typical of the Mojave Desert, including creosote-burrobush (78 percent) and Mojave mixed-scrub (12 percent). Approximately nine percent of this route is in urban areas (Appendix D).

Important Biological Resources–Eleven important biological resources were identified within 1 km of the route, 5 of which were within 100 m (Appendix K; Attachment 1; plates 8, 9, 10, and 12).

The only resident threatened or endangered species along the Sloan/Jean heavy-haul route is the desert tortoise. The entire route is within the range of the desert tortoise (Bury et al. 1994). The abundance of tortoises along the first part of the route in Ivanpah Valley is moderate to high relative to other areas in Nevada (BLM 1992b; Map 13-3). The abundance of tortoises along the remainder of the route through Las Vegas Valley, Indian Springs Valley, and the NTS generally is low to very low (BLM 1992b; Map 13-3; Rautenstrauch and O'Farrell 1998). This route does not cross areas classified as critical habitat for desert tortoises (50 CFR 17.95, pp. 385-392).

Four other species classified as sensitive by the BLM have been documented within 100 m of this route (NNHP 1997). The pinto beardtongue has been found in the Las Vegas Valley. Ripley's springparsley and Parish's scorpionweed have been found adjacent to Jackass Flats Road on the NTS in eastern Rock Valley, and the fringed myotis has been observed near Yucca Mountain in Fortymile Wash. A number of other bats classified as sensitive by the BLM may also occur along the route, and the route is within the range of the chuckwalla and gila monster.

The route crosses ephemeral streams that may be waters of the United States, as defined in Section 404 of the Clean Water Act. The route does not cross designated game habitat (BLM 1998, Maps 3-7, 3-8, and 3-9), and there are no springs, riparian areas, or other potential wetlands within 400 m of this route (USGS 1998).

The six important biological resources located 100-1,000 m from the route include BLM sensitive plant species and two areas of bighorn sheep winter range.

Apex/Dry Lake–The Apex/Dry Lake heavy-haul route begins at the proposed intermodal transfer station near I-15 in Dry Lake Valley, approximately 13 km north of the junction with U.S. Highway 93. The route proceeds south to I-15 and along the interstate into the northern Las Vegas Valley. The route follows the proposed Northern Beltway around the northern end of Las Vegas Valley to U.S. Highway 95, U.S. Highway 95 to Mercury, and Jackass Flats Road to Yucca Mountain. The route passes through Las Vegas, Indian Springs, Mercury, and Rock valleys and ranges in elevation from approximately 700 to 1,000 m. The highest elevation reached along this route is 1,200 m at the pass between Rock Valley and Jackass Flats. The land cover types along of this route are typical of low-elevation Mojave Desert, primarily creosote-burrobush (76 percent) and Mojave mixed scrub (16 percent). Approximately 3 percent of this route is in urban areas (Appendix D).

Important Biological Resources–Eight important biological resources were identified within 1 km of the Apex/Dry Lake heavy-haul route (Appendix J; Attachment 1, plates 8, 9, 10, and 12). Four of these resources are found within 100 m of the route.

The only resident threatened or endangered species along the Apex/Dry lake heavy-haul route is the desert tortoise. The entire route passes through desert tortoise habitat (Bury et al. 1994), and the relative abundance of tortoises along this route through the Las Vegas Valley, Indian Springs Valley, and the NTS generally is low (BLM 1992b, Map 13-3; Rautenstrauch and O'Farrell 1998). This route does not cross areas classified as critical habitat for desert tortoises (50 CFR 17.95, pp. 385-392).

Three species classified as sensitive by the BLM have been documented within 100 m of this route (NNHP 1997). Ripley's springparsley and Parish's scorpionweed have been found on the NTS adjacent to Jackass Flats Road in eastern Rock Valley, and the fringed myotis has been observed near Yucca Mountain in Fortymile Wash. A number of other bats classified as sensitive by the BLM may also occur along the route, and the route is within the range of the chuckwalla and gila monster.

The route crosses ephemeral streams that may be waters of the United States, as defined in Section 404 of the Clean Water Act. The route does not cross designated game habitat (BLM 1998, Maps 3-7, 3-8, and 3-9), and there are no springs, riparian areas, or other potential wetlands within 400 m (USGS 1998).

The four important biological resources located 100-1,000 m from the route are BLM sensitive plant species.

3.3.4.3 Intermodal Transfer Stations

Three areas have been identified as possible locations for an intermodal transfer station (Figure 1-3). The following paragraphs describe the areas within 1 km of the possible locations of the stations, including general topography, vegetation types (Appendix D), and important biological resources (Appendix O) in the areas.

Caliente Intermodal Transfer Station–The proposed location of this station is about 1 km southwest of Caliente, just west of Meadow Valley Wash and at an elevation of about 1,350 m. Dominant land cover types within the area are agriculture (i.e., pasture 88 percent) and salt desert scrub (12 percent).

Important Biological Resources–Five important biological resources have been found within 1 km of the location of this station (Appendix O; Attachment 1, plate 1). None of these resources were within 100 m of the location.

No species classified as Federally threatened or endangered, as State protected, or as BLM sensitive have been documented within or near the proposed Caliente Intermodal Transfer Station (NNHP 1997).

Meadow Valley Wash, which is perennially wet within this area as either a narrow stream or broad, moist flats, is less than 200 m from the proposed site. Portions of this wash and moist

areas within the proposed location of the station may be wetlands; however, no formal wetlands delineation has been conducted.

The Meadow Valley Wash speckled dace and Meadow Valley Wash desert sucker, which are classified as sensitive species by the BLM, occur in Meadow Valley Wash (NNHP 1997).

Meadow Valley also is designated as quail habitat (BLM 1979, pp. 2-34 through 2-35), and there is one spring about 500 m northwest of the location (USGS 1998).

Sloan/Jean Intermodal Transfer Station–The Sloan/Jean intermodal transfer station is located south of Las Vegas in Ivanpah Valley. Three sites within this valley are being considered: southwest of Sloan (324 ha), northeast of Jean (303 ha), and south of Jean (103 ha) (Figure 1-3). These sites are at an elevation of about 910 m and have vegetation typical of the Mojave Desert. The dominant land cover type is creosotebush (97 percent) (Appendix D).

Important Biological Resources–Seven important biological resources have been found within 1 km of the location of the Sloan/Jean intermodal transfer station (Appendix O; Attachment 1, plate 12). Three of these resources were found within 100 m.

The three sites being considered for this station are within the range of the desert tortoise. The abundance of tortoises in Ivanpah Valley generally is moderate to high relative to other areas within the range of this species in Nevada (Karl 1980; BLM 1992b, Map 3-13). This area is not critical habitat for desert tortoises (50 CFR 17.95, pp. 385-392).

The only BLM sensitive species found within 100 m of the sites is the pinto beardtongue, which has been found within the sites southwest of Sloan and south of Jean (NNHP 1997).

There are no herd management units or designated game habitat within 100 m of any of the three sites (BLM 1998, Maps 2-1, 3-7, 3-8, and 3-9), but designated bighorn sheep winter range occurs less than 1 km west of the Sloan site.

There are no springs or riparian areas within 1 km of the sites (USGS 1998). Some ephemeral washes that intersect the sites may be waters of the United States, as defined in Section 404 of the Clean Water Act.

Apex/Dry Lake Intermodal Transfer Station–The area being considered for the Dry Lake intermodal transfer station is northeast of Las Vegas in Dry Lake Valley. Three sites within this area are being considered: two to the west of I-15 (18 and 355 ha) and one to the east of the interstate (95 ha). The elevation of these sites is about 610 m. This area is within the Mojave Desert, and the dominant land cover type is creosotebush (100 percent) (Appendix D).

Important Biological Resources–Four important biological resources have been found within 1 km of the proposed locations of the Apex/Dry Lake Intermodal Transfer Station (Appendix O; Attachment 1, plate 11). Two of these resources have been found within 100 m.

The only resident threatened or endangered species at the Apex/Dry Lake Intermodal Transfer Station is the desert tortoise. The abundance of tortoises in Dry Lake Valley generally is low,

but some areas have a higher abundance (BLM 1992b, Map 3-13). This area is not critical habitat for desert tortoises (50 CFR 17.95, pp. 385-392).

The only BLM sensitive species found within 100 m of the three sites is the Geyer's milkvetch, which has been found on the southern edge of the southern site west of I-15 (NNHP 1997).

There are no herd management units or designated game habitat within 1 km of any of the three sites (BLM 1998, Maps 2-1, 3-7, 3-8, and 3-9).

There are no springs or riparian areas within 1 km of these sites (USGS 1998). Some ephemeral washes that intersect the sites may be waters of the United States, as defined in Section 404 of the Clean Water Act.

4. OPPOSING VIEWS

Opinions critical of the YMP environmental program have been voiced by the State of Nevada (as represented by C. R. Malone) and by the NWTRB. While these criticisms have come in several forms, they have been focused in six major areas: the breadth and integration of the program, lack of a systems ecology approach, the unique ecosystem at Yucca Mountain, lack of baseline data, sampling and statistical design, and issues relating to the ethical and professional practices of the biological staff.

4.1 LACK OF AN INTEGRATED PROGRAM

The State and the NWTRB assert that the YMP did not address environmental issues in a comprehensive, interdisciplinary sense (NWTRB 1994, pp. 39–47; Malone 1995), but instead equated environmental protection to compliance with single-medium environmental statutes (Malone 1989a). Malone (1989a) also asserts that DOE believed comprehensive monitoring for detecting an adverse environmental impact was unnecessary, and that DOE has tailored a piecemeal program to comply with individual requirements instead of demonstrating that it will minimize the impact to all segments of the environment. According to the NWTRB (1994, p. 44), this has resulted in collecting a "hodge-podge" of unrelated and unintegrated data.

4.2 LACK OF A SYSTEMS ECOLOGY APPROACH

Malone (1995) asserts there have been no studies of how the surface biology (soil biota and vegetation) could be impacted by thermal loading and global warming and no studies of how changes in the surface biology could affect water infiltration rates. Malone (1995) and the NWTRB (1994, pp. 40–44) further assert that the YMP should adopt a systems ecology approach in order to understand the mechanistic effects of thermal loading. Malone (1995) describes systems ecology as the "ecosystem approach."

While the State is not concerned about "the loss of a small amount of desert ecosystem" (Malone 1995, p. 271), the State and the NWTRB are concerned about effects on repository performance if vegetation atop the repository is lost (NWTRB 1994, pp. 46; Malone 1995).

4.3 YUCCA MOUNTAIN IS A UNIQUE ECOSYSTEM

Malone (1989a) asserts DOE does not recognize the unique ecological nature of the Yucca Mountain site. Malone asserts that the ecosystem is unique for two reasons: it is located in the ecotone between the Great Basin and Mojave deserts, and it is situated on volcanic, rather than sedimentary, rock.

In addition to the unique nature of the Yucca Mountain ecosystem, many Project activities are "located in flood plains where some of the most favorable ecological habitat at Yucca Mountain occurs" (Malone 1989a, p. 81).

4.4 LACK OF BASELINE DATA

Lemons and Malone (1989b) assert that there was no comprehensive environmental program integrating the Yucca Mountain ecological studies into a systematic, interdisciplinary

environmental review before investigations began (in 1982) and before the unique and fragile desert environment at Yucca Mountain was potentially irreversibly altered. Instead, DOE began studies of sensitive species, archaeology, airborne particulates, and groundwater after site investigations were initiated and an impact may have occurred (Lemons and Malone 1989b) and then established an environmental baseline from these data for use in preparation of the EIS (Malone 1989a).

Malone (1987) and the State of Nevada, Agency for Nuclear Projects, NWPO (Correspondence from R.R. Loux, Executive Director, to W. Barnes, Yucca Mountain Project Office, February 6, 1997, MOL.19970718.0117) assert that because there were no baseline data prior to the time site investigations began, DOE cannot assess the impact of geologic characterization. Furthermore, the baseline established after the impact of site investigations activities (geologic characterization) has occurred will be biased and unacceptable for regulatory purposes, jeopardizing the EIS (Malone 1987).

In addition, Malone (1989a) asserts the absence of baseline data collected prior to site investigations precludes effective reclamation planning as required by the Nuclear Waste Policy Act, and DOE cannot be expected to fulfill the requirements of these acts for reclamation.

4.5 SAMPLING AND STATISTICAL DESIGN

The NWTRB (1994, pp. 45) and NWPO have expressed concern that the sampling design for assessing the impact of site characterization activities on plants and animals may be flawed because the original treatment and control plots may have been too close to one another, and the control plots may therefore receive the impact; however, later the NWTRB (1995b, p. 44) concluded the modified design (treatment, control, and far-field control plots) should be adequate to detect the long-term impact of site characterization activities.

The NWPO also discusses concerns that Yucca Mountain is a single ecosystem; therefore, data collected during sampling at Yucca Mountain is pseudoreplicated and not suitable for analysis using traditional statistical methods. The NWPO suggests the use of Bayesian procedures for the analysis of these data.

4.6 ETHICS AND PROFESSIONAL PRACTICE

Malone (1989b) asserts an inherent effect of large organizations is that people tend to support the organization in which they work, systematically distorting adverse information to the point that news of potentially adverse consequences is suppressed in favor of information supporting the organization's objectives. Because YMP biologists work in a large organization, they can be expected to distort adverse biological information (Malone 1995) and therefore should be more open to outside review and the concerns of other interested parties (Lemons and Malone 1989a, 1989b).

Malone (1995) asserts that DOE continues to pursue population and community ecology studies lacking integration with abiotic environmental sciences such as hydrology, geology, and climate. In Malone's view, this is contrary to principles of environmental ethics and standards of professional environmental practice because DOE is not using a systems ecology approach.

5. MAJOR ISSUES AND DATA NEEDS

5.1 MAJOR ISSUES

The topics discussed below probably will be the most sensitive issues related to the impact of the proposed action on biological resources. These topics were identified based on regulatory and compliance requirements, a preliminary evaluation of biological resources in the regions of influence, scoping comments, and concerns and opposing views raised in the past.

Impact on Desert Tortoises–The desert tortoise is classified as a threatened species under the ESA. That act requires DOE to consult with the FWS to determine if the proposed action will jeopardize continued existence of this species. The act also requires DOE to obtain an incidental take permit prior to conducting any activity that may kill, harm, or otherwise negatively impact tortoises. The proposed action may affect desert tortoises in several ways, including direct mortality, loss and fragmentation of habitat, and changes in sex ratios caused by thermal loading. Given the low abundance of tortoises at Yucca Mountain and the species widespread range, it is very unlikely that the FWS will conclude that the proposed action will jeopardize this species. Nonetheless, FWS will require a thorough evaluation of impact prior to making that decision and issuance of an incidental take permit. During 1998–1999, DOE will conduct that evaluation and prepare a Biological Assessment of the potential impact of repository construction and operation on desert tortoises. Sufficient information is available for that evaluation.

Impact on Threatened and Endangered Species at Springs–Regulatory and land-management agencies such as the FWS and National Park Service will be concerned with the effects of the proposed action on the quantity and quality of groundwater at springs south of Yucca Mountain. Such changes could be detrimental to the many threatened, endangered, and endemic species depending upon those springs. Current understanding of the hydrology of the region (D'Agnese et al. 1997) indicates that the proposed action will have no impact on those springs. Sufficient information should be available on the hydrology of the region and biological resources at these springs for these potential effects to be sufficiently analyzed.

Thermal Loading–The NWTRB (1994) and the State of Nevada (Malone 1995) hypothesized that the loss of vegetation at Yucca Mountain caused by thermal loading could have serious consequences on repository performance. Because of this concern and because of the difficulty of predicting the effects of increased soil temperatures on biota, this will be a sensitive topic. Sufficient information should be available to evaluate potential effects of thermal loading on vegetation.

Impact of a Rail Line on Herd Management Areas–During meetings to gather information on biological resources along rail corridors, BLM employees expressed numerous concerns about the impact of a fenced rail line on their program to manage wild horses. BLM has divided the State into large herd management areas, many of which would be fragmented by fencing the rail alignments. Similar concerns were raised about the effects of fencing on cattle grazing allotments. Although these concerns are not very important relative to those mentioned above and are probably not important enough to influence selection of a preferred rail alignment, they may result in numerous comments from BLM or in difficulties when negotiating land withdrawals or rights of ways.

5.2 DATA NEEDS

5.2.1 Selection of Regions of Influence

Additional analysis must be conducted during the development of the EIS to better understand the potential impact and therefore define the boundaries of the regions of influence discussed in this report. Sufficient information will be available to conduct that analysis.

5.2.2 Identification of Receptors

Yucca Mountain–A great deal of work has been done to characterize the plant and animal communities at Yucca Mountain. This information is sufficient for identifying receptors in this region.

Region Surrounding Yucca Mountain–Sufficient information is available from databases (e.g., NNHP 1997) and land and resource management agencies to identify most locations of species of special status in the region surrounding Yucca Mountain. More information is available for lands north and east of Yucca Mountain (i.e., NTS and Nellis Air Force Range) than for lands south and west.

Springs and Riparian Zones in the Regional Groundwater Basin–The rare or endemic vertebrates dependent upon springs and riparian areas possibly affected by the proposed action have been well described. Less information is available on invertebrates found in those areas. Some additional information on invertebrates may be available in unpublished reports, but field investigations would have to be conducted to develop a complete list of invertebrates found there. Such field investigations are not needed to complete an adequate analysis of impact for this EIS.

Transportation Corridors–Sufficient information is available to identify the habitat of ESA protected species, protected areas, unique unprotected habitat, and crucial game habitat on land managed by federal agencies. In contrast, little or no information is available to determine the species of special status occurring on private lands. In at least two areas (Meadow Valley Wash and Oasis Valley), rail corridors cross private property that may have ESA protected or BLM sensitive species. Information on biological resources on this private property probably will not be available for the EIS.

Less information is available concerning the locations of BLM sensitive species than is available for the receptors listed above. Many known locations of these sensitive species are documented in NNHP (1997), but field surveys have not been conducted along most of the transportation corridors. Those field surveys are not needed to complete an adequate analysis of impact for this EIS.

Locations of streams, lakes, springs, and riparian areas were identified from BLM Resource Management Plans, the Nevada Gap Analysis Program (Utah State University 1996), and USGS topographic Maps and databases. Additional springs, riparian areas, and wetlands not in these sources may occur along transportation routes. Many sites identified from these sources were visited in 1997 to determine the presence or absence of potential wetlands; however, a formal wetlands delineation required for Section 404 of the Clean Water Act was not conducted. Such a

delineation must be conducted if wetlands may be modified during construction or modification of a transportation corridor, but that delineation is not needed to conduct an adequate analysis for this EIS.

5.2.3 Analysis of Impact

Sufficient information is available to analyze the potential impact of the proposed action on biological resources.

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6.2 CODES, STANDARDS AND REGULATIONS

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APPENDIX A

COMMON AND SCIENTIFIC NAMES OF PLANTS AND ANIMALS MENTIONED IN THE ENVIRONMENTAL BASELINE FILE FOR BIOLOGICAL RESOURCES

Appendix A. Common and scientific names of plants and animals mentioned in the Environmental Baseline File for Biological Resources and their status as designated under the U.S. Endangered Species Act (ESA), by the Nevada Office of the U.S. Bureau of Land Management (BLM), and by the State of Nevada (NV)

Common Name	Scientific Name	ESA[1]	BLM[1]	NV[1]
PLANTS				
alkaliplant, Amargosa	*Nitrophila mohavensis*	E		CE
ash, velvet	*Fraxinus velutina*			
baccharis, Emory's	*Baccharis emoryi*			
beardtongue, Nevada sanddune	*Penstemon arenarius*		S	
beardtongue, Death Valley	*Penstemon fruticiformis* ssp *amargosae*		S	
beardtongue, Paiute	*Penstemon pahutensis*		S	
beardtongue, Pinto (rosy twotone)	*Penstemon bicolor* ssp. *roseus*		S	
beardtongue, Pinto (yellow twotone)	*Penstemon bicolor* ssp. *bicolor*		S	
beardtongue, whitemargin	*Penstemon albomarginatus*		S	
bearpoppy, California	*Arctomecon californica*		S	CE
bearpoppy, desert (white)	*Arctomecon merriamii*		S	
bedstraw, Hilend's (Kingston)	*Galium hilendiae* ssp *kingstonense*		S	
bird's beak, Tecopa	*Cordylanthus tecopensis*		S	
blackbrush	*Coleogyne ramosissima*			
blazingstar, Ash Meadows	*Mentzelia leucophylla*	T		CE
brome, foxtail	*Bromus rubens*			
buckwheat, Eastern Mojave (California)	*Eriogonum fasciculatum*			
buckwheat, Pahrump Valley	*Eriogonum bifurcatum*		S	
bullrush	*Scirpus* sp.			
burreed	*Sparganium* sp.			
burrobush, white	*Ambrosia dumosa*			
cactus, redspined (Mojave) fishhook	*Sclerocactus polyancistrus*			Ca
catseye	*Cryptantha* sp.			
catseye, Welsh's (White River)	*Cryptantha welshii*		S	
cattail	*Typha* sp.			
centaury, springloving	*Centaurium namophilum*	T		CE
cottonwood, black	*Populus trichocarpa*			
cottonwood, Fremont's	*Populus fremontii*			
creosotebush	*Larrea tridentata*			
desertholly	*Atriplex hymenelytra*			
elkweed, Modoc	*Frasera albicaulis (=pahutensis)* var. *modocensis*		S	
ephedra	*Ephedra* sp.			
fiddleneck, bristly	*Amsinckia tessellata*			
fir, white	*Abies concolor*			Ch
fleabane, sheep	*Erigeron ovinus*		S	
globemallow, Rusby's	*Sphaeralcea rusbyi* ssp *eremicola*			
greasewood	*Sarcobatus vermiculatus (=baileyi)*			
gumweed, Ash Meadows	*Grindelia fraximopratensis*	T		CE
heathgoldenrod	*Ericameria* sp.			
heathgoldenrod (stickyleaf rabbitbrush)	*Ericameria (=Chrysothamnus) paniculata*			

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Common Name	Scientific Name	ESA[1]	BLM[1]	NV[1]
PLANTS				
heathgoldenrod, Cooper's	*Ericameria cooperi*			
heathgoldenrod, narrowleaf	*Ericameria linearifolia*			
hopsage, spiny	*Grayia spinosa*			
horsebrush, littleleaf	*Tetradymia glabrata*			
jointfir, Nevada	*Ephedra nevadensis*			
Joshua tree	*Yucca brevifolia*			Y
juniper	*Juniperus* sp.			Ch
ladiestresses, Ash Meadows	*Spiranthes infernalis*		S	
menodora, spiny	*Menodora spinescens*			
mesquite, honey	*Prosopis glandulosa*			
mesquite, screwbean	*Prosopis pubescens*			
milkvetch, Ash Meadows	*Astragalus phoenix*	T		CE
milkvetch, Clokey's egg	*Astragalus oophorus* var. *clokeyanus*		S	
milkvetch, egg (long-calyx)	*Astragalus oophorus* var. *lonchocalyx*		S	
milkvetch, Funeral Mountain	*Astragalus funereus*		S	
milkvetch, Gilman's	*Astragalus gilmanii*		S	
milkvetch, Mojave (halfring)	*Astragalus mohavensis* var. *hemigyrus*		S	CE
milkvetch, Needle Mountain	*Astragalus eurylobus*		S	
milkvetch, Spring Mountain	*Astragalus remotus*		S	
milkvetch, Geyer's (threecorner)	*Astragalus geyeri* spp. *triquetrus*		S	
milkweed, Eastwood	*Asclepias eastwoodiana*		S	
mormon tea	*Ephedra viridis*			
mousetail, King's (Ash Meadows ivesia)	*Ivesia kingii (=eremica)*	T		CE
needle-and-thread	*Hesperostipa comata*			
pickleweed	*Salicornia* sp.			
pine, Great Basin bristlecone	*Pinus longaeva*			Ch
pine, limber	*Pinus flexilis*			Ch
pine, ponderosa	*Pinus ponderosa*			Ch
pinyon, singleleaf	*Pinus monophylla*			Ch
pondweed	*Potamogeton* sp.			
primrose, Nevada	*Primula nevadensis*		S	
rabbitbrush	*Chrysothamnus* sp.			
rabbitbrush, rubber	*Chrysothamnus nauseosus*			
ratany, littleleaf	*Krameria erecta*			
reed, common	*Phragmites australis*			
ricegrass	*Achnatherum* sp.			
sage, woolly (Death Valley)	*Salvia funerea*			
sagebrush	*Artemisia sp.*			
sagebrush, big	*Artemisia tridentata*			
sagebrush, bud	*Artemisia spinescens*			
saltbush, fourwing	*Atriplex canescens*			

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Common Name	Scientific Name	ESA[1]	BLM[1]	NV[1]
PLANTS (continued)				
saltbush, shadscale	*Atriplex confertifolia*			
saltbush, Torrey's	*Atriplex torreyi*			
saltgrass	*Distichlis* sp.			
sedge	*Carex* sp.			
scorpionweed, Beatley's	*Phacelia beatleyae*		S	
scorpionweed, Parish's	*Phacelia parishii*		S	
smokebush	*Psorothamnus* sp.			
snakeweed, broom	*Gutierrezia sarothrae*			
springparsley, Ripley's (sanicle biscuitroot)	*Cymopterus ripleyi* var *saniculoides*		S	
suncup, largeflower (Cane Spring)	*Camissonia megalantha*			
sunray, nakedstem (Ash Meadows)	*Enceliopsis nudicaulis* var. *corrugata*	T		CE
tamarisk, fivestamen	*Tamarix chinensis (=pentandra)*			
willow, desert	*Chilopsis linearis*			
winterfat	*Krascheninnikovia lanata*			
wolfberry	*Lycium* sp.			
wolfberry, Anderson's	*Lycium andersonii*			
yucca	*Yucca* sp.			Y
INVERTEBRATES				
ant, harvester	*Hymenoptera, Formicidae*			
beetle, darkling	*Coleoptera, Tenebrionidae*			
beetles, riffle	*Stenelmis* sp., *Microcylleopus* sp.			
beetle, Devil's Hole riffle	*Stenelmis calida calida*		S	
crayfish	*Procambarus* sp.			
grasshopper	*Orthoptera, Acrididae*			
naucorid	*Ambrysus* sp.			
naucorid, Ash Meadows	*Ambrysus amargosus*	T		
pebblesnail, Pahranagat	*Fluminicola merriami*		S	
scarab, Crescent Dune Aegialian	*Aegialia crescenta*		S	
scarab, Crescent Dune Serican	*Serica* sp. 1		S	
scarab, Giuliani's dune	*Pseudocotalpa giulianii*		S	
springsnails	*Pyrgulopsis* sp., *Tryonia* sp.			
springsnail, Oasis Valley	*Pyrgulopsis micrococcus*		S	
wasp, redheaded sphesid	*Eucerceris ruficeps*		S	
FISHES				
bass, largemouth	*Micropterus salmoides*			G
bullhead, black	*Ameiurus melas*			G
chub, Pahranagat roundtail	*Gila robusta jordani*	E	S	PE
dace, speckled	*Rhinichthys* sp.			

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Common Name	Scientific Name	ESA[1]	BLM[1]	NV[1]
FISHES (continued)				
dace, Amargosa speckled	*Rhinichthys osculus nevadensis*	E	S	PE
dace, Ash Meadows speckled	*Rhinichthys osculus nevadensis*	E	S	PE
dace, Big Smoky Valley speckled	*Rhinichthys osculus lariversi*			S
dace, Meadow Valley Wash speckled	*Rhinichthys osculus* ssp. 2		S	
dace, Oasis Valley speckled	*Rhinichthys osculus* ssp. 1		S	
dace, Pahranagat (White River) speckled	*Rhinichthys osculus velifer*		S	S
molly, sailfin	*Poecilia mexicana*			
mosquitofish	*Gambusia affinis*			
poolfish, Ash Meadows	*Empetrichthys mearriami*			
poolfish, Pahrump	*Empetrichthys latos*	E		PE
pupfish	*Cyprinodon* sp.			
pupfish, Ash Meadows Amargosa	*Cyprinodon nevadensis mionectes*	E		PE
pupfish, Cottonball Marsh	*Cyprinodon milleri*			
pupfish, Devil's Hole	*Cyprinodon diabolis*	E		PE
pupfish, Salt Creek	*Cyprinodon salinus*			
pupfish, Warm Springs	*Cyprinodon nevadensis pectoralis*	E		PE
springfish, Railroad Valley	*Crenichthys nevadae*	T		
springfish, Hiko White River	*Crenichthys baileyi grandis*	E		
sucker, Meadow Valley Wash Desert	*Catostomus clarki* ssp. 2		S	S
sucker, razorback	*Xyrauchen texanus*	E		P
sucker, White River desert	*Catostomus clarki intermedius*		S	P
tui chub, Big Smoky Valley	*Gila bicolor* ssp.		S	S
tui-chub, Railroad Valley	*Gila bicolor* ssp. 7		S	S
AMPHIBIANS				
bullfrog	*Rana catesbeiana*			G
frog, leopard	*Rana pipiens*			
salamander, tiger	*Ambystoma tigrinum*			
toad, Amargosa	*Bufo nelsoni*		S	
toad, Great Basin spadefoot	*Scaphiopus intermontanus*			
toad, red-spotted	*Bufo punctatus*			
toad, western	*Bufo boreas*			
toad, Woodhouse	*Bufo woodhousei*			
treefrog, Pacific / frog, Pacific chorus	*Hyla / Pseudacris regilla*			
REPTILES				
chuckwalla, western	*Sauromalus obesus obesus*		S	
coachwhip	*Masticophis flagellum*			
gila monster, banded	*Heloderma suspectus cinctum*		S	P
lizard, longnose leopard	*Gambelia wislizenii*			

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Common Name	Scientific Name	ESA[1]	BLM[1]	NV[1]
REPTILES (continued)				
lizard, Mojave black-collared	*Crotaphytus bicinctores*			
lizard, side-blotched	*Uta stansburiana*			
lizard, zebratail	*Callisaurus draconoides*			
sidewinder	*Crotalus cerastes*			
snake, gopher	*Pituophis catenifer*			
snake, ground	*Sonora semiannulata*			
snake, longnose	*Rhinocheilus lecontei*			
tortoise, desert	*Gopherus agassizii*	T		PT
turtle, snapping	*Chelydra serpentina*			
whiptail, western	*Cnemidophorus tigris*			
BIRDS				
chukar	*Alectoris chukar*			G
coot, American	*Fulica americana*			G
dove, mourning	*Zenaida macroura*			G
duck, ruddy	*Oxyura jamaicensis*			G
eagle, bald	*Haliaeetus leucocephalus*	T		PE
eagle, golden	*Aquila chrysaetos*			P
falcon, American peregrine	*Falco peregrinus anatum*	E		PE
falcon, prairie	*Falco mexicanus*			
finch, house	*Carpodacus mexicanus*			
flycatcher, willow	*Empidonax traillii*			
flycatcher, southwestern willow	*Empidonax traillii extimus*	E	S	
grebe, pied-billed	*Podilymbus podiceps*			
grouse, sage	*Centrocercus urophasianus*			G
hawk, ferruginous	*Buteo regalis*		S	P
hawk, red-tailed	*Buteo jamaicensis*			P
heron, great-blue	*Ardea herodias*			
mockingbird, northern	*Mimus polyglottos*			
oriole, northern	*Icterus galbula*			
owl, barn	*Tyto alba*			P
owl, long-eared	*Asio otus*			P
plover, mountain	*Charadrius montanus*	C	S	
quail, Gambel's	*Callipepla gambelii*			G
raven, common	*Corvus corax*			
roadrunner, greater	*Geococcyx californianus*			P
sparrow, black-throated	*Amphispiza bilineata*			
sparrow, sage	*Amphispiza belli*			
swallow, bank	*Riparia riparia*			
tanager	*Piranga* sp.			

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Common Name	Scientific Name	ESA[1]	BLM[1]	NV[1]
BIRDS (continued)				
teal, green-winged	*Anas crecca*			G
towhee, spotted	*Pipilo maculatus*			
thrasher, Le Conte's	*Toxostoma lecontei*			
thrush	*Catharus* sp.			
vireo, least Bell's	*Vireo bellii pusillus*	E		
warbler, Wilson's	*Wilsonia pusilla*			
wren, rock	*Salpinctes obsoletus*			
yellowthroat, common	*Geothlypis trichas*			
MAMMALS				
badger	*Taxidea taxus*			
bat, Allen's big-eared	*Euderma (=Idionycterus) phyllote*		S	
bat, big-eared	*Corynorhinus* sp.			
bat, hoary	*Lasiurus cinereus*			
bat, Mexican free-tail	*Tadarida brasiliensis*			
bat, pallid	*Antrozous pallidus*			
bat, spotted	*Euderma maculata*		S	PT
bat, Townsend's big-eared	*Corynorhinus townsendii*		S	
bat, western pipistrelle	*Pipistrellus hesperus*			
bobcat	*Lynx rufus*			FB
burro, wild (feral)	*Equus asinus*			
cottontail, desert	*Sylvilagus auduboni*			
cottontail, mountain	*Sylvilagus nuttalli*			
coyote	*Canis latrans*			U
deer, mule	*Odocoileus hemionus*			G
elk	*Cervus elaphus*			
fox, gray	*Urocyon cinereoargenteus*			FB
fox, kit	*Vulpes velox*			FB
grasshopper mouse, southern	*Onychomys torridus*			
horse, feral	*Equus caballas*			
jackrabbit, black-tailed	*Lepus californicus*			U
kangaroo rat, chisel-toothed	*Dipodomys microps*			
kangaroo rat, desert	*Dipodomys deserti*			
kangaroo rat, Merriam's	*Dipodomys merriami*			
lion, mountain	*Puma (Felis) concolor*			G
mouse, cactus	*Peromyscus eremicus*			
mouse, canyon	*Peromyscus crinitus*			
mouse, deer	*Peromyscus maniculatus*			
mouse, house	*Mus musculus*			
mouse, pinyon	*Peromyscus truei*			
mouse, western harvest	*Reithrodontomys megalotis*			

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Common Name	Scientific Name	ESA[1]	BLM[1]	NV[1]
MAMMALS (continued)				
myotis, California	*Myotis californicus*			
myotis, fringed	*Myotis thysanodes*		S	
myotis, long-legged	*Myotis volans*		S	
myotis, western small-footed	*Myotis ciliolabrum*		S	
myotis, Yuma	*Myotis yumanensis*		S	
pocket gopher, San Antonio	*Thomomys umbrinus curtatus*		S	
pocket gopher, valley	*Thomomys bottae*			
pocket mouse, Great Basin	*Perognathus parvus*			
pocket mouse, little	*Perognathus longimembris*			
pocket mouse, long-tailed	*Chaetodipus formosus*			
pronghorn	*Antilocapra americana*			G
rabbit, pygmy	*Brachylagus idahoensis*		S	G
ringtail	*Bassariscus astutus*			
sheep, bighorn	*Ovis canadensis*			G
skunk, western spotted	*Spilogale gracilis*			U
sqirrel, round-tailed ground	*Spermophilus tereticaudus*			
squirrel, white-tailed antelope	*Ammospermophilus leucurus*			
vole, Ash Meadows montane	*Microtus montanus nevadensis*		S	
vole, Pahranagat Valley	*Microtus montanus fucosus*		S	
weasel, long-tailed	*Mustela frenata*			U
woodrat, desert	*Neotoma lepida*			

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APPENDIX B

INVERTEBRATE SPECIMENS, REPRESENTING AT LEAST 18 ORDERS AND 53 FAMILIES, COLLECTED ON 16 STUDY PLOTS AT YUCCA MOUNTAIN DURING 1991-1992

Appendix B. Invertebrate Specimens, Representing at least 18 Orders and 53 Families, Collected on 16 Study Plots at Yucca Mountain During 1991 – 1992

Phylum	Class	Order	Family	Count
Arthropoda				
	Arachnida			
		Scorpiones (6)		
			unidentified	6
		Araneae (95)		
			unidentified	95
		Acari (142)		
			Ixoxidae	63
			mites	78
			unidentified	1
		Solifugae (3)		
			unidentified	3
	Hexapoda			
		Collembola (74)		
			Isotomidae	72
			Onychiuridae	1
			Sminthuridae	1
		Thysanura (5)		
			Lepismatidae	5
		Orthoptera (235)		
			Acrididae	88
			Blattidae	1
			Eumastacidae	65
			Gryllacrididae	13
			Gryllidae	17
			Mantidae	11
			Phasmatidae	1
			Polyphagidae	28
			Tettigoniidae	11
		Isoptera (1)		
			Termitidae	1
		Hemiptera (2258)		
			Berytidae	59
			Cydnidae	2
			Lygaeidae	1579
			Miridae	141
			Pentatomidae	70

Appendix B. Invertebrate Specimens, Representing at least 18 Orders and 53 Families, Collected on 16 Study Plots at Yucca Mountain During 1991 – 1992 (Continued)

Phylum / Class / Order	Family	Count
Hemiptera (continued)		
	Reduviidae	19
	Rhopalidae	372
	unidentified	16
Homoptera (1127)		
	Acanalonidae	7
	Cercopidae	1
	Cicadellidae	1064
	Flatidae	54
	unidentified	1
Thysanopter (4)		
	unidentified	4
Neuroptera (156)		
	Chrysopidae	16
	Hemerobiidae	2
	Myrmeleontidae	138
Coleoptera (8864)		
	Anobiidae	2
	Bostrichidae	3
	Cantharidae	1
	Carabidae	274
	Cerambycidae	21
	Chrysomelidae	151
	Cleridae	3
	Coccinellidae	3
	Curculionidae	1
	Elateridae	1159
	Rhipiphoridae	48
	Scarabaeidae	4689
	Scolytidae	1
	Staphylinidae	1
	Tenebrionidae	2505
	unidentified	2
Diptera (329)		
	Anthomyiidae	1
	Asilidae	12
	Muscidae	16
	Sarcophagidae	17
	unidentified	283

Appendix B. Invertebrate Specimens, Representing at least 18 Orders and 53 Families, Collected on 16 Study Plots at Yucca Mountain During 1991 – 1992 (Continued)

Phylum	Class	Order	Family	Count
		Lepidoptera (10717)		
			Sphingidae	136
			unidentified	10581
		Hymenoptera (10315)		
			Formicidae	517
			Ichneumonidae	1
			Mutilidae	2
			unidentified	9795
	Malacostraca			
		Isopoda (1)		
			unidentified	1
Nematoda				
		Nematode (1)		
			unidentified	1
Unidentified				
		Unidentified (121)		
			unidentified	121

APPENDIX C

DESCRIPTIONS OF LAND COVER TYPES FOUND WITHIN OR NEAR YUCCA MOUNTAIN AND THE POTENTIAL TRANSPORTATION CORRIDORS AND FACILITIES

(University of California 1994; Utah State University 1996)

Nevada

Land cover type descriptions are from the Nevada Gap Analysis (Utah State University 1996) and are based on dominant species. This is not intended to be a complete species list, but rather an overview of the most common species associated with each cover type. The minimum mapping unit was 30 m, with the primary data source being Thematic Mapping images. Five of the land cover types found near Yucca Mountain were identified using screen interpretation, with the remainder using digital classification techniques (Utah State University 1996).

AGRICULTURE (AG) - Row crops, irrigated pasture and hay fields, dry farm crops. Distribution - Located state-wide.

ASH (ASH) - Woodland dominated by velvet ash *Fraxinus velutina* and screwbean *Prosopis pubescens*. Primary associated shrub species includes *Baccharis emoryi*. Distribution - This cover type is only found in the vicinity of Ash Meadows, near Amargosa Valley.

BARREN (BAR) - Barren soil or rock with less than five percent total vegetative cover. Distribution - This class is distributed throughout Nevada with the majority being low elevation barren soil or high elevation rock cliffs and talus slopes.

BLACKBRUSH (BB) - Shrubland principally dominated by blackbrush *Coleogyne ramosissima*. Primary associated tree species include juniper *Juniperus osteosperma*. Primary associated shrub species include spiny hopsage *Grayia spinosa*, mormon tea *Ephedra* spp., shadscale *Atriplex confertifolia*, desert thorn *Lycium* spp., snakeweed *Xanthocephalum* spp., and creosote *Larrea tridentata*. Other associated species include joshua tree *Yucca brevifolia*, and yucca *Yucca* spp. Distribution - Blackbrush is typically a transition vegetation class between Mojave scrub and Great Basin shrubs. It typically occurs in elevation transition areas between 4,000-5,000 feet (1,200-1,500 m) and in latitude transition areas north of creosote-bursage.

CREOSOTE-BURSAGE (CB) - Scrubland principally dominated by creosote *Larrea tridentata* and white bursage *Ambrosia dumosa*. Primary associated shrub species include blackbrush *Coleogyne ramosissima*, mormon tea *Ephedra* spp., dalea *Dalea fremontii*, shadscale *Atriplex confertifolia*, hopsage *Grayia spinosa*, desert thorn *Lycium* spp., ratany *Krameriaceae parvifolia*, burro bush *Hymenoclea salsola*, honey mesquite *Prosopis glandulosa*, and brittlebush *Encelia farinosa*. Other associated species include joshua tree *Yucca brevifolia*, yucca *Yucca* spp., prickly pear *Opuntia engelmannii* and cholla. Distribution - This class occurs widely within the Mojave desert below 4,000 feet (1,200 m) and typically is found in valley bottoms, lowlands and flatlands of mild slope.

GRASSLAND (GL) - Perennial and annual grasslands. Principle perennial grass species include wheatgrasses *Agropyron* spp., bluegrass *Poa* spp., basin wildrye *Elymus cinereus*, galleta *Hilaria* spp., needlegrass *Stipa* spp., sand dropseed *Sporobolus cryptandrus*, blue gramma *Bouteloua gracilis*, squirreltail *Sitanion hystrix* and Indian ricegrass *Oryzopsis hymenoides*. Principle annual grass species include cheatgrass *Bromus tectorum*. Primary associated shrub species include sagebrush *Artemisia* spp., shadscale *Atriplex confertifolia*, greasewood *Sarcobatus vermiculatus* and creosote *Larrea tridentata*. Primary associated tree species include juniper *Juniperus* spp. Distribution - This is a wide-spread, broadly defined class distributed mostly in central and northern Nevada. The majority of this class occurs as a result of seeded perennial grasslands or fire induced annual grasslands; however, it also includes valley, foothill, and mountain native grasslands.

GREASEWOOD (GW) - Shrubland principally dominated by greasewood *Sarcobatus vermiculatus*. Primary associated shrub species include shadscale *Atriplex confertifolia*, iodine bush *Allenrolfea occidentalis*, basin sagebrush *Artemisia tridentata* var. *tridentata* and bailey greasewood *Sarcobatus baileyi*. Other associated species include seepweed *Suaeda torreyana*, halogeten *Halogeten glomeratus* and tumbleweed *Salsola iberica*. Distribution - Greasewood is found throughout Nevada, typically in the salt desert scrub zone. It is very salt tolerant and can usually be found on flat valley floors.

HOPSAGE (HOP) - Shrubland characterized by the occurrence of hopsage *Grayia spinosa*, typically in concert with desert thorn *Lycium* spp, rabbitbrush *Chrysothamnus* spp., tea *Ephedra* spp. and shadscale *Atriplex confertifolia*. Primary associated shrub species include sagebrush *Artemisia* spp. blackbrush *Coleogyne ramosissima*, rabbitbrush *Chrysothamnus* spp., winterfat *Ceratoides lanata*, ratany *Krameriaceae parvifolia*, bursage *Ambrosia dumosa*, and creosote *Larrea tridentata*. Distribution - This is a transition shrubland, typically between Mojave and Great Basin ecosystems. This class occurs in the northern reaches of the Mojave and the southern fringe of the Great Basin.

JUNIPER_1 (JUN1) - Conifer woodland principally dominated by Utah juniper *Juniperus osteosperma* at canopies less than 30 percent. Primary associated tree species include Rocky Mountain juniper *Juniperus scopulorum*, western juniper *Juniperus occidentalis* and single leaf pinyon *Pinus monophylla*. Primary associated shrub species include sagebrush *Artemisia* spp., rabbitbrush *Chrysothamnus* spp., and blackbrush *Coleogyne ramosissima*. Distribution - Juniper is widely distributed throughout Nevada in open canopy stands. It typically occurs at lower elevations below the pinyon-juniper zone. In southern Nevada, juniper occurs commonly with blackbrush.

JUNIPER_2 (JUN2) - Conifer woodland principally dominated by juniper *Juniperus osteosperma* at canopies from 30-60 percent. Primary associated tree species include Rocky Mountain juniper *Juniperus scopulorum*, western juniper *Juniperus occidentalis*, and single leaf pinyon *Pinus monophylla*. Primary associated shrub species include sagebrush *Artemisia* spp., rabbitbrush *Chrysothamnus* spp., and blackbrush *Coleogyne ramosissima*. Distribution - Juniper is widely distributed throughout Nevada in open canopy stands. It typically occurs at lower elevations below the pinyon-juniper zone. Northern Nevada contains only juniper, with small stands of western juniper in extreme northwest Nevada. In southern Nevada, juniper occurs commonly with blackbrush.

LOWLAND RIPARIAN (LRP) - Localized vegetation influenced by the presence of abundant water in contrast to the surrounding landscape in lowland areas. Principal tree species include Fremont cottonwood *Populus fremontii* and black cottonwood *Populus trichocarpa*. Principal shrub species include salt cedar *Tamarix pentandra*, velvet ash *Fraxinus velutina*, desert willow *Chilopsis linearis*, and mesquite *Prosopis glandulosa*. Distribution - Riparian areas generally lower than 4,000 feet (1,200 m) in the Mojave and 5,000 feet (1,500 m) in the remaining areas of Nevada. Velvet ash, desert willow, and mesquite are only found in the Mojave. This class is common along the Carson, Colorado, Humboldt, Truckee, Virgin, and Walker rivers.

MESQUITE (MES) - Shrubland dominated by mesquite *Prosopis glandulosa*. Primary associated shrub species include salt cedar *Tamarix pentandra*, torrey saltbush *Atriplex torreyi*, and creosote *Larrea tridentata*. Distribution - This cover type is only found principally on the west side of the Mojave desert in scattered clumps.

MOJAVE BRISTLECONE_2 (MBC2) - Conifer forest principally dominated by bristlecone pine *Pinus aristata* at canopies from 30-60 percent. Primary associated tree species include limber pine *Pinus flexilis*, Engelmann spruce *Picea engelmannii*, white fir *Abies concolor*, and ponderosa pine *Pinus ponderosa*. Primary associated shrub species include sagebrush *Artemisia* spp. and snowberry *Symphoricarpos* spp. Distribution - This class is distributed in the Snake and Sheep mountains within the Mojave Desert, usually from 9,000-11,500 feet (2,700-3,500 m).

MOJAVE MIXED SCRUB (MMS) - Mojave desert mixed scrublands are usually characterized by the occurrence of creosote *Larrea tridentata* in association with several possible species, including bursage *Ambrosia dumosa*, dalea *Psorothamnus fremontii*, desert thorn *Lycium* spp., shadscale *Atriplex confertifolia*, hopsage *Grayia spinosa*, ratany *Krameriaceae parvifolia*, and tea *Ephedra* spp. Primary associated shrub species include blackbrush *Coleogyne ramosissima*, brittlebrush *Encelia farinosa*, burro bush *Hymenoclea salsola*, bebbia *Bebbia juncea*, desert saltbush *Atriplex polycarpa*, and desert holly *Atriplex hymenelytra*. Other associated species include joshua tree *Yucca brevifolia*., yucca *Yucca* spp., cacti *Echinocereus* spp., and cholla *Opuntia biglovii*. Distribution - This class typically occurs on slopes, washes, or upland areas within the Mojave desert that are difficult to characterize because of several mixed shrub species with no clear dominance.

MOUNTAIN SAGEBRUSH (MSB) - Mountain shrubland dominated or co-dominated by mountain big sagebrush *Artemisia tridentata* ssp. *vaseyana*, subalpine sagebrush *Artemisia tridentata* ssp. *spiciformis*, low sagebrush *Artemisia arbuscula*, and silver sagebrush *Artemisia cana*, in concert with mountain shrubs, grasses and forbs. Primary associated tree species include pinyon *Pinus monophylla*, mountain mahogany *Cercocarpus ledifolius*, limber pine *Pinus flexilis*, white fir *Abies concolor*, subalpine fir *Abies lasiocarpa*, Engelmann spruce *Picea engelmannii*, ponderosa pine *Pinus ponderosa*, lodgepole pine *Pinus contortus*, whitebark pine *Pinus albicaulis*, and Jeffrey pine *Pinus jeffreyi*. Primary associated shrub species include snowberry *Symphoricarpos* spp., alder leaf mountain mahogany *Cercocarpus montanus*, bitterbrush *Purshia tridentata*, littleleaf mountain mahogany *Cercocarpus intricatus*, buckbrush *Ceanothus* spp., manzanita *Arctostaphylos* spp., ninebark *Physocarpus alternans*, currant *Ribes* spp., squawbush *Rhus* spp., and cliffrose *Cowania mexicana*. Distribution - This class is widespread throughout Nevada mountains, usually at elevations from 6,500-10,000 feet (2,000-3,000 m). It is especially prevalent in central and northern Nevada where mountain forests are minimal.

MOUNTAIN SHRUB (MNS) - Deciduous shrubland principally dominated by oak *Quercus* spp., maple *Acer* spp., alder leaf mountain mahogany *Cercocarpus montanus*, cliffrose *Cowania mexicana*, bitterbrush *Purshia tridentata*, serviceberry *Amelanchier* spp., buckbrush *Ceanothus* spp., snowberry *Symphoricarpos* spp., manzanita *Arctostaphylos* spp.,ninebark *Physocarpus alternans*, currant *Ribes* spp., squawbush *Rhus* spp., and littleleaf mountain mahogany *Cercocarpus intricatus*. Primary associated shrub species include sagebrush *Artemisia* spp. and rabbitbrush *Chrysothamnus* spp. Primary associated tree species include pinyon *Pinus monophylla*, juniper *Juniperus osteosperma*, mountain mahogany *Cercocarpus ledifolius*, aspen *Populus tremuloides*, white fir *Abies concolor*, limber pine *Pinus flexilis*, ponderosa pine *Pinus ponderosa*, subalpine fir *Abies lasiocarpa* and Engelmann spruce *Picea engelmannii*. Distribution - This is a wide-spread class in the foothills and mountains of Nevada. Because of the landscape scale of the mapping, many of these species could not be isolated. The largest concentrations of this class are found in the mountains of southern, eastern, and northeastern Nevada.

PINYON_1 (PN1) - Conifer woodland principally dominated by single leaf pinyon *Pinus monophylla* at canopies less than 30 percent. Primary associated tree species include Utah juniper *Juniperus osteosperma*, ponderosa pine *Pinus ponderosa*, white fir *Abies concolor*, mountain mahogany *Cercocarpus ledifolius*, and Jeffrey pine *Pinus jeffreyi*. Primary associated shrub species include sagebrush *Artemisia* spp., oak *Quercus gambelii*, alder leaf mountain mahogany *Cercocarpus montanus*, littleleaf mountain mahogany *Cercocarpus intricatus*, cliffrose *Cowania mexicana*, manzanita *Arctostaphylos* spp., shrub live oak *Quercus turbinella*, and bitterbrush *Purshia tridentata*. Distribution - Pinyon is most widely distributed throughout eastern, central, and western Nevada at elevations above the pinyon-juniper zone. It is absent in northern Nevada.

PINYON_2 (PN2) - Conifer forest principally dominated by single leaf pinyon *Pinus monophylla* at canopies from 30-60 percent. Primary associated tree species include Utah juniper *Juniperus osteosperma*, ponderosa pine *Pinus ponderosa*, white fir *Abies concolor*, mountain mahogany *Cercocarpus ledifolius*, and Jeffrey pine *Pinus jeffreyi*. Primary associated shrub species include sagebrush *Artemisia* spp., oak *Quercus gambelii*, alder leaf mountain mahogany *Cercocarpus montanus*, littleleaf mountain mahogany *Cercocarpus intricatus*, cliffrose *Cowania mexicana*, manzanita *Arctostaphylos* spp., shrub live oak *Quercus turbinella*, and bitterbrush *Purshia tridentata*. Distribution - Pinyon is most widely distributed throughout eastern, central and western Nevada at elevations above the pinyon-juniper zone. It is absent in northern Nevada.

PINYON-JUNIPER_1 (PJ1) - Conifer woodland principally co-dominated by single leaf pinyon *Pinus monophylla* and Utah juniper *Juniperus osteosperma* at canopies less than 30 percent. Primary associated tree species include mountain mahogany *Cercocarpus ledifolius*. Primary associated shrub species include sagebrush *Artemisia* spp., rabbitbrush *Chrysothamnus* spp., oak *Quercus gambelii*, alder leaf mountain mahogany *Cercocarpus montanus*, bitterbrush *Purshia tridentata*, littleleaf mountain mahogany *Cercocarpus intricatus*, and cliffrose *Cowania mexicana*. Distribution - Pinyon-Juniper is distributed throughout all but northern Nevada. It is most abundant in eastern and central Nevada. It typically occurs at elevations above the juniper zone and below the pinyon zone.

PINYON-JUNIPER_2 (PJ2) - Conifer woodland principally co-dominated by pinyon *Pinus monophylla* and juniper *Juniperus osteosperma* at canopies from 30-60 percent. Primary associated tree species include mountain mahogany *Cercocarpus ledifolius*. Primary associated shrub species include sagebrush *Artemisia* spp., rabbitbrush *Chrysothamnus* spp., oak *Quercus gambelii*, alder leaf mountain mahogany *Cercocarpus montanus*, bitterbrush *Purshia tridentata*, littleleaf mountain mahogany *Cercocarpus intricatus*, and cliffrose *Cowania mexicana*. Distribution - Pinyon-Juniper is distributed throughout all but northern Nevada. It is most abundant in eastern and central Nevada. It typically occurs at elevations above the juniper zone and below the pinyon zone.

PLAYAS (PLY) - Barren internal basin floors which can occasionally be covered by water. Distribution - Located state-wide on flat, low-elevation valley floors.

PONDEROSA PINE_1/MOUNTAIN SHRUB (PP1/MNS) - Conifer woodland principally dominated by ponderosa pine *Pinus ponderosa* at canopies less than 30 percent, co-dominant with mountain shrubs including oak *Quercus gambelii*, alder leaf mountain mahogany *Cercocarpus montanus*, snowberry *Symphoricarpos* spp., manzanita *Arctostaphylos* spp., and littleleaf mountain mahogany *Cercocarpus intricatus*. Primary associated tree species include pinyon *Pinus monophylla*, juniper *Juniperus osteosperma*, white fir *Abies concolor*, limber pine *Pinus flexilis*, mountain mahogany *Cercocarpus ledifolius*, and bristlecone pine *Pinus aristata*. Primary associated shrub species include sagebrush *Artemisia* spp. Distribution - This class is predominantly found in the Spring, Sheep, and Clover mountains of southern Nevada.

PONDEROSA PINE_2 (PP2) - Conifer forest principally dominated by ponderosa pine *Pinus ponderosa* at canopies from 30-60 percent. Primary associated tree species include pinyon *Pinus monophylla*, juniper *Juniperus osteosperma*, white fir *Abies concolor*, limber pine *Pinus flexilis*, mountain mahogany *Cercocarpus ledifolius*, and bristlecone pine *Pinus aristata*. Primary associated shrub species include sagebrush *Artemisia* spp., oak *Quercus gambelii*, alder leaf mountain mahogany *Cercocarpus montanus*, snowberry *Symphoricarpos* spp., manzanita *Arctostaphylos* spp., and littleleaf mountain mahogany *Cercocarpus intricatus*. Distribution - This class is predominantly found in the Spring, Sheep, and Clover mountains of southern Nevada, and the Snake, Wilson Creek, Quinn Canyon, and Schell Creek mountains of eastern Nevada.

SAGEBRUSH (SB) - Shrubland principally dominated by big sagebrush *Artemisia tridentata* spp., black sagebrush *Artemisia nova*, or low sagebrush *Artemisia arbuscula*. Primary associated tree species include juniper *Juniperus osteosperma*, pinyon *Pinus monophylla*, mountain mahogany *Cercocarpus ledifolius*, Jeffrey pine *Pinus jeffreyi*, and ponderosa pine *Pinus ponderosa*. Primary associated shrub species include rabbitbrush *Chrysothamnus* spp., snakeweed *Gutierrezia sarothrae*, blackbrush *Coleogyne ramosissima*, shadscale *Atriplex confertifolia*, greasewood *Sarcobatus* spp., spiny hopsage *Grayia spinosa*, and bitterbrush *Purshia tridentata*. Primary associated grass species include wheatgrasses *Agropyron* spp., cheatgrass *Bromus tectorum*, bluegrasses *Poa* spp., needlegrasses *Stipa* spp., fescues *Festuca* spp., and galleta *Hilaria jamesii*. Distribution - Sagebrush is the most widespread and abundant cover type in Nevada. Typically this class occurs above 5,000 feet (1,500 m) with associated grass species making up less than 25 percent of the sagebrush canopy.

SAGEBRUSH/PERENNIAL GRASS (SB/PG) - Co-dominant sagebrush *Artemisia* spp. shrubland and perennial grassland. Co-dominance is defined by either shrub or grass composing at least 25 percent of the total canopy. Principle grass species include wheatgrasses *Agropyron* spp., bluegrasses *Poa* spp., needlegrasses *Stipa* spp., fescues *Festuca* spp., ricegrass *Oryzopsis hymenoides*, and galleta *Hilaria jamesii*. Primary associated shrub species include rabbitbrush *Chrysothamnus* spp., bitterbrush *Purshia tridentata*, and cliffrose *Cowania mexicana*. Primary associated grass species include cheatgrass *Bromus tectorum* and squirreltail *Elymus elymoides*. Distribution - This class typically occurs mid-elevation between sagebrush and mountain sagebrush classes in central Nevada and is wide-spread as part of the sagebrush steppe of northern Nevada.

SALT DESERT SCRUB (SDS) - Shrublands principally dominated by one or more of the following: shadscale *Atriplex confertifolia*, desert holly *Atriplex hymenelytra*, Bailey's greasewood *Sarcobatus baileyi*, desert thorn *Lycium* spp., Torrey saltbush *Atriplex torreyi*, winterfat *Ceratoides lanata*, budsage *Artemisia spinescens*, fourwing saltbush *Atriplex canescens*, Mormon tea *Ephedra* spp., Bailey's greasewood *Sarcobatus baileyi*, horsebrush *Tetradymia canescens*, and snakeweed *Gutierrezia sarothrae*. Primary associated shrub species include greasewood *Sarcobatus vermiculatus*, sagebrush *Artemisia* spp., blackbrush *Coleogyne ramosissima*, iodine bush *Allenrolfea occidentalis*, and creosote *Larrea tridentata*. Primary associated forb species includes halogeten *Halogeten*

glomeratus. Primary associated grass species include saltgrass *Distichlis spicata* and cheatgrass *Bromus rectorum*. Distribution - This is a broad abundant class which can occur in a variety of physiographic areas throughout the state. Typically this class occurs below 5,000 feet (1,500 m), except for central Nevada, and especially dominates the Lahontan basin of western Nevada.

SAND DUNES (SD) - Sand dunes with less than five percent total vegetative cover. Distribution - Located state-wide, with major dunes near Winnemucca and Sand Mountain near Fallon.

WETLAND (WET) - Low elevation marsh and wetland areas. Principal species include cattail *Typha latifolia*, bullrush *Scirpus* spp., burreed *Sparganium* spp., common reed grass *Phragmites australis*, pondweed *Potamogeton* spp., and sedge *Carex* spp. Distribution - This class occurs in limited areas throughout Nevada, typically in low elevation basins around a permanent water source. The largest expanses occur in Ruby valley and the Carson Sink.

WHITE FIR_2 (WF2) - Conifer forest principally dominated by white fir *Abies concolor* at canopies from 30-60 percent. Primary associated tree species include ponderosa pine *Pinus ponderosa*, pinyon *Pinus monophylla*, mountain mahogany *Cercocarpus montanus*, Engelmann spruce *Picea engelmannii*, limber pine *Pinus flexilis* and bristlecone pine *Pinus aristata*. Primary associated shrub species include sagebrush *Artemisia* spp., snowberry *Symphoricarpos* spp., buckbrush *Ceanothus* spp., and manzanita *Arctostaphylos* spp. Distribution - This class is distributed throughout eastern and southern Nevada typically above 7,500 feet (2,300 m) on north and east aspects.

URBAN (URB)- Commercial, mining and residential areas. Distribution - Located state-wide.

California

Descriptions of land cover types within the 84-km circle from the California GAP Analysis, Mojave Ecoregion (University of California 1994). Data were produced by the University of California (1994), Santa Barbara, Department of Geography, and obtained from the World-Wide-Web. The minimum mapping unit was 100 ha, and the data used in the mapping was compiled from existing sources (e.g., BLM management plans, Southern California Edison resource inventories, Soil Conservation Service surveys, LANDSAT thematic images and field reconnaissance), as opposed to largely digital classification techniques used in Nevada.

ALKALI PLAYA: Poorly drained soils with high alkalinity due to evaporation of water accumulated in closed drainages. May have widely spaced alkaline tolerating shrubs such as *Allenrolfea occidentalis*, *Atriplex confertifolia*, *A. parryi*, and *Sarcobatus vermiculatus*.

DESERT HOLLY SCRUB: Dominated by *Atriplex hymenelytra*; few other shrubs.

DESERT SALTBRUSH SCRUB: Widely scattered cover type found on margins of dry lake beds on poorly drained, alkaline soils. Stands are typically dominated by a single *Atriplex* species, including *Atriplex canescens*, *A. confertifolia*, or *A. polycarpa*. *Grayia spinosa* and *Lycium* spp. commonly occur.

DRY SALT FLAT: Non-playa alkaline encrusted barren area.

DUNES AND SAND FIELDS: May be barren and active, stabilized and/or partially stabilized sand. Stabilized by the presence of evergreen, or deciduous shrubs, including *Ambrosia dumosa*, *Astragalus* spp., and *Atriplex* spp.

MESQUITE BOSQUE: Occurs along washes, streambanks, or other areas with substantial near-surface groundwater supplies. Dense to open woodland dominated by *Prosopis* spp. *Atriplex* spp. is a commonly occurring shrub.

MIXED BARREN LAND: Vegetation may exist, but cover is extremely low.

MOJAVE CREOSOTE BUSH SCRUB: Widely spaced shrubs, usually with bare space in between. This is the basic creosote scrub of the Mojave Desert, dominated by *Larrea tridentata* or *Larrea tridentata* and *Ambrosia*

dumosa. This cover type also may contain shrubs such as found in Mojave Mixed Woody Scrub as sub-dominants, including *Ephedra nevadensis* and *Lycium* spp.

MOJAVE MIXED WOODY SCRUB: Varied in composition but generally characterized by one or several of the following species: *Ambrosia dumosa*, *Tetradymia* spp., *Lycium* spp., *Coleogyne ramosissima* (as a sub-dominant), *Krascheninnikovia lanata*, *Psorothamnus arborescens*, *Thamnosma montanum*, *Hymenoclea salsola*, *Encelia* spp., *Yucca schidigera*, and/or *Eriogonum fasciculatum*.

MOJAVEAN PINON AND JUNIPER WOODLANDS: An open woodland, generally found between 1200-2500 m, dominated by *Pinus monophylla* and/or *Juniperus* spp. Shrubby understory species may include *Coleogyne ramosissima*, *Eriogonum fasciculatum*, and/or *Ephedra nevadensis*.

QUARRY: Active or historic mining excavations.

SHADSCALE SCRUB: Cover type often found on poorly-drained flats with heavy, slightly alkaline soils and on well drained slopes at slightly higher elevations (approximately 900-1800 m). Dominated by *Atriplex confertifolia* and/or *Artemisia spinescens*.

URBAN: Includes residential, commercial, and industrial development.

APPENDIX D

LENGTH (KM) OR AREA (KM^2) AND PROPORTION OF TRANSPORTATION CORRIDORS AND FACILITIES IN DIFFERENT LAND COVER TYPES

(CRWMS M&O 1999h)

Appendix D-1. Length (km) and Proportion of Rail Corridors in Different Land Cover Types (Utah State University 1996) (See Appendix C for Descriptions of the Land Cover Types.)

Corridor	Total	Land Cover Type[a]													
		AG		BB		CB		GL		GW		HOP		JUN	
Section	km	km	%	km	%	km	%	km	%	km	%	km	%	km	%
Caliente	**514.5**	**1.6**	**0.3**	**0.5**	**0.1**	**30.7**	**6.0**	**0.9**	**0.2**	**1.9**	**0.4**	**10.1**	**2.0**	**1.3**	**0.3**
Eccles to Meadow Valley	16.7	0.5	2.9												
Meadow Valley to Sand Spring Valley	151.9	1.1	0.7					0.9	0.6						
Sand Spring Valley to Mud Lake	178.7									1.9	1.1			1.3	0.7
Mud Lake to Beatty Wash	117.4					1.5	1.3					10.1	8.6		
Beatty Wash to Yucca Mountain	49.8			0.5	0.9	29.2	58.7								
Carlin (via Big Smoky Valley)	**522.0**			**0.5**	**0.1**	**30.7**	**5.9**			**33.5**	**6.4**	**10.1**	**1.9**		
Carlin (via Monitor Valley)	**517.9**			**0.5**	**0.1**	**30.7**	**5.9**			**22.4**	**4.3**	**10.1**	**1.9**		
Beowawe to U.S. 50	144.0									22.4	15.6				
U.S. 50 to Mud Lake via Big Smoky	210.9									11.1	5.3				
U.S. 50 to Mud Lake via Monitor Valley	206.7														
Mud Lake to Beatty Wash	117.4					1.5	1.3					10.1	8.6		
Beatty Wash to Yucca Mountain	49.8			0.5	0.9	29.2	58.7								
Caliente-Chalk Mountain	**333.9**	**1.6**	**0.5**	**82.9**	**24.8**			**1.4**	**0.4**			**6.4**	**1.9**		
Eccles to Meadow Valley	16.7	0.5	2.9												
Meadow Valley to Sand Spring Valley	151.9	1.1	0.7					0.9	0.6						
Sand Spring Valley to Yucca Mountain	165.3			82.9	50.1			0.5	0.3			6.4	3.9		
Jean (Wilson Pass)	**179.0**			**32.9**	**18.4**	**104.9**	**58.6**								
Jean (Stateline Pass)	**196.0**			**0.2**	**0.1**	**158.4**	**80.8**								
Jean to Pahrump (via Wilson Pass)	73.5			32.7	44.5	17.8	24.2								
Jean to Pahrump (via Stateline Pass)	90.5					71.3	78.8								
Pahrump to Yucca Mountain	105.5			0.2	0.2	87.0	82.5								
Valley Modified	**150.8**					**119.2**	**79.0**								

[a] AG=agriculture, BB=blackbrush, CB=creosote-bursage, GL=grassland, GW=greasewood, HOP=hopsage, JUN=juniper, MMS=Mojave mixed scrub, PJ=pinyon-juniper, PLY=playa, SB=sagebrush, SB/PG=SB/grassland, SDS=salt desert scrub, California=unclassified areas in California, URB=urban

Appendix D-1. Length (km) and Proportion of Rail Corridors in Different Land Cover Types (Utah State University 1996) (See Appendix C for Descriptions of the Land Cover Types.) (Continued)

Corridor	Total	Land Cover Type[a]													
		MMS		PJ		PLY		SB		SB/PG		SDS		California	
Section	km	km	%	km	%	km	%	km	%	km	%	km	%	km	%
Caliente	**514.5**	**23.1**	**4.5**			**0.3**	**0.1**	**152.7**	**29.7**	**1.5**	**0.3**	**290.0**	**56.4**		
Eccles to Meadow Valley	16.7							3.4	20.5			12.8	76.6		
Meadow Valley to Sand Spring Valley	151.9							81.6	53.7	1.5	1.0	66.8	44.0		
Sand Spring Valley to Mud Lake	178.7					0.3	0.2	59.7	33.4			115.6	64.7		
Mud Lake to Beatty Wash	117.4	12.2	10.4					8.0	6.8			85.6	72.9		
Beatty Wash to Yucca Mountain	49.8	10.9	21.9									9.2	18.5		
Carlin (via Big Smoky Valley)	**552.0**	**23.1**	**4.4**	**3.3**	**0.6**			**130.2**	**24.9**	**12.0**	**2.3**	**278.7**	**53.4**		
Carlin (via Monitor Valley)	**517.9**	**23.1**	**4.5**	**3.3**	**0.6**			**223.0**	**43.1**	**30.3**	**5.9**	**174.4**	**33.7**		
Beowawe to U.S. 50	144.0			3.3	2.3			86.8	60.3	3.9	2.7	27.6	19.1		
U.S. 50 to Mud Lake via Big Smoky	210.9							35.4	16.8	8.0	3.8	156.3	74.1		
U.S. 50 to Mud Lake via Monitor Valley	206.7							128.2	62.0	26.4	12.8	52.1	25.2		
Mud Lake to Beatty Wash	117.4	12.2	10.4					8.0	6.8			85.6	72.9		
Beatty Wash to Yucca Mountain	49.8	10.9	21.9									9.2	18.5		
Caliente-Chalk Mountain	**333.9**	**8.2**	**2.4**					**100.6**	**30.1**	**1.5**	**0.4**	**131.4**	**39.3**		
Eccles to Meadow Valley	16.7							3.4	20.5			12.8	76.6		
Meadow Valley to Sand Spring Valley	151.9							81.6	53.7	1.5	1.0	66.8	44.0		
Sand Spring Valley to Yucca Mountain	165.3	8.2	4.9					15.6	9.4			51.8	31.3		
Jean (Wilson Pass)	**179.0**	**37.7**	**21.1**									**3.5**	**2.0**		
Jean (Stateline Pass)	**196.0**	**28.5**	**14.6**									**3.5**	**1.8**	**5.3**	**2.7**
Jean to Pahrump (via Wilson Pass)	73.5	23.0	31.2												
Jean to Pahrump (via Stateline Pass)	90.5	13.8	15.3											5.3	5.9
Pahrump to Yucca Mountain	105.5	14.7	14.0									3.5	3.3		
Valley Modified	**150.8**	**24.0**	**15.9**			**0.8**	**0.6**					**6.8**	**4.5**		

[a] AG=agriculture, BB=blackbrush, CB=creosote-bursage, GL=grassland, GW=greasewood, HOP=hopsage, JUN=juniper, MMS=Mojave mixed scrub, PJ=pinyon-juniper, PLY=playa, SB=sagebrush, SB/PG=SB/grassland, SDS=salt desert scrub, California=unclassified areas in California, URB=urban

Route	Total	Land Cover Type[a]											
		AG		BB		CB		GW		HOP		JUN	
Section	km	km	%	km	%	km	%	km	%	km	%	km	%
Caliente	**540.0**	**4.8**	**0.9**	**21.9**	**4.1**	**69.1**	**12.8**	**11.3**	**2.1**	**30.5**	**5.6**	**7.0**	**1.3**
Caliente to Crystal Springs	68.0			4.7	6.9					21.8	32.0	7.0	10.3
Crystal Springs to Rachel	61.2	1.9	3.1	17.2	28.1					5.9	9.6		
Rachel to FOC via Tonopah	392.2	2.9	0.7	0.0	0.0	59.3	15.1	11.3	2.9	2.8	0.7		
FOC to Yucca Mountain	18.5					9.8	52.9						
Caliente-Chalk	**284.0**	**2.8**	**1.0**	**45.0**	**15.9**	**28.5**	**10.0**			**27.6**	**9.7**	**7.0**	**2.5**
Caliente to Crystal Springs	68.0			4.7	6.9					21.8	32.0	7.0	10.3
Crystal Springs to Rachel	61.2	1.9	3.1	17.2	28.1					5.9	9.6		
Rachel to FOC via NTS	136.3	0.9	0.6	23.1	17.0	18.7	13.7						
FOC to Yucca Mountain	18.5					9.8	52.9						
Caliente-Las Vegas	**383.7**			**4.7**	**1.2**	**236.8**	**61.7**			**21.8**	**5.7**	**7.0**	**1.8**
Caliente to Crystal Springs	68.0			4.7	6.9					21.8	32.0	7.0	10.3
Crystal Springs to Dry Lake Siding	135.5					99.6	73.5						
Dry Lake Siding to U.S. 95	43.4					27.6	63.5						
U.S. 95 to FOC	118.2					99.8	84.4						
FOC to Yucca Mountain	18.5					9.8	52.9						
Apex/Dry Lake	**180.1**					**137.2**	**76.1**						
Dry Lake Siding to U.S. 95	43.4					27.6	63.5						
U.S. 95 to FOC	118.2					99.8	84.4						
FOC to Yucca Mountain	18.5					9.8	52.9						
Sloan/Joan	**214.0**					**166.6**	**77.9**						
Jean to U.S. 95	77.3					57.1	73.8						
U.S. 95 to FOC	118.2					99.8	84.4						
FOC to Yucca Mountain	18.5					9.8	52.9						

[a] AG=agriculture, BB=blackbrush, CB=creosote-bursage, GL=grassland, GW=greasewood, HOP=hopsage, JUN=juniper, MMS=Mojave mixed scrub, PJ=pinyon-juniper, PLY=playa, SB=sagebrush, SB/PG=SB/grassland, SDS=salt desert scrub, California=unclassified areas in California, URB=urban

Route	Land Cover Type[a]											
	MMS		PJ		PLY		SB		SDS		URB	
Section	km	%	km	%	km	%	km	%	km	%	km	%
Caliente	**44.1**	**8.2**	**6.0**	**1.1**	**0.1**	**0.0**	**73.8**	**13.7**	**265.2**	**49.1**	**6.1**	**1.1**
Caliente to Crystal Springs	0.2	0.3	5.6	8.2			18.2	26.7	9.3	13.7	1.3	1.9
Crystal Springs to Rachel	1.0	1.7					11.7	19.2	23.4	38.3		
Rachel to FOC via Tonopah	34.7	8.8	0.5	0.1	0.1	0.0	43.8	11.2	231.9	59.1	4.9	1.2
FOC to Yucca Mountain	8.1	44.0							0.6	3.1		
Caliente-Chalk	**20.0**	**7.0**	**5.6**	**2.0**			**40.7**	**14.3**	**105.6**	**37.2**	**1.3**	**0.5**
Caliente to Crystal Springs	0.2	0.3	5.6	8.2			18.2	26.7	9.3	13.7	1.3	1.9
Crystal Springs to Rachel	1.0	1.7					11.7	19.2	23.4	38.3		
Rachel to FOC via NTS	10.6	7.7					10.8	7.9	72.2	53.0		
FOC to Yucca Mountain	8.1	44.0							0.6	3.1		
Caliente-Las Vegas	**60.0**	**15.6**	**5.6**	**1.4**			**18.2**	**4.7**	**22.8**	**5.9**	**6.9**	**1.8**
Caliente to Crystal Springs	0.2	0.3	5.6	8.2			18.2	26.7	9.3	13.7	1.3	1.9
Crystal Springs to Dry Lake Siding	31.8	23.5							4.1	3.0		
Dry Lake Siding to U.S. 95	4.2	9.6							8.4	19.5	3.2	7.4
U.S. 95 to FOC	15.7	13.3							0.3	0.3	2.4	2.0
FOC to Yucca Mountain	8.1	44.0							0.6	3.1		
Apex/Dry Lake	**28.0**	**15.5**							**9.4**	**5.2**	**5.6**	**3.1**
Dry Lake Siding to U.S. 95	4.2	9.6							8.4	19.5	3.2	7.4
U.S. 95 to FOC	15.7	13.3							0.3	0.3	2.4	2.0
FOC to Yucca Mountain	8.1	44.0							0.6	3.1		
Sloan/Joan	**26.4**	**12.4**							**0.9**	**0.4**	**20.0**	**9.4**
Jean to U.S. 95	2.6	3.4									17.6	22.8
U.S. 95 to FOC	15.7	13.3							0.3	0.3	2.4	2.0
FOC to Yucca Mountain	8.1	44.0							0.6	3.1		

[a] AG=agriculture, BB=blackbrush, CB=creosote-bursage, GL=grassland, GW=greasewood, HOP=hopsage, JUN=juniper, MMS=Mojave mixed scrub, PJ=pinyon-juniper, PLY=playa, SB=sagebrush, SB/PG=SB/grassland, SDS=salt desert scrub, California=unclassified areas in California, URB=urban

Appendix D-3. Area (km^2) and Proportion of the Footprints of Intermodal Transfer Stations in Different Land Cover Types (Utah State University 1996) (See Appendix C for descriptions of the Land Cover Types.)

	Total	Land Cover Type[a]									
		AG		CB		MMS		SB		SDS	
Facility	**km^2**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**
Caliente	0.7	0.6	82					<0.1	6	0.1	12
Apex/Dry Lake	5.4			5.4	100						
Sloan/Jean	7.4			7.2	97	0.2	3				

[a] AG=agriculture, CB=creosote-bursage, MMS=Mojave mixed scrub, SB=sagebrush, SDS=salt desert scrub

APPENDIX E

BIOLOGICAL RESOURCES WITHIN 5 KM OF THE POTENTIAL CALIENTE RAIL CORRIDOR

(Map ID numbers in the table are shown on maps YMP-97-071.3 through YMP-97-077.3 and YMP-97-083.3, Attachment 1)

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Primary Corridor: Eccles Siding to Panaca							
Not mapped	18	Herd Management Area	The Cedar Range, east of Caliente, is a wild horse herd management area.	Mitigation may be necessary	2.2.2 Low	within	BLM 1979
323SS1	18, D1	BLM Sensitive Species	The Needle Mountain milkvetch has been found about 10 km east of Caliente.	None known	2.2.2 Moderate	806	NNHP 1997
571SW	10, D4	Spring	Lower Ash Spring, a group of 2 springs, is located east of Meadow Valley Wash and southeast of Caliente.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4663	USGS 1998
566SW	10, D4	Spring	An unnamed spring is located east of Caliente.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1698	USGS 1998
567SW	10, D4	Spring	Oak Springs (2 springs) are located east of Caliente.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2218	USGS 1998
562SW	10, C4	Spring	Two unnamed springs are located in Meadow Valley north of Caliente	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	506	USGS 1998
326SS1	10, C4	BLM Sensitive Species	The Needle Mountain milkvetch has been found near S.R. 319 in Meadow Valley Wash, 4 km north of Caliente.	None known	2.2.2 Moderate	1639	NNHP 1997
327SS1	10, C4	BLM Sensitive Species	The Needle Mountain milkvetch has been found about 7 km northeast of Caliente.	None known	2.2.2 Moderate	944	NNHP 1997
55PA3	10, C4 18, C1	Crucial game habitat/use area	Portions of Meadow Valley Wash are habitat for Gamble's quail and waterfowl. Areas less than 0.4 km from existing springs, seeps, and stock watering developments within designated quail areas are classified as crucial for quail.	Avoid when possible	2.1.3 Moderate	within	BLM 1979

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
458SS1 275SS1	10, C4-D4	Riparian Area	The corridor crosses and is adjacent to Meadow Valley Wash north of Caliente. An adjacent stream and riparian area was field verified 8/97.	Avoid riparian areas by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland.	within	USGS 1998; Field Verified 8/97
		BLM Sensitive Species	The Meadow Valley Wash speckled dace has been found in Meadow Valley Wash.	None Known	2.2.2 Moderate	within	NNHP 1997
		BLM Sensitive Species	The Meadow Valley Wash desert sucker has been found in Meadow Valley Wash.	None Known	2.2.2 Moderate	within	NNHP 1997
Crestline Secondary Corridor: Crestline to Panaca							
Not mapped	18	Herd Management Area	The Cedar Range, east of Caliente, is a wild horse herd management area.	Mitigation may be necessary	2.2.2 Low	within	BLM 1979
612SW	18, C2	Spring	Sheep Spring is located south of S.R. 319, southeast of Panaca.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2415	USGS 1998
614SW	18, C2	Spring	Miller Spring is located south of S.R. 319, southeast of Panaca. This spring is considered an important water source for game.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	304	USGS 1998
618SW	18, D2	Spring	Oak Well is south of the corridor, south of S.R. 319.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4235	USGS 1998
51PA3	18, C1 18, C2	Crucial game habitat/use area	A crucial winter concentration area for bighorn sheep and mule deer is in the Cedar Range approximately 13 km west of Crestline, Nevada.	Avoid when possible	2.1.3 Moderate	within	BLM 1979
613SW	18, C2	Spring	Miser Spring is located south of S.R. 319, southeast of Panaca.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	976	USGS 1998
611SW	18, C2	Spring	Dow Spring is located south of S.R. 319, southeast of Panaca.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2113	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
615SW	18, C1	Spring	Chokecherry Spring is located southeast of Panaca.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2434	USGS 1998
617SW	18, C1	Spring	Buckboard Spring is located southeast of Panaca.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3301	USGS 1998
616SW	18, C1	Spring	Keel Spring is located southeast of Panaca.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2515	USGS 1998
324SS1	18, C1	BLM Sensitive Species	The Needle Mountain milkvetch has been found near the corridor, 4 km southeast of Panaca.	None known	2.2.2 Moderate	208	NNHP 1997
325SS1	18, C1	BLM Sensitive species	The Needle Mountain milkvetch has been found in the Cedar Range, 16 km northeast of Caliente.	None known	2.2.2 Moderate	3824	NNHP 1997
276SS1	18, C1	BLM Sensitive Species	The Needle Mountain milkvetch is found north of the corridor, south of S.R. 319.	None known	2.2.2 Moderate	2558	BLM 1998
277SS1	18, C1	BLM Sensitive Species	The Needle Mountain milkvetch is found south of S.R. 319 and Panaca, and east of U.S. Highway 93.	None known	2.2.2 Moderate	1895	BLM 1998
55PA3	10, C4	Crucial game habitat/use area	Portions of Meadow Valley Wash are habitat for Gamble's quail and waterfowl. Areas less than 0.4 km from existing springs, seeps, and stock watering developments within designated quail areas are classified as crucial for quail.	Avoid when possible	2.1.3 Moderate	Within	BLM 1979
458SS1 275SS1	10, C4-D4	Riparian Area	The corridor crosses Meadow Valley Wash south of Panaca. The stream and riparian area was field verified 8/97.	Avoid riparian areas by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland.	within	USGS 1998; Field Verified 8/97
		BLM Sensitive Species	The Meadow Valley Wash speckled dace has been found in Meadow Valley Wash.	None Known	2.2.2 Moderate	within	NNHP 1997
		BLM Sensitive Species	The Meadow Valley Wash desert sucker has been found in Meadow Valley Wash.	None Known	2.2.2 Moderate	within	NNHP 1997

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Caliente Secondary Corridor: Caliente to Panaca							
458SS1 275SS1	10, C4-D4	Riparian Area	The corridor crosses Meadow Valley Wash south of Panaca. The stream and riparian area was field verified 8/97.	Avoid riparian areas by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland.	within	USGS 1998; Field Verified 8/97
		BLM Sensitive Species	The Meadow Valley Wash speckled dace has been found in Meadow Valley Wash.	None Known	2.2.2 Moderate	within	NNHP 1997
		BLM Sensitive Species	The Meadow Valley Wash desert sucker has been found in Meadow Valley Wash.	None Known	2.2.2 Moderate	within	NNHP 1997
567SW	10, D4	Spring	Oak Springs (2 springs) are located east of Caliente.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2218	USGS 1998
570SW	10, D4	Spring	Two unnamed springs are located south of Caliente and east of Meadow Valley Wash.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3051	USGS 1998
565SW	10, D4	Spring	An unnamed spring is located in Caliente.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	562	USGS 1998
569SW	10, D4	Spring	An unnamed spring is located south of U.S Highway 93 and southwest of Caliente.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3270	USGS 1998
564SW	10, D4	Spring	An unnamed spring is located north of U.S. Highway 93 and south of Antelope Canyon.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2076	USGS 1998
563SW	10, C4	Spring	An unnamed spring is located in Meadow Valley north of Caliente.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	within	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
562SW	10, C4	Spring	Two unnamed springs are located in Meadow Valley north of Caliente.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	506	USGS 1998
374SS1	10, C4	BLM Sensitive Species	The Welsh's catseye has been found in Meadow Valley Wash, north-northeast of Caliente.	None known	2.2.2 Moderate	within	NNHP 1997
55PA3	10, C4-D4	Crucial game habitat/use area	Portions of Meadow Valley Wash are habitat for Gambel's quail and waterfowl. Areas less than 0.4 km from existing springs, seeps, and stock watering developments within designated quail areas are classified as crucial for quail.	Avoid when possible	2.1.3 Moderate	within	BLM 1979
Meadow Valley Wash to Sand Spring Valley (Rachel)							
Not mapped	10, 18	Game Habitat	The Chief Range and the Delamar Mountains are year-round mule deer use areas.	None known	2.2.2 Low	within	BLM 1979
Not mapped	10	Herd Use/Management Area	The Chief Range is a wild horse herd management area.	Mitigation may be necessary	2.2.2 Low	within	BLM 1979
561SW	10, C4	Spring	Bennett Spring is located 3.2 km southeast of Bennett Pass.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	1041	USGS 1998
Not mapped	10, C3-C4	Game Habitat	The corridor passes through Gambel's quail year-round range at Bennett Pass.	None knowm	None Known	within	BLM 1979
59PA2	10, B3-B4	Seasonal game habitat/use area	The area around Highland Peak is a mule deer summer use area.	None known	2.2.2 Low	3174	BLM 1979
292SS1	10, B3	BLM Sensitive Species	A hawk nesting area is found on the western edge of the Highland Range. The species nesting there are not confirmed; however, the area is considered important habitat for sensitive raptor species.	Avoid nesting areas by at least 0.8 km	2.1.3 Moderate, 2.2.2 High if listed species are found in the area	2908	BLM[1]

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
560SW	10, B1	Spring	A group of 5 named springs (Deadman, Coal, Black Rock, and Hamilton springs) and one unnamed spring are located east of White River.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	50-2640	USGS 1998
684RA	9, C4 10, A1	Riparian Area	The corridor parallels and crosses the White River for approximately 25 km. The surface of the river was dry during field surveys in August 1997. Soil disturbance for stock watering was present.	Avoid riparian areas by at least 0.4 km.	1.1.1 Moderate, 2.1.2 Moderate, High if a jurisdictional wetland	within	BLM 1979 Field verified, 1997
341SS1	9, B4 10, A1-B1	BLM Sensitive Species	The pygmy rabbit has been observed north of the corridor, in the White River Valley.	None known	2.2.2 Moderate	2761	NNHP 1997
372SS1	9, B4	BLM Sensitive Species	Welsh's catseye has been found in White River Valley, north of the corridor.	None known	2.2.2 Moderate	2865	NNHP 1997
373SS1	9, C2	BLM Sensitive Species	Welsh's catseye has been found in Garden Valley, east of the Quinn Canyon Range.	None known	2.2.2 Moderate	2688	NNHP 1997
634SW	9, C1	Spring	An unnamed spring is located between the two options of the corridor, between the Quinn Canyon Range and the Worthington Mountains.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1250	Field verified, 1997
60PA2	8, B4 9, D1	Seasonal game habitat/use area	A mule deer winter use area is located in the Worthington Mountains and Quinn Canyon Range.	None known	2.2.2 Low	within	BLM 1979
572SW	8, B4	Spring	McCutchen Spring is located north of Worthington Mountains.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	838	USGS 1998
Sand Spring Valley (Rachel) to Mud Lake							
574SW	8, B4	Spring	Mud Spring is located west of Worthington Mountains.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3192	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
573SW	8, A4	Spring	Quinn Canyon Spring is west of the Worthington Mountains.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4463	USGS 1998
60PA2	8, B4	Seasonal game habitat/use area	A mule deer winter use area is located in the Worthington Mountains and Quinn Canyon Range.	None known	2.2.2 Low	within	BLM 1979
Not mapped	8, B3	Game Habitat	The area along the western edge of Sand Spring (Penoyer) Valley, southeast of the Quinn Canyon Range, is a pronghorn year-round use area.	None Known	2.2.2 Low	within	BLM 1979
576SW	8, B3	Spring	An unnamed spring is located north of Black Top Mountain and east of S.R. 375.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4996	USGS 1998
577SW	8, B3	Spring	An unnamed spring is located north of Black Top Mountain and east of S.R. 375.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3283	USGS 1998
578SW	8, B3	Spring	An unnamed spring is located north of Black Top Mountain and east of S.R. 375.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4086	USGS 1998
579SW	8, B2	Spring	An unnamed spring is located north of Black Top Mountain and east of S.R. 375.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4288	USGS 1998
Not mapped	8	Game Habitat	Railroad and Reveille valleys are pronghorn year-round habitat.	None known	2.2.2 Low	within	BLM 1994a
Not mapped	8	Game Habitat	Reveille Range is pronghorn and mule deer habitat.	None known	2.2.2 Low	within	BLM 1994a
Not mapped	7	Herd use/ management area	The Reveille Wild Horse Herd Management Area is located in the middle of the Reveille Valley.	Mitigation may be necessary	2.2.2 Low	within	BLM 1994a

Appendix E. Biological Resources Within 5 km of the Potential Caliente Rail Corridor (Continued)

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
687RA	7, B4	Riparian Area	A riparian area is located east of Kawich Range.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	3635	BLM 1994a
587SW	7, B4	Spring	An unnamed spring is located east of Kawich Range.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4403	USGS 1998
584SW	7, A4	Spring	Black Spring is located south of the town of Warm Springs.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	17	USGS 1998
582SW	7, A4	Spring	Hot Springs, a group of 2 springs, is located west of U.S. Highway 6 and southwest of the town of Warm Springs.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2764	USGS 1998
631SW	7, A4	Spring Outflow	The outflow and stream from Hot Springs is located soutwest of the S.R. 375 and U.S. Highway 6 junction and flows east along the S.R. 375.	Avoid streams and waterbodies by at least 0.4 km	1.1.1 Moderate, 2.1.2 Moderate, or High if jurisdictional wetland	2954	USGS 1998
94TE2	7, A4	Federally Threatened Species	Railroad Valley springfish has been found in Warm Springs, northwest of U.S. Highway 6, in southern Railroad Valley.	Avoid	2.2.1 High	3199	NNHP 1997
583SW	7, A4	Spring	Warm Spring is located northwest of the town of Warm Springs.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3408	USGS 1998
586SW	7, A3	Spring	Clifford Spring is located southwest of the town Warm Springs.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3113	USGS 1998
Not mapped	7, B3 & A3	Game Habitat	In the Kawich Range, west of Warm Springs, the corridor crosses mule deer year-round habitat.	None known	2.2.2 Low	within	BLM 1994a
413SS1	7, B2	BLM Sensitive Species	The Nevada sanddune beardtongue has been found in Stone Cabin Valley, about 7 km south of U.S. Highway 6.	None known	2.2.2 Moderate	921	NNHP 1997, Field verified 08/97

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Not mapped	7	Game Habitat	Stone Cabin Valley is pronghorn year-round habitat.	None known	2.2.2 Low	within	BLM 1994a
Not mapped	7	Herd Use/Management Area	The Stone Cabin Wild Horse Herd Management Area is located in Stone Cabin Valley.	Mitigation may be necessary	2.2.2 Low	within	BLM 1994a
588SW	7, B2	Spring	Coyote Hole Spring is located west of Kawich Range.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4062	USGS 1998
Not mapped	7	Herd Use/Management Area	The Saulsbury Wild Horse Herd Management Area is located between Stone Cabin and Ralston valleys, east of Monitor Hills.	Mitigation may be necessary	2.2.2 Low	within	BLM 1994a
Not mapped	6	Game Habitat	Ralston Valley is pronghorn year-round habitat.	None known	2.2.2 Low	within	BLM 1994a
Mud Lake to Yucca Mountain							
Not mapped	6	Game Habitat	The corridor crosses pronghorn year-round habitat north of Goldfield, west of Mud Lake	None known	2.2.2 Low	within	BLM 1994a
321SS1	6, C3	BLM Sensitive Species	The Eastwood milkweed has been found near the Esmeralda-Nye county line, west of Mud Lake, about 19 km northeast of Goldfield.	None known	2.2.2 Moderate	170	NNHP 1997
Not mapped	6	Herd Use/Management Area	The corridor crosses the Goldfield Wild Horse and Burro Herd Management Area, east of Goldfield.	Mitigation may be necessary	2.2.2 Low	within	BLM 1994a
589SW	6, D3	Spring	Tognoni Springs are located northeast of Goldfield.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	571	USGS 1998
635SW	6, D3	Spring	An unnamed spring is located south of Mud Lake and east of U.S. Highway 95.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	352	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
591SW	6, D3	Spring	Willow Spring is located south of Mud Lake and east of U.S. Highway 95.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1198	USGS 1998
590SW	6, D3	Spring	Wildhorse Spring is located south of Mud Lake and east of U.S. Highway 95.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3158	USGS 1998
Not mapped	6, D3	Game Habitat	The corridor crosses bighorn sheep habitat east of Goldfield.	None known	2.2.2 Low	within	BLM 1994a
Not mapped	6, A2	Game Habitat	The corridor passes west of mule deer and bighorn sheep habitat around Stonewall Mountain.	None known	2.2.2 Low	4000	BLM 1994a
Not mapped	6, A2	Herd Use/Management Area	The corridor crosses the western edge of the Stonewall Wild Horse and Burro Herd Management Area near Stonewall Mountain.	Mitigation may be necessary	2.2.2 Low	within	BLM 1994a
412SS1	11, D4	BLM Sensitive Species	The Nevada sanddune beardtongue has been found east of U.S. Highway 95, about 25 km southeast of Scotty's Junction.	None known	2.2.2 Moderate	within	NNHP 1997
Not mapped	11, D4 12, C1	Herd Use/Management Area	The corridor crosses the Bullfrog Wild Horse and Burro Herd Management Area in the Bullfrog Hills and Bare Mountains near Beatty.	Mitigation may be necessary	2.2.2 Low	within	BLM 1994a
595SW	11, D4 12, C1	Spring	Numerous springs and seeps are found along the length of the Amargosa River throughout the Oasis Valley.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	within – 2543	USGS 1998
344SS1	11, D4	BLM Sensitive Species	The Amargosa toad has been found in the springs and wet meadows associated with the Amargosa River.	None known	2.2.2 Moderate	4217	NNHP 1997
459SS1	11, D4	BLM Sensitive Species	The Oasis Valley speckled dace has been found in springs and outflows associated with the Amargosa River.	None known	2.2.2 Moderate	4217	NNHP 1997

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
81PA5	12, C1	Area of Critical Environmental Concern	The Amargosa-Oasis ACEC is four distinct areas located west of the corridor, north of Beatty, typically associated with springs and their outflows.	Land-disturbing activities not allowed in ACEC	2.1.3 High or Moderate	3570	BLM 1994a
685RA	12, C1	Riparian Area	A designated riparian area is within the corridor, east of Oasis Valley, flowing into the Amargosa River.	Avoid riparian areas by at least 0.4 km.	2.1.2 Moderate, High if a jurisdictional wetland	within	BLM 1994a
460SS1	12, C1	BLM Sensitive Species	The Oasis Valley speckled dace has been observed in Fleur de Lis Spring, 12 km north northeast of Beatty.	None known	2.2.2 Moderate	2742	NNHP 1997
452SS1	12, C1	BLM Sensitive Species	The Oasis Valley springsnail has been observed in an unnamed spring near Fleur de Lis Spring, 12 km north of Beatty.	None known	2.2.2 Moderate	2919	NNHP 1997
346SS1	12, C1	BLM Sensitive Species	The Amargosa toad has been observed in the Amargosa River and near Fleur de Lis Spring, north of Beatty.	None known	2.2.2 Moderate	2742	NNHP 1997
592SW	12, C1	Spring	A group of 13 unnamed springs is located southwest of the corridor in Oasis Valley, north of Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	280-1320	USGS 1998
345SS1	12, C1	BLM Sensitive Species	The Amargosa toad has been observed in the outflow of a large group of unnamed springs in the Upper Oasis Valley.	None known	2.2.2 Moderate	1221	NNHP 1997
632SW	12, C1	Stream and Riparian Area	The Amargosa River is an intermittent stream for most of its length, with persistent water and extensive wet meadows near springs and seeps.	Avoid streams and riparian areas by at least 0.4 km	1.1.1 Moderate, 2.1.2 Moderate, High if a jurisdictional wetland	within – 340	USGS 1998
347SS1	12, C1	BLM Sensitive Species	The Amargosa toad has been observed in the Amargosa River, at Oleo Road crossing.	None known	2.2.2 Moderate	2792	NNHP 1997
594SW	12, C1	Spring	Goss Springs (a group of 7 springs) is located southwest of the corridor in Oasis Valley.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1461	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
595SW	11, D4 12, C1	Spring	Numerous springs and seeps are found along the length of the Amargosa River throughout the Oasis Valley.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2550-4350	USGS 1998
290SS1	12, C1	BLM Sensitive Species	The areas along the Amargosa River and the associated springs are identified as habitat for the Amargosa toad.	None known	2.2.2 Moderate	3207	BLM 1994a
328SS1	12, C1	BLM Sensitive Species	The Funeral Mountain milkvetch has been found near Beatty Wash.	None known	2.2.2 Moderate	440	NNHP 1997; Blomquist et al. 1995
329SS1	12, C1	BLM Sensitive Species	The Funeral Mountain milkvetch has been found near Beatty Wash.	None known	2.2.2 Moderate	243	NNHP 1997
Not mapped	12, C1-D2	Game Habitat	Bighorn sheep habitat is located in the Bare Mountains west of the corridor, east of Beatty.	None known	2.2.2 Low	4000	BLM 1994a
Not mapped	12, D1-D2	Federally Threatened Species	The desert tortoise is found throughout Crater Flat to Yucca Mountain.	Mitigation may be necessary	2.2.1 Moderate	within	Bury et al. 1994
401SS1	12, D3	BLM Sensitive Species	The fringed myotis has been observed on the Nevada Test Site, in Fortymile Wash.	None known	2.2.2 Moderate	1292	NNHP 1997

[1] personal communication, M. Sweeney, BLM Tonopah Field Office, February 14, 1997, MOL.19990208.0113, MOL.19990208.0117, MOL.19990208.0175.

APPENDIX F

BIOLOGICAL RESOURCES WITHIN 5 KM OF THE POTENTIAL CARLIN RAIL CORRIDOR

(Map ID numbers in the table are shown on maps YMP-97-066.3 through YMP-97-071.3, Attachment 1)

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Beowawe to Austin							
481SW	1, A4	Spring	An unnamed hot spring is north of the corridor, north of Beowawe, south of Interstate 80.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	4714	USGS 1998
80PA1	1, B4	Important Game Habitat/Use Area	A sage grouse strutting ground is located east of the corridor, southeast of Beowawe.	Avoid when possible	2.2.2 Low	1432	BLM 1987b
482SW	1, B4	Spring	An unnamed spring is located south of Beowawe on the eastern edge of S.R. 306.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	2117	USGS 1998
483SW	1, B4	Spring	A group of 4 unnamed springs is located between the corridor and S.R. 306, south of Beowawe.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	1403	USGS 1998
484SW	1, C4	Spring	Cold Springs, a group of 7 springs, is located east of the corridor in Crescent Valley.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	2377	USGS 1998
342SS1	1, C3	BLM Sensitive Species	The pygmy rabbit has been observed north northeast of Tenabo in Crescent Valley.	None known	2.2.2 Moderate	3291	NNHP 1997
67PA2	1, C3	Seasonal Game Habitat/Use Areas	A mule deer spring use area is located west of the corridor, near Tenabo.	Avoid when possible	2.2.2 Low	1069	BLM 1983a
485SW	1, D3	Spring	An unnamed spring is located north of Mount Tenabo.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	4891	USGS 1998
486SW	1, D3	Spring	An unnamed spring is located east of the corridor and southeast of Tenabo.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	4120	USGS 1998
488SW	1, D2	Spring	An unnamed spring is located southwest of Gold Acres.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	3351	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
487SW	1, D2	Spring	Wells Spring is located southwest of Gold Acres.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	4282	USGS 1998
489SW	1, D3	Spring	A group of three unnamed springs is located east of the corridor and west of Cortez.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	2901	USGS 1998
68PA2	1, D3 2, A3	Seasonal Game Habitat/Use Areas	Mule deer summer habitat is located east of the corridor in the Bald Mountain area of the northern Toiyabe Range.	Avoid when possible	2.2.2 Low	3575	BLM 1983a
491SW	2, A3	Spring	Tub Spring is located near the corridor, northeast of Red Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	463	USGS 1998 Field Verified 08/973
490SW	2, A3	Spring	An unnamed spring is located in the northern Toiyabe Range and north of Bald Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4012	USGS 1998
492SW	2, A3	Spring	House Spring is located in the northern Toiyabe Range, north of Bald Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4700	USGS 1998
493SW	2, A3	Spring	Wilson Spring is located in the northern Toiyabe Range, northwest of Bald Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3867	USGS 1998
494SW	2, A2	Spring	Wholey Spring is located west of the corridor, north of Red Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3441	USGS 1998
495SW	2, A2	Spring	Red Mountain Spring No.2 is located west of the corridor, near Red Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1806	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
496SW	2, A2	Spring	Wholey Spring No.2 is a group of three springs located north of Red Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4602	USGS 1998
Not mapped	2, A2	Game Habitat	The area around Red Mountain is mule deer habitat.	None known	2.2.2 Low	4000	BLM 1983a
497SW	2, A2	Spring	Red Mountain Spring is located west of the corridor, east of Red Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	820	USGS 1998
498SW	2, A2	Spring	Red Mountain Spring No.3 is located southeast of Red Mountain, west of the corridor.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1610	USGS 1998
Not mapped	2, A3	Herd Use/ Management Area	The Bald Mountain Wild Horse and Burro Herd Use Area extends into the corridor from the Bald Mountain area.	Mitigation may be necessary	2.2.2 Low	within	BLM 1983a
499SW	2, A3	Spring	Blind Spring is located in the northern Toiyabe Range, west of Bald Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2936	USGS 1998
500SW	2, A3	Spring	Wood Springs is a group of two springs located in the northern Toiyabe Range, west of Bald Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1817	USGS 1998
501SW	2, A3	Spring	Upper Wood Spring is located in the northern Toiyabe Range, southwest of Bald Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3657	USGS 1998
502SW	2, A3	Spring	Upper Wood Spring No. 2 is located in the northern Toiyabe Range, southwest of Bald Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4232	USGS 1998
503SW	2, A3	Spring	Mud Spring is located in the northern Toiyabe Range, south of Upper Wood Spring No. 2 (502SW).	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4958	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
504SW	2, A2	Spring	Summit Spring is located west of the corridor, south of Red Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	931	USGS 1998
277SS1	2, A2	BLM Sensitive Species	A ferruginous hawk nesting area is located west of the corridor, south of Red Mountain.	Avoid hawk nesting area by 3.2 km	2.2.2 Moderate	3270	BLM[1]
505SW	2, A3	Spring	Dry Canyon Spring is located east of the corridor, west of Hot Springs Point.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	446	USGS 1998
69PA2	2, C3	Seasonal Game Habitat/Use Area	Mule deer summer habitat is located throughout most of the northern Toiyabe Range, west of Grass Valley and the corridor.	Avoid when possible	2.2.2 Low	1634	BLM 1983a
506SW	2, B2	Spring	An unnamed spring is located in the Toiyabe Range, east of Carico Lake Valley.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2545	USGS 1998
507SW	2, B2	Spring	An unnamed spring is located on the eastern slope of the Toiyabe Range.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2913	USGS 1998
509SW	2, B3	Spring	An unnamed spring is located on the eastern slope of the Toiyabe Range, southwest of Hot Spring Point.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	847	USGS 1998
508SW	2, B2	Spring	An unnamed spring is located on the east slope of the Toiyabe Range, west of Hot Springs Point.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4421	USGS 1998
291SS1	2, B3	BLM Sensitive Species	A ferruginous hawk nesting area is located east of the corridor, south of Hot Springs Point.	Avoid hawk nesting area by 3.2 km	2.2.2 Moderate	4052	BLM[1]
70PA2	2, B3	Seasonal Game Habitat/Use Area	Mule deer spring seasonal range is located approximately 5 km south of Hot Springs Point, east of the corridor.	Avoid when possible	2.2.2 Low	2020	BLM[1]

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
66PA1	2, B3	Important Game Habitat/Use Area	A sage grouse strutting ground is located approximately 3 km south of Hot Springs Point, east of the corridor.	Avoid when possible	2.2.2 Low	950	BLM[1]
511SW	2, B2	Spring	An unnamed spring is located on the east slope of the Toiyabe Range, west of Hot Springs Point.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4000	USGS 1998
510SW	2, B3	Spring	An unnamed group of three springs is located on the east slope of the Toiyabe Range, southwest of Hot Springs Point.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1900 – 2300	USGS 1998
62PA2	2, B3	Seasonal Game Habitat/Use Area	Mule deer spring seasonal range is located east of the corridor, in Grass Valley, west of the Simpson Park Mountains.	Avoid when possible	2.2.2 Low	1765	BLM[1]
63PA2	2, B3	Seasonal Game Habitat/Use Area	The corridor passes through mule deer spring seasonal range in Grass Valley, south of Hot Spring Point.	Avoid when possible	2.2.2 Low	within	BLM[1]
512SW	2, B2	Spring	Corral Spring is located west of the Toiyabe Range, in Corral Canyon.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4816	USGS 1998
513SW	2, B3	Spring	Cowboy Rest Spring is located on the eastern slope of the Toiyabe Range, in western Grass Valley.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4652	USGS 1998
71PA1	2, B3	Important Game Habitat/Use Area	A sage grouse strutting ground is located within the corridor in the Grass Valley, east of the Toiyabe Range.	Avoid when possible	2.2.2 Low	within	BLM[1]
678RA	2, B3	Riparian Area	Rosebush Creek, an intermittent riparian area, is west of the corridor flowing out of the eastern slope of the Toiyabe Range, in western Grass Valley, north of Mount Callaghan.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	1020	BLM[1]; Habitat verified 08/97
64PA2	2, B3	Seasonal Game Habitat/Use Area	A mule deer winter use area is located west of the corridor, on the eastern slope of the Toiyabe Range, north of Mount Callaghan.	Avoid when possible	2.2.2 Low	2293	BLM[1]

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
514SW	2, C3	Spring	An unnamed spring is located west of the corridor, on the eastern slope of the Toiyabe Range, north of Mount Callaghan.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4580	USGS 1998
278SS1	2, C3	BLM Sensitive Species	A ferruginous hawk nesting area is located within the corridor east of Mount Callaghan.	Avoid hawk nesting area by 3.2 km	2.2.2 Moderate	within	BLM[1]
675RA	2, C2	Riparian Area	North Fork Creek is a designated riparian area located west of the corridor, approximately 5 km northeast of Mount Callaghan.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	2500	BLM[1]
676RA	2, C2	Riparian Area	Portions of Skull Creek, which crosses the western alternate of the corridor east of Mount Callaghan, have been designated as riparian areas.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	within	BLM 1983a
65PA1	2, C2	Important Game Habitat/Use Area	A sage grouse strutting ground is located west of the corridor in southern Grass Valley, east of Mount Callaghan.	Avoid when possible	2.2.2 Low	1205	BLM[1]
515SW	2, C2	Spring	An unnamed spring is located west of the corridor, east of Mount Callaghan.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4800	USGS 1998
Not mapped	2, C2	Herd Use/ Management Area	The corridor crosses the Mount Callaghan wild horse and burro herd use area.	Mitigation may be necessary	2.2.2 Low	within	BLM 1983a
674RA	2, D2	Riparian Area	The corridor crosses Ox Corral Creek approximately 5 km north of the point where the two alternates converge. The creek is intermittent, and portions of it have been designated as riparian habitat. The creek was surveyed 8/97 and found to be dry with no riparian vegetation present.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	within	BLM 1983a; Habitat verified 8/97
279SS1	2, D2	BLM Sensitive Species	A ferruginous hawk nesting area is located west of the corridor, southeast of Mount Callaghan.	Avoid hawk nesting area by 3.2 km	2.2.2 Moderate	1098	BLM[1]

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
78PA3	2, D2	Crucial Game Habitat/Use Area	A sage grouse nesting area is located west of the corridor, south of Mount Callaghan and west of Bates Mountain.	Avoid when possible Mitigation may be necessary	2.1.3 Moderate	2613	BLM[1]
53PA2	2, C4 3, A3	Seasonal Game Habitat/Use Area	The Simpson Park Mountains, east of the corridor from McClusky Peak to U.S. Highway 50, is mule deer summer habitat.	Avoid when possible	2.2.2 Low	10	BLM 1983a
516SW	2, C4	Spring	A group of three unnamed springs is located east of the corridor, in the Simpson Park Mountains, northeast of Bates Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4257	USGS 1998
517SW	2, D3	Spring	A group of springs is located east of the corridor, on the western slope of the Simpson Park Mountains. The group contains three springs referred to as Cottonwood Springs, and a group of five unnamed springs in Salt Marsh Canyon.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3414	USGS 1998
673RA	2, D3	Riparian Area	Water Canyon, a designated riparian area, crosses the corridor, approximately 9 km northeast of Bates Mountain.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	within	BLM[1]; Habitat verified 8/97
688RA	2, D3	Riparian Area	The corridor crosses Steiner Creek, a designated riparian area. The creek was surveyed 08/97 and found to be dry and lacking riparian vegetation.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	within	BLM 1983a; Habitat verified 8/97
518SW	2, D3	Spring	A group of unnamed springs is located east of the corridor, on the western side of the Simpson Park Mountains, northeast of Bates Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2517	USGS 1998
54PA2	2, D2	Seasonal Game Habitat/Use Area	Pronghorn summer range is found south of the Simpson Park Mountains. The area borders the corridor to the east, around Bates Mountain.	Avoid when possible	2.2.2 Low	within	BLM 1983a
519SW	2, D3	Spring	A group of unnamed springs is located east of the corridor, on the western slope of the Simpson Park Mountains, north of Bates Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2494	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
520SW	2, D3	Spring	Bates Mountain Springs, a group of two springs; Indian Ranch Spring; and an unnamed spring are located east of the corridor in the Bates Mountain area.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2821	USGS 1998
521SW	2, D2	Spring	Rye Patch Spring is located west of the corridor, at the north entrance to Rye Patch Canyon, west of Bates Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	98	USGS 1998; Habitat verified 8/97
672RA	2, D2 3, A2	Riparian Area	The corridor crosses and parallels riparian area within Rye Patch Canyon, west of Bates Mountain.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	within	BLM 1983a; Habitat verified 8/97
522SW	2, D2	Spring	Bullrush Spring is located east of Rye Patch Canyon, west of Bates Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	696	USGS 1998
523SW	2, D2	Spring	Box Spring is located west of the corridor and Rye Patch Canyon.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4510	USGS 1998
524SW	2, D3	Spring	Long and Dry Creek springs are located east of the corridor, south of Bates Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4897	USGS 1998
526SW	3, A2	Spring	An unnamed spring is located west of the corridor and Rye Patch Canyon, north of U.S. Highway 50.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1685	USGS 1998
72PA1	3, A3	Important Game Habitat/Use Area	A sage grouse strutting ground is located at the southeast end of Rye Patch Canyon, within the corridor.	Avoid when possible	2.2.2 Low	within	BLM[1]
Primary Corridor: Austin to Mud Lake via Big Smoky Valley							
Not mapped	3, A3	Herd Use/ Management Area	The corridor crosses the Hickison Burro Use Area around Hickison Summit, west of Austin.	Mitigation may be necessary	2.2.2 Low	within	BLM 1983a

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
52PA2	3, A3	Seasonal Game Habitat/Use Area	The corridor crosses pronghorn winter range south of Hickison Summit, east of Austin, along U.S. Highway 50.	Avoid when possible	2.2.2 Low	2000	BLM 1983a
528SW	3, A2	Spring	Windlass Spring is located west of the corridor, southeast of Austin.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3780	USGS 1998
529SW	3, B2	Spring	Spencer Hot Springs is located east of the corridor and south of U.S. Highway 50.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2990	USGS 1998
46PA2	3, C2-C3	Seasonal Game Habitat/Use Area	East of the corridor, the central portion of the Toquima Range, along the Lander-Nye county line, is a mule deer winter use area.	Avoid when possible	2.2.2 Low	2500	BLM[1]
530SW	3, C2	Spring	A group of unnamed springs is located west of the corridor, south of the Nye-Lander county line.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4492	USGS 1998
531SW	3, D1	Spring	A group of 35 unnamed springs and associated riparian and marsh habitat are located west of the corridor, about 28 km north of Round Mountain on the east side of the Big Smoky Valley.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	826	USGS 1998
633SW	3, D1	Riparian Area	A wet meadow, marsh area has formed from the numerous associated springs (531SW) southwest of the Toquima Range, north of Round Mountain (Plate 4, B4).	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	620	USGS 1998
455SS7	3, D1	BLM Sensitive Species	The Big Smoky Valley speckled dace has been observed in several springs and outflows in a complex of springs and marsh habitat (531SW and 633SW), southwest of the Toquima Range and north of Round Mountain.	None known	2.2.2 Moderate	1100 –1750	NNHP 1997
539SW	3, D1	Spring	An unnamed spring is located west of the corridor in Big Smoky Valley, southwest of the Toquima Range, north of Round Mountain (Plate 4, B4).	Avoid springs by at least o.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4053	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
680RA	3, D1	Riparian Area	Moores Creek and the associated riparian habitat is east of the corridor, west of the Toquima Range, and north of Round Mountain.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	2479	USGS 1998; Field verified 8/97
558SW	3, D1	Spring	An unnamed spring is located west of the corridor in eastern Big Smoky Valley, north of Round Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4726	USGS 1998
679RA	4, A4	Riparian Area	Shipley (Barker) Creek, north of Carver's Station, passes west of the corridor. A portion of Shipley Creek is a designated riparian area; however, when surveyed in August 1997, neither riparian vegetation nor water was present.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	2937	BLM 1994a; Habitat verified 8/97
543SW	4, A3	Spring	A group of 9 unnamed springs is located west of the corridor, surrounding Carver's Station along S.R. 376.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2238	USGS 1998
544SW	4, B3	Spring	Antelope Spring is located west of the corridor, southwest of Round Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4106	USGS 1998
545SW	4, B3	Spring	Boyd Canyon Spring is located west of the corridor, southwest of Round Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4219	USGS 1998
547SW	4, B3	Spring	Coyote Hole Spring is located west of the corridor, and west of S.R. 376 and Manhattan.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1716	USGS 1998
546SW	4, B3	Spring	A group of 3 unnamed springs is located west of the corridor and west of S.R. 376 and Manhattan.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4799	USGS 1998
548SW	4, C3	Spring	A group of four unnamed springs is located west of Seyler Reservoir.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3165	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
280SS2	4, C3	Seasonal Game Habitat/Use Area	Waterfowl habitat is located around Seyler Reservoir. This habitat is an important stopover habitat for migratory waterfowl, shorebirds, and neotropical migrants.	Avoid when possible	2.2.2 Low	150	BLM[1]
628SW	4,C3	Riparian Area	Seyler Reservoir (intermittent or seasonal) is west of the corridor, west of Manhattan.	Avoid streams or water bodies by at least 0.4 km	2.1.2 Moderate, High if jurisdictional wetland	265	USGS 1998
629SW	4, C3	Spring	Mustang Spring is located west of the corridor, south of Seyler Reservoir, west of Manhattan.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	559	Field Identified (1997)
411SS1	4, C2	BLM Sensitive Species	A population of Nevada sanddune beardtongue is located in the Big Smokey Valley, southwest of Seyler Reservoir (628SW).	None known	2.2.2 Moderate	3856	NNHP 1997
463SS1	4, C3	BLM Sensitive Species	The San Antonio pocket gopher has been observed in the eastern Big Smoky Valley, southwest of Manhattan.	None known	2.2.2 Moderate	1206	NNHP 1997
Not mapped	4, C3	BLM Sensitive Species	The corridor crosses San Antonio pocket gopher habitat near in the eastern Big Smoky Valley, southwest of Manhattan.	None known	2.2.2 Moderate	within	BLM[2]
Not mapped	4	Game Habitat	Big Smoky Valley is year-round pronghorn habitat.	None known	2.2.2 Low	within	BLM[2]
293SS1	6, A2	BLM Sensitive Species	The Crescent Dune Aegialian Scarab has been found in Crescent Dunes, 15 Ml northwest of Tonopah.	None known	2.2.2 Moderate	1481	NNHP 1997
462SS1	6, A2	BLM Sensitive Species	The Crescent Dune Serican Scarab has been found in Crescent Dunes, 15 Ml northwest of Tonopah.	None known	2.2.2 Moderate	1481	NNHP 1997
Monitor Valley Secondary Corridor: Austin to Mud Lake via Monitor Valley							
Not mapped	3, A3	Herd Use/ Management Area	The corridor crosses the Hickison Burro Use Area around Hickison Summit, west of Austin.	Mitigation may be necessary	2.2.2 Low	within	BLM 1983a

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
52PA2	3, A3	Seasonal Game Habitat/Use Area	The corridor crosses pronghorn winter range south of Hickison Summit east of Austin, along U.S. Highway 50. The corridor also crosses a migration corridor for ungulates between the southern Simpson Park Range to the forests in the Toquima Range to the south.	None known	2.2.2 Low	within	BLM 1983a
527SW	3, A3	Spring	Ackerman Spring is located north of the corridor and south of Hickison Summit. Surveyed in 8/97 and found to be dry.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3798	USGS 1998; Field Verified 8/97
45PA1	3, A3	Important Game Habitat/Use Area	A sage grouse strutting ground is located northeast of the corridor, south of U.S. Highway 50.	Avoid when possible	2.2.2 Low	1480	BLM[1]
73PA2	3, A4	Seasonal Game Habitat/Use Area	The corridor crosses the western edge of a mule deer spring seasonal use area at the north end of the Monitor Valley southeast of Hickison Summit.	None known	2.2.2 Low	within	BLM 1983a
76PA2	3, A4	Seasonal Game Habitat/Use Area	A mule deer winter range is located inside the mule deer spring seasonal use area (73PA2).	Avoid when possible	2.2.2 Low	2061	BLM 1983a
Not mapped	3	Herd Use/ Management Area	The North Monitor Wild Horse and Burro Herd Management Area is located in the northern portion of Monitor Valley.	Mitigation may be necessary	2.2.2 Low	within	BLM 1983a
61PA1	3, B3	Important Game Habitat/Use Area	The corridor crosses a sage grouse strutting ground in the Monitor Valley, northeast of the Toquima Range.	Avoid when possible	2.2.2 Low	within	BLM[1]
46PA2	3, C3	Seasonal Game Habitat/Use Area	West of the corridor, the central portion of the Toquima Range, along the Lander-Nye county line, is a mule deer winter use area.	Avoid when possible	2.2.2 Low	2735	BLM[1]
Not mapped	3	Game Habitat	The eastern slopes of Monitor Valley are pronghorn year-round habitat.	None known	2.2.2 Low	within	BLM[2]
47PA3	3, C4	Crucial Game Habitat/Use Area	The corridor crosses a sage grouse nesting area in the Monitor Valley.	Avoid when possible	2.2.2 Low	within	BLM[1]

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
48PA2	3, C3	Seasonal Game Habitat/Use Area	A mule deer winter use area is located west of the corridor and east of the Toquima Range.	Avoid when possible	2.2.2 Low	723	BLM[1]
532SW	3, C3	Spring	Mud Spring is located west of the corridor on the eastern slope of the Toquima Range.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3227	USGS 1998
533SW	3, C3	Spring	Johnny Potts Spring is located south of Mud Spring (532SW), west of the corridor and east of the Toquima Range.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4800	USGS 1998
534SW	3, C4	Spring	A group of seven unnamed springs is located east of the corridor and east of the Toquima Range, south of the Lander-Nye county line.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2512	USGS 1998
536SW	3, C3	Spring	An unnamed spring is located west of the corridor and east of the Toquima Range.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2991	USGS 1998
537SW	3, C4	Spring	An unnamed hot spring is located east of the corridor and east of the Toquima Range, south of the Lander-Nye county line.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1965	USGS 1998
671RA	3, C4	Riparian Area	A riparian area, which is an outflow of the above spring, is located east of the corridor, and east of the Toquima Range.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	1785	BLM[1]; Habitat verified 08/97
49PA3	3, C4	Crucial Game Habitat/Use Area	A sage grouse nesting area is located east of the corridor and east of the Toquima Range.	Avoid when possible	2.2.2 Low	2393	BLM[1];
538SW	3, D4	Spring	Diana's Punch Bowl consists of 2 hot springs and a pool located east of the corridor and east of the Toquima Range and south of the Lander-Nye county line.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1900	USGS 1998
456SS1	3, D4	BLM Sensitive Species	Speckled dace have been observed in the outflow from Diana's Punch Bowl (538SW).	None known	2.2.2 Moderate	2100	BLM[1] Habitat verified 8/97

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
540SW	3, D4	Spring	An unnamed hot spring is located east of the corridor and east of the Toquima Range.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	654	USGS 1998
541SW	3, D4	Spring	A group of 3 unnamed springs is located east of the corridor and east of the Toquima Range.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1846	USGS 1998
542SW	3, D3	Spring	A group of 3 unnamed springs is located west of the corridor and east of the Toquima Range.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3503	USGS 1998
44PA1	3, D3	Game Habitat/Use Area	Sage grouse habitat is located east of the corridor, east of the Toquima Range.	Avoid when possible	2.2.2 Low	132	BLM 1994a
40PA3	5, A2	Crucial game habitat/use areas	A sage grouse nesting area is located east of the corridor, northeast of Mount Jefferson.	Avoid when possible	2.1.3 Moderate	3511	BLM[2]
41PA1	5, A2	Important game habitat/use area	Sage grouse habitat is located approximately 15 km north of the Monitor Range.	Not known	2.2.2 Low	3074	BLM 1994a
Not mapped		Riparian Area	A designated riparian area is within this sage grouse habitat area.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if jurisdictional wetland	3070	BLM 1994a
550SW	5, A2	Spring	A group of 5 unnamed springs is located north of Belmont, east of Mount Jefferson.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2355	USGS 1998
42PA1	5, A2	Important game habitat/use area	Designated Sage grouse habitat is located approximately 15 km northwest of the Monitor Range.	Not known	2.2.2 Low	2092	BLM 1994a
Not mapped		Riparian Area	Within this area there is a designated riparian are along Pine Creek.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if jurisdictional wetland	2090	BLM 1994a

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
343SS1	5, A2	BLM Sensitive Species	The pygmy rabbit has been observed in the Monitor Valley approximately 14 km east of Mount Jefferson.	None known	2.2.2 Moderate	2724	NNHP 1997
43PA1	5, B2	Important game habitat/use area	The corridor crosses designated sage grouse habitat in Monitor Valley, north of Belmont.	None known	2.2.2 Low	within	BLM 1994a
683RA	5, B2	Riparian Area	A designated riparian area is located west of the corridor, northwest of Belmont. Surveyed in 8/97 and found to be dry with no riparian vegetation present.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	216	BLM 1994a; Habitat verified 8/97
551SW	5, B2	Spring	An unnamed spring is located along the designated riparian area (683RA), west of the corridor, north of Belmont.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3758	USGS 1998
682RA	5, B2	Riparian Area	Barley Creek, a designated riparian area, is located east of the corridor and northeast of Belmont. Surveyed in 8/97 and found to be dry with no riparian vegetation present.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	2179	BLM 1994a; Habitat verified 08/97
50PA1	5, B2	Important game habitat/use area	Designated sage grouse habitat is located east of the corridor in Monitor Valley, east of Belmont.	None known	2.2.2 Low	3551	BLM 1994a
56PA1	5, B2	Important game habitat/use	The corridor crosses sage grouse habitat in Monitor Valley northeast of Belmont.	None known	2.2.2 Low	within	BLM 1994a
Not mapped	5, B2-C2	Game Habitat	The corridor crosses elk habitat on the eastern slopes of the Monitor Range, east of Belmont.	None known	2.2.2 Low	within	BLM 1994a
57PA1	5, C2	Important game habitat/use	Sage grouse habitat is located east of the corridor in the southern portion of Monitor Valley, east of Belmont.	None known	2.2.2 Low	3095	BLM 1994a
552SW	5, B1	Spring	Combination Spring is located west of the corridor, north of Belmont.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3402	USGS 1998
553SW	5, B1	Spring	Mexican Spring is located west of Belmont.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4954	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
556SW	5, C1	Spring	A group of four unnamed springs is located along a designated riparian area (681RA) approximately 11 km south of Belmont, in the northern portion of Ralston Valley.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3599	USGS 1998
681RA	5, C1	Riparian Area	A designated riparian area is located approximately 11 km south of Belmont, in the northern portion of Ralston Valley. Surveyed in 8/97 and found to be dry and lacking riparian vegetation.	Avoid riparian areas by at least 0.4 km	2.1.2 Moderate, High if a jurisdictional wetland	2383	BLM 1994a; Habitat verified 08/97
554SW	5, C1	Spring	Keller Spring is located southwest of Belmont.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4891	USGS 1998
555SW	5, C1	Spring	Stewart Spring is located west of the corridor, southwest of Belmont.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4342	USGS 1998
557SW	5, C1	Spring	An unnamed Spring is located east of the corridor in Ralston Valley, west of Hat Peak.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1119	USGS 1998
549SW	4, C4	Spring	Spanish Spring is west of the corridor in Ralston Valley, about 20 km southwest of Belmont, and south of Manhattan.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4672	USGS 1998
Not mapped	4-5	Herd Use/ Management Area	The Saulsbury Wild Horse and Burro Herd Management Area is located in Ralston Valley, from Hunt's Canyon south to Thunder Mountain, along the western edge of the Monitor Range.	Mitigation measures may be necessary	2.2.2 Low	within	BLM 1994a
322SS1	4, D4	BLM Sensitive Species	A population of Eastwood milkweed is located west of the corridor approximately 30 km south of Manhattan, 25 km northeast of Tonopah.	None known	2.2.2 Moderate	4212	NNHP 1997
Mud Lake to Yucca Mountain: See Appendix E							

[1] personal communication, D. Crimmins and C. Stubbs, BLM Battle Mountain District Office, January 22, 1997, MOL.19990208.0118, MOL.199990208.0119.

[2] personal communication, M. Sweeney, BLM Tonopah Field Office, February 14, 1997, MOL.1990208.0113, MOL.19990208.0117, MOL.19990208.0175.

APPENDIX G

BIOLOGICAL RESOURCES WITHIN 5 KM OF THE POTENTIAL CALIENTE-CHALK MOUNTAIN RAIL CORRIDOR

(Map ID numbers in the table are shown on maps YMP-97-073.3, YMP-97-087.3, and YMP-97-088.3, Attachment 1)

Map ID	Plate, Quad	Resource category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Caliente to Sand Spring Valley (Rachel): see Appendix E							
Rachel to Groom Pass							
574SW	8, B4	Spring	Mud Spring is located on the south slope of the Quinn Canyon Range.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3192	USGS 1998
60PA2	8, B4	Seasonal game habitat/use area	The first 2 km of this portion of the corridor crosses the mule deer winter use area located in the Worthington Mountains and Quinn Canyon Range.	None known	2.2.2 Low	within	BLM 1979
Not Mapped	8, B3	Game Habitat	The area along the western edge of Sand Spring Valley, southeast of the Quinn Canyon Range, south through Emigrant Valley, is a pronghorn year-round use area.	None known	2.2.2 Low	within	BLM 1979; BLM 1992a
580SW	8, D3	Spring	An unnamed spring is located on the west slope of Chalk Mountain, east of Belted Peak.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4662	USGS 1998
581SW	8, D3	Spring	White Blotch Spring, a pair of springs, is located on the west slope of Chalk Mountain, east of Belted Peak.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2334	USGS 1998
Not Mapped	19, B4	Game Habitat	The corridor enters mule deer year-round habitat north of Groom Pass.	None known	2.2.2 Low	within	BLM 1992a
Primary Corridor: Groom Pass to Yucca Mountain via Western Yucca Flat							
114SS1	19, C4	BLM Sensitive Species	Ripley's springparsley has been found in northern Yucca Flat, south of the corridor.	None known	2.2.2 Moderate	2557	Blomquist et al. 1995
621SW	19, B3	Spring	Tub Spring is located in the Rhyolite Hills, northwest of Groom Pass.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1681	USGS 1998

Map ID	Plate, Quad	Resource category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
392SS1	19, B3	BLM Sensitive Species	Hilend's bedstraw has been found about 200 m north of Tub Spring, at the southeast base of Oak Spring Butte.	None known	2.2.2 Moderate	1971	NNHP 1997
619SW	19, B3	Spring	Oak Springs are located east of Burnt Mountain northwest of Groom Pass.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3555	USGS 1998
111SS1	19, B3	BLM Sensitive Species	Hilend's bedstraw has been found southwest of Oak Springs, east of Burnt Mountain.	None known	2.2.2 Moderate	3450	Blomquist et al. 1995
393SS1	19, B3	BLM Sensitive Species	Hilend's bedstraw has been found northwest of Oak Springs.	None known	2.2.2 Moderate	4112	NNHP 1997
622SW	19, B3	Spring	Whiterock Spring is found north of the corridor, south of Burnt Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	560	USGS 1998
425SS1	12, A4 19, B3	BLM Sensitive Species	Paiute beardtongue has been found downstream of the aqueduct, south of Aqueduct Mesa, about 2 km west of the east peak of Twin Peaks, west of Burnt Mountain.	None known	2.2.2 Moderate	3712	NNHP 1997
113SS1	12, A4 19, B3	BLM Sensitive Species	Paiute beardtongue has been found east of Gold Meadows, west of the corridor.	None known	2.2.2 Moderate	4995	Blomquist et al. 1995
623SW	12, B4 19, C3	Spring	An unnamed spring is located east of Ranier Mesa, south of Twin Peaks, on the Nevada Test Site.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1566	USGS 1998
624SW	12, B4 19, C3	Spring	Captain Jack Spring is located at the north end of the Eleana Range, on the Nevada Test Site.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2213	USGS 1998
116SS1	12, B4 19, C3	BLM Sensitive Species	Clokey's egg milkvetch has been found near Captain Jack Spring.	None known	2.2.2 Moderate	1291	Blomquist et al. 1995

Map ID	Plate, Quad	Resource category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
115SS1	12, B4 19, C3	BLM Sensitive Species	Clokey's egg milkvetch has been found west of Captain Jack Spring, in the Eleana Range.	None known	2.2.2 Moderate	292	Blomquist et al. 1995
391SS1	12, B4 19, C2	BLM Sensitive Species	Hilend's bedstraw has been found in the Eleana Range, west of Captain Jack Spring.	None known	2.2.2 Moderate	4904	NNHP 1997
394SS1	12, B4 19, C2	BLM Sensitive Species	Hilend's bedstraw has been found in the Eleana Range, west of Captain Jack Spring.	None known	2.2.2 Moderate	4570	NNHP 1997
120SS1	12, B4 19, C2	BLM Sensitive Species	Paiute beardtongue has been found west of Captain Jack Spring, in the Eleana Range.	None known	2.2.2 Moderate	4889	Blomquist et al. 1995
121SS1	12, B4 19, C2	BLM Sensitive Species	The Paiute beardtongue has been found west of Captain Jack Spring, in the Eleana Range.	None known	2.2.2 Moderate	4900	Blomquist et al. 1995
376SS1	19, C3	BLM Sensitive Species	Ripley's springparsley has been found near Paiute Mesa Road in the western portion of Yucca Flat, west of BJ Wye.	None known	2.2.2 Moderate	42	NNHP 1997
146SS1	19, C3	BLM Sensitive Species	Ripley's springparsley is found east of the corridor, west of BJ Wye in Yucca Flat.	None known	2.2.2 Moderate	838	Blomquist et al. 1995
626SW	12, C4 19, C2	Spring	Tippipah Spring is located west of the corridor, northeast of Shoshone Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3866	USGS 1998
426SS1	12, C4 19, D2	BLM Sensitive Species	Paiute beardtongue has been found around the Shoshone Mountain and west of Midway Valley.	None known	2.2.2 Moderate	3718	NNHP 1997 Blomquist et al. 1995
185SS1	12, C4 19, D2	BLM Sensitive Species	Paiute beardtongue has been found south of Shoshone Mountain.	None known	2.2.2 Moderate	4698	Blomquist et al. 1995
188SS1	12, C4 19, D2	BLM Sensitive Species	Funeral Mountain milkvetch has been found south of Shoshone Mountain.	None known	2.2.2 Moderate	2611	Blomquist et al. 1995
209SS1	12, D4 19, D2	BLM Sensitive Species	Funeral Mountain milkvetch has been found in several areas south of Shoshone Mountain.	None known	2.2.2 Moderate	1500 – 2470	NNHP 1997; Blomquist et al. 1995

Map ID	Plate, Quad	Resource category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
210SS1	12, D4 19, D2	BLM Sensitive Species	Funeral Mountain milkvetch has been found south of Shoshone Mountain.	None known	2.2.2 Moderate	1700	Blomquist et al. 1995
334SS1	12, D4 19, D2	BLM Sensitive Species	Funeral Mountain milkvetch has been found south of Shoshone Mountain.	None known	2.2.2 Moderate	2470	NNHP 1997; Blomquist et al. 1995
368SS1	12, D4 19, D2	BLM Sensitive Species	Largeflower suncup has been found south of Shoshone Mountain.	None known	2.2.2 Moderate	846	NNHP 1997
369SS1	12, D4 20, A2	BLM Sensitive Species	Largeflower suncup has been found south of Shoshone Mountain.	None known	2.2.2 Moderate	1260	NNHP 1997
Central Secondary Corridor: Groom Pass to Yucca Mountain via Central Yucca Flat							
114SS1	19, C4	BLM Sensitive Species	Ripley's springparsley has been found south of the corridor in northern Yucca Flat, southwest of Groom Pass.	None known	2.2.2 Moderate	2557	Blomquist et al. 1995
380SS1	19, C3	BLM Sensitive Species	Ripley's springparsley has been found about 4 km north of BJ Wye, in Yucca Flat.	None known	2.2.2 Moderate	1258	NNHP 1997
379SS1	19, C3	BLM Sensitive Species	Ripley's springparsley has been found about 4 km northwest of BJ Wye, in Yucca Flat.	None known	2.2.2 Moderate	1049	NNHP 1997, Blomquist et al. 1995
378SS1	19, C3	BLM Sensitive Species	Ripley's springparsley has been found about 4 km northwest of BJ Wye, in Yucca Flat.	None known	2.2.2 Moderate	1805	NNHP 1997
377SS1	19, C3	BLM Sensitive Species	Ripley's springparsley has been found in Yucca Flat about 1 km northwest of BJ Wye.	None known	2.2.2 Moderate	255	NNHP 1997, Blomquist et al. 1995
375SS1	19, C3	BLM Sensitive Species	Ripley's springparsley has been found about 1 km west-northwest of BJ Wye, in Yucca Flat.	None known	2.2.2 Moderate	1007	NNHP 1997
152SS1	19, C3	BLM Sensitive Species	Ripley's springparsley has been found west of Yucca Flat.	None known	2.2.2 Moderate	within	Blomquist et al. 1995

Appendix G. Biological resources Within 5 km of the Potential Caliente-Chalk Mountain Rail Corridor (Continued)

Map ID	Plate, Quad	Resource category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
154SS1	19, C3	BLM Sensitive Species	Ripley's springparsley has been found west of Yucca Flat.	None known	2.2.2 Moderate	within	Blomquist et al. 1995
364SS1	19, D3	BLM Sensitive Species	Largeflower suncup has been found in Yucca Pass at the southern end of Yucca Flat.	None known	2.2.2 Moderate	287	NNHP 1997
365SS1	19, D3	BLM Sensitive Species	Largeflower suncup has been found in Yucca Pass at the southern end of Yucca Flat.	None known	2.2.2 Moderate	636	NNHP 1997
627SW	20, A3	Spring	Cane Spring is located on the north slope of Skull Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	769	USGS 1998
453SS1	20, A3	BLM Sensitive Species	The Oasis Valley springsnail has been found in Cane Spring, on the north slope of Skull Mountain.	None known	2.2.2 Moderate	803	NNHP 1997
366SS1	20, A3	BLM Sensitive Species	Largeflower suncup has been found near Cane Spring, on the north slope of Skull Mountain.	None known	2.2.2 Moderate	1013	NNHP 1997
403SS1	12, D3 20, A2	BLM Sensitive Species	The long-legged myotis has been observed at the Yucca Mountain Field Operations Center (FOC) building in Jackass Flats.	None known	2.2.2 Moderate	3539	NNHP 1997
Eastern Secondary Corridor: Groom Pass to Yucca Mountain via Eastern Yucca Flat							
114SS1	19, C4	BLM Sensitive Species	Ripley's springparsley has been found in northern Yucca Flat, south of the corridor.	None known	2.2.2 Moderate	2557	Blomquist et al. 1995
349SS1	19, C4	BLM Sensitive Species	Largeflower suncup has been found in eastern Yucca Flat, west of Halfpint Range.	None known	2.2.2 Moderate	within	NNHP 1997
122SS1	19, C4	BLM Sensitive Species	Beatley's scorpionweed has been found east of Yucca Flat in the Halfpint Range, east of Banded Mountain.	None known	2.2.2 Moderate	4726	Blomquist et al. 1995
123SS1	19, C4	BLM Sensitive Species	Beatley's scorpionweed has been found east of Yucca Flat in the Halfpint Range, east of Banded Mountain.	None known	2.2.2 Moderate	4373	Blomquist et al. 1995

Appendix G. Biological resources Within 5 km of the Potential Caliente-Chalk Mountain Rail Corridor (Continued)

Map ID	Plate, Quad	Resource category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
427SS1	19, C4	BLM Sensitive Species	Beatley's scorpionweed has been found in eastern Yucca Flat in the northern Halfpint Range, southeast of Banded Mountain.	None known	2.2.2 Moderate	2080	NNHP 1997
350SS1	19, C4	BLM Sensitive Species	Largeflower suncup has been found on the west side of Halfpint Range, east of Yucca Flat, about 1.5 km northwest of Reitman's Seep (625SW).	None known	2.2.2 Moderate	752	NNHP 1997
429SS1	19, C4	BLM Sensitive Species	Beatley's scorpionweed has been found on the west slope of Halfpint Range, 1 km north of Reitman's Seep.	None known	2.2.2 Moderate	500	NNHP 1997
430SS1	19, C4	BLM Sensitive Species	Beatley's scorpionweed has been found in Yucca Flat, near Reitman's Seep.	None known	2.2.2 Moderate	1742	NNHP 1997
348SS1	19, C4	BLM Sensitive Species	Largeflower suncup has been found east of Yucca Flat about 700 m north of Reitman's Seep (625SW).	None known	2.2.2 Moderate	1299	NNHP 1997
431SS1	19, C4	BLM Sensitive Species	Beatley's scorpionweed has been found in Yucca Flat around Reitman's Seep.	None known	2.2.2 Moderate	1184	NNHP 1997
625SW	19, C4	Spring	Reitman's Seep is found in eastern Yucca Flat, east of BJ Wye.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	955	USGS 1998
432SS1	19, C4	BLM Sensitive Species	Numerous groups of Largeflower suncup and Beatley's scorpionweed have been found in Yucca Flat southeast of Reitman's Seep.	None known	2.2.2 Moderate	1090-1620	NNHP 1997; Blomquist et al. 1995
351SS1	19, C4	BLM Sensitive Species	Largeflower suncup has been found in eastern Yucca Flat, west of Halfpint Range.	None known	2.2.2 Moderate	67	NNHP 1997
352SS1	19, C4	BLM Sensitive Species	Largeflower suncup has been found in eastern Yucca Flat, about 5 km east of BJ Wye.	None known	2.2.2 Moderate	473	NNHP 1997
381SS1	19, C4	BLM Sensitive Species	Ripley's springparsley has been found in several locations adjacent to and east of the corridor in eastern Yucca Flat, east of BJ Wye.	None known	2.2.2 Moderate	within – 280	NNHP 1997

Map ID	Plate, Quad	Resource category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
433SS1	19, C4	BLM Sensitive Species	Beatley's scorpionweed has been found in eastern Yucca Flat, west of Halfpint Range, east of BJ Wye.	None known	2.2.2 Moderate	437	NNHP 1997
428SS1	19, C4	BLM Sensitive Species	Beatley's scorpionweed has been found in eastern Yucca Flat, west of Halfpint Range.	None known	2.2.2 Moderate	1664	NNHP 1997
434SS1	19, C4	BLM Sensitive Species	Beatley's scorpionweed has been found in eastern Yucca Flat, east of BJ Wye.	None known	2.2.2 Moderate	2180	NNHP 1997
353SS1	19, C4	BLM Sensitive Species	Largeflower suncup has been found at 7 small sites west of Halfpint Range about 6 km east of BJ Wye.	None known	2.2.2 Moderate	1592	NNHP 1997
354SS1	19, C4	BLM Sensitive Species	Largeflower suncup has been found about 5.5 km east of BJ Wye.	None known	2.2.2 Moderate	232	NNHP 1997
355SS1	19, D4	BLM Sensitive Species	Largeflower suncup has been found at 3 small sites about 6.5 km east-southeast of BJ Wye in Yucca Flat.	None known	2.2.2 Moderate	275	NNHP 1997
435SS1	19, D4	BLM Sensitive Species	Beatley's scorpionweed has been found west of Halfpint Range in Yucca Flat, 6 km southeast of BJ Wye.	None known	2.2.2 Moderate	42	NNHP 1997
436SS1	19, D4	BLM Sensitive Species	Beatley's scorpionweed has been found in eastern Yucca Flat, northwest of Halfpint Range, 6 km southeast of BJ Wye.	None known	2.2.2 Moderate	339	NNHP 1997
356SS1	19, D4	BLM Sensitive Species	Largeflower suncup has been found about 8 km southeast of BJ Wye, in Yucca Flat.	None known	2.2.2 Moderate	74	NNHP 1997
437SS1	19, D4	BLM Sensitive Species	Beatley's scorpionweed has been found in eastern Yucca Flat, west of Halfpint Range.	None known	2.2.2 Moderate	317	NNHP 1997, Blomquist et al. 1995
357SS1	19, D4	BLM Sensitive Species	Largeflower suncup has been found in southeastern Yucca Flat, west of Halfpint Range, northeast of Yucca Lake.	None known	2.2.2 Moderate	546	NNHP 1997
438SS1	19, D4	BLM Sensitive Species	Beatley's scorpionweed has been found in southeastern Yucca Flat, northeast of Yucca Lake.	None known	2.2.2 Moderate	557	NNHP 1997

Appendix G. Biological resources Within 5 km of the Potential Caliente-Chalk Mountain Rail Corridor (Continued)

Map ID	Plate, Quad	Resource category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
358SS1	19, D4	BLM Sensitive Species	Largeflower suncup has been found in southeastern Yucca Flat, near the pass to Plutonium Valley.	None known	2.2.2 Moderate	2415	NNHP 1997
359SS1	19, D4	BLM Sensitive Species	Largeflower suncup has been found west of the corridor in southeastern Yucca Flat, east of Yucca Lake.	None known	2.2.2 Moderate	472	NNHP 1997
180SS1	19, D4	BLM Sensitive Species	Largeflower suncup has been found in west of the corridor in southeastern Yucca Flat, east of Yucca Lake.	None known	2.2.2 Moderate	687	Blomquist et al. 1995
360SS1	19, D4	BLM Sensitive Species	Largeflower suncup has been found about 1 km northeast of French Peak.	None known	2.2.2 Moderate	4149	NNHP 1997
442SS1	19, D4	BLM Sensitive Species	Beatley's scorpionweed has been found about 2 km southwest of French Peak.	None known	2.2.2 Moderate	901	NNHP 1997
363SS1	19, D4	BLM Sensitive Species	Largeflower suncup has been found about 1 km west-southwest of French Peak.	None known	2.2.2 Moderate	1305	NNHP 1997
443SS1	19, D4	BLM Sensitive Species	Beatley's scorpionweed has been found about 1.5 km southwest of French Peak.	None known	2.2.2 Moderate	1768	NNHP 1997
441SS1	19, D4	BLM Sensitive Species	Beatley's scorpionweed has been found in the Halfpint Range, 1.5 km southwest of French Peak.	None known	2.2.2 Moderate	1983	NNHP 1997
330SS1	19, D4	BLM Sensitive Species	Funeral Mountain milkvetch has been found in numerous areas on the slopes of French Peak.	None known	2.2.2 Moderate	3385	NNHP 1997, Blomquist et al. 1995
361SS1	19, D4	BLM Sensitive Species	Largeflower suncup has been found near the summit of French Peak.	None known	2.2.2 Moderate	3801	NNHP 1997
362SS1	19, D4	BLM Sensitive Species	Largeflower suncup has been found 2 km south-southeast of French Peak.	None known	2.2.2 Moderate	4054	NNHP 1997
627SW	20, A3	Spring	Cane Spring is located on the north slope of Skull Mountain.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	769	USGS 1998

Appendix G. Biological resources Within 5 km of the Potential Caliente-Chalk Mountain Rail Corridor (Continued)

Map ID	Plate, Quad	Resource category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
453SS1	20, A3	BLM Sensitive Species	The Oasis Valley springsnail has been found in Cane Spring, on the north slope of Skull Mountain.	None known	2.2.2 Moderate	803	NNHP 1997
366SS1	20, A3	BLM Sensitive Species	Largeflower suncup has been found near Cane Spring, on the north slope of Skull Mountain.	None known	2.2.2 Moderate	1013	NNHP 1997
403SS1	12, D3 20, A2	BLM Sensitive Species	The long-legged myotis has been observed at the Yucca Mountain Field Operations Center building in Jackass Flats.	None known	2.2.2 Moderate	3539	NNHP 1997
Not Mapped	19, 20	Federally Threatened Species	Desert tortoises are found on the Nevada Test Site south of Yucca Flat to Yucca Mountain	Mitigation may be necessary	2.2.2 Moderate	within	Rautenstrauch, et al. 1994

APPENDIX H

BIOLOGICAL RESOURCES WITHIN 5 KM OF THE POTENTIAL JEAN RAIL CORRIDOR

(Map ID numbers in the table are shown on maps YMP-97-077.3 through YMP-97-082.3, Attachment 1)

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Primary Corridor: Jean to Pahrump via Wilson Pass							
Not mapped		Federally Threatened Species	The entire corridor is within the range of the desert tortoise.	Mitigation may be necessary	2.1.1 Moderate	within	Bury et al. 1994
407SS1	17, C2	BLM Sensitive Species	White-margined beardtongue has been found south of Jean and east of I-15.	None known	2.2.2 Moderate	3796	NNHP 1997
274SS1	17, C2	BLM Sensitive Species	White-margined beardtongue has been found south of Jean and east of I-15.	None known	2.2.2 Moderate	2500	BLM 1998
387SS1	17, C2	BLM Sensitive Species	Sheep fleabane has been found southeast of Jean.	None known	2.2.2 Moderate	3610	NNHP 1997
409SS1	17, C2	BLM Sensitive Species	White-margined beardtongue has been found south of Jean.	None known	2.2.2 Moderate	1562	NNHP 1997
272SS1	17, C2	BLM Sensitive Species	Pinto (yellow) beardtongue has been found near Jean, east of I-15.	None known	2.2.2 Moderate	within	BLM 1998
410SS1	17, C2	BLM Sensitive Species	White-margined beardtongue has been found in the dry lake east of Jean.	None known	2.2.2 Moderate	3825	NNHP 1997
414SS1	17, C2	BLM Sensitive Species	Pinto (yellow) beardtongue has been found north of Jean between I-15 and the frontage road.	None known	2.2.2 Moderate	509	NNHP 1997
268SS1	17, C2	BLM Sensitive Species	Pinto (rosy) beardtongue has been found north of Jean and east of I-15.	None known	2.2.2 Moderate	within	BLM 1998
266SS1	17, C1	BLM Sensitive Species	Pinto (rosy) beardtongue has been found near Jean, west of I-15 and north of S.R. 161.	None known	2.2.2 Moderate	1276	BLM 1998
271SS1	17, C1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found west of I-15 and south of S.R. 161.	None known	2.2.2 Moderate	2334	BLM 1998
12PA2	17, B2	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located west of I-15 and east of the Bird Spring Range.	None known	2.2.2 Low	1804	BLM 1998
273SS1	17, C1	BLM Sensitive Species	Pinto (rosy) beardtongue has been found near S.R. 161 between Jean and Goodsprings.	None known	2.2.2 Moderate	3121	BLM 1998
397SS1	17, C1	BLM Sensitive	The banded gila monster has been found south of the corridor near Goodsprings.	None known	2.2.2 Moderate	2480	NNHP 1997
267SS1	17, C1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found near S.R. 161 between Jean and Goodsprings.	None known	2.2.2 Moderate	1654	BLM 1998
417SS1	17, C1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found along S.R. 161 between Jean and Goodsprings,	None known	2.2.2 Moderate	1839	NNHP 1997

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
270SS1	17, C1	BLM Sensitive Species	Pinto (rosy) beardtongue has been found south of corridor and south of S.R. 161 between Jean and Goodsprings.	None known	2.2.2 Moderate	2390	BLM 1998
264SS1	17, C1	BLM Sensitive Species	Pinto (rosy) beardtongue has been found near S.R. 161 between Jean and Goodsprings.	None known	2.2.2 Moderate	762	BLM 1998
Not mapped	17	Herd Management Area	The corridor crosses the Red Rocks wild horse and burrow management area northeast of Goodsprings, south of the Spring Mountains.	Mitigation may be necessary	2.2.2 Low	within	BLM 1998
16PA2	17, B1	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located northeast of Goodsprings in the south end of the Bird Spring Range.	None known	2.2.2 Low	37	BLM 1998
not mapped	17, B1	Seasonal Game Habitat/Use Area	The corridor crosses a bighorn sheep migration corridor between habitat in the Bird Spring Range (16PA2) and the Spring Mountains (15Pa2).	None known	2.2.2 Low	within	BLM 1992b
269SS1	17, C1	BLM Sensitive Species	The Pinto (yellow) beardtongue has been found south of S.R. 161 between Jean and Goodsprings.	None known	2.2.2 Moderate	1789	BLM 1998
265SS1	17, C1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found south of S.R. 161 between Jean and Goodsprings.	None known	2.2.2 Moderate	1771	BLM 1998
418SS1	17, B1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found east of Goodsprings.	None known	2.2.2 Moderate	772	NNHP 1997
421SS1	17, B1	BLM Sensitive Species	Pinto (rosy) beardtongue has been found east of Goodsprings.	None known	2.2.2 Moderate	772	NNHP 1997
15PA2	17, C1 16, B4	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located in the southern portion of the Spring Mountains. Parts of the northeastern edges of the habitat are within the corridor west of Wilson Pass.	None known	2.2.2 Low	within	BLM 1998
38PA3 18 PA3	17, B1	Crucial Game Habitat/Use Area	Crucial quail (38PA3) and chukar (18PA3) habitat is located in the southern end of the Bird Spring Range northeast of Goodsprings.	Avoid when possible	2.1.3 Moderate	4101	BLM 1998
340SS1	17, B1	BLM Sensitive Species	Spring Mountain milkvetch has been found in Goodsprings Valley.	None known	2.2.2 Moderate	960	NNHP 1997
14PA3	17, B1	Crucial Game Habitat/Use Area	Crucial bighorn habitat is located in the Bird Spring Range northeast of Goodsprings.	Avoid when possible	2.1.3 Moderate	1500	BLM 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
416SS1	17, B1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found north of Goodsprings.	None known	2.2.2 Moderate	1201	NNHP 1997
319SS1	17, B1	BLM Sensitive Species	Desert bearpoppy has been found in the Bird Spring Range.	None known	2.2.2 Moderate	2488	NNHP 1997
419SS1	17, B1	BLM Sensitive Species	Pinto (rosy) beardtongue has been found in the Bird Spring Range.	None known	2.2.2 Moderate	2488	NNHP 1997
263SS1	17, B1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found on the western edge of the Bird Spring Range.	None known	2.2.2 Moderate	1527	BLM 1998
262SS1	17, B1	BLM Sensitive Species	Pinto (rosy) beardtongue has been found in the Bird Spring Range.	None known	2.2.2 Moderate	2723	BLM 1998
17PA3	17, B1	Crucial Game Habitat/Use Area	Crucial Chukar habitat is located north of Goodsprings west of the Bird Springs Mountains.	Avoid when possible	2.1.3 Moderate	within	BLM 1998
607SW	17, B1	Spring	Wilson Tank is located on the west side of the Bird Spring Range.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3665	USGS 1998
33PA3	17, A1 16, B4 14, D4	Crucial Game Habitat/Use Area	Crucial quail habitat is located north and west of Wilson Pass in the southern end of the Spring Mountains.	Avoid when possible	2.1.3 Moderate	within	BLM 1998
27PA2	17, B1	Seasonal Game Habitat/Use Area	Mule deer winter habitat is located in and north of Wilson Pass, within 33PA3.	None known	2.2.2 Low	within	BLM 1998
608SW	17, B1	Spring	Aztec Tank is located west of the Bird Spring Range on the east side of the Spring Mountains.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3883	USGS 1998
10PA2	17, A1	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located north of Wilson Pass in the southern end of the Spring Mountains.	None known	2.2.2 Low	1290	BLM 1998
610SW	16, B4	Spring	Cave Spring is located north of Wilson Pass.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	1261	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
13PA3	16, B4	Crucial Game Habitat/Use Area	Crucial bighorn habitat is located in the Wilson Pass area and to the north on Potosi Mountain.	Avoid when possible	2.1.3 Moderate	within	BLM 1998
609SW	16, B4	Spring	Mexican Spring is located south of Potosi Mountain.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2616	USGS 1998
261SS1	16, B4	BLM Sensitive Species	Spring Mountain milkvetch has been found south of Potosi Mountain.	None known	2.2.2 Moderate	4257	BLM 1998
606SW	16, A4	Spring	Potosi Spring is located at the western base of Potosi Mountain.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4766	USGS 1998
398SS1	16, A4	BLM Sensitive Species	Allen's big-eared bats have been observed at Potosi Spring.	None known	2.2.2 Moderate	4577	NNHP 1997
402SS1	16, A4	BLM Sensitive Species	Fringed myotis have been observed at Potosi Spring.	None known	2.2.2 Moderate	4577	NNHP 1997
404SS1	16, A4	BLM Sensitive Species	Long-legged myotis have been observed at Potosi Spring.	None known	2.2.2 Moderate	4577	NNHP 1997
405SS1	16, A4	BLM Sensitive Species	Yuma myotis have been observed at Potosi Spring.	None known	2.2.2 Moderate	4577	NNHP 1997
451SS1	16, A4	BLM Sensitive Species	Townsend's big-eared bats have been observed at Potosi Spring.	None known	2.2.2 Moderate	4577	NNHP 1997
260SS1	16, A4	BLM Sensitive Species	Pinto (yellow) beardtongue has been found east of the intersection of the corridor and S.R. 160.	None known	2.2.2 Moderate	1276	BLM 1998
Not mapped	16	Herd Management Area	The corridor crosses the Wheeler Pass wild horse and burrow management area west of the Spring Mountains, southeast of Pahrump.	Mitigation may be necessary	2.2.2 Low	within	BLM 1998
36PA3	16, A4	Crucial Game Habitat/Use Area	Crucial quail habitat is located near Lovell Canyon on the west side of the Spring Mountains.	Avoid when possible	2.1.3 Moderate	2300	BLM 1998
23PA2	16, A3	Seasonal Game Habitat/Use Area	Mule deer winter range is located southwest of Lovell Canyon on the west side of the Spring Mountains.	None known	2.2.2 Low	2093	BLM 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
24PA3	16, A3	Crucial Game Habitat/Use Area	Mule deer crucial summer habitat is located on the northern edge of 23PA2, west of Lovell Canyon on the west side of the Spring Mountains.	Avoid when possible	2.1.3 Moderate	3821	BLM 1998
22PA2	14, D2 16, A3	Seasonal Game Habitat/Use Area	Mule deer winter range is located on the west slope of the Spring Mountains near Trout Canyon.	None known	2.2.2 Low	1645	BLM 1998
34PA3	14, D2 16, A3	Crucial Game Habitat/Use Area	Crucial quail habitat is located on the west slope of the Spring Mountains near Trout Canyon.	Avoid when possible	2.1.3 Moderate	4107	BLM 1998
Stateline Pass Secondary Corridor: Primm To Pahrump via Stateline Pass							
406SS1	17, C2	BLM Sensitive Species	The white-margined beardtongue has been east of the Borax Siding in Ivanpah Valley.	None known	2.2.2 Moderate	2965	NNHP 1997
415SS1	17, C1	BLM Sensitive Species	The Pinto (yellow) beardtongue has been found adjacent to I-15 southwest of the Borax siding.	None known	2.2.2 Moderate	1097	NNHP 1997
407SS1	17, C2	BLM Sensitive Species	The White-margined beardtongue has been found west of I-15 between the Borax Siding and Jean.	None known	2.2.2 Moderate	3796	NNHP 1997
39PA3	17, C1	Crucial Game Habitat/Use Area	Crucial Quail habitat is located near Roach east of I-15.	Avoid when possible	2.1.3 Moderate	2470	BLM 1998
15PA2	17, C1	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located in the southern end of the Spring Mountains.	None known	2.2.2 Low	within	BLM 1998
466SS1	17, D1	BLM Sensitive Species	Desert bearpoppy has been found south of Stateline Pass in California.	None known	2.2.2 Moderate	1167	California Dept. of Fish and Game 1997
472SS1	16, D4	BLM Sensitive Species	Desert bearpoppy has been found south of Stateline Pass in California.	None known	2.2.2 Moderate	3257	California Dept. of Fish and Game 1997
469SS1	16, D4	BLM Sensitive Species	Desert bearpoppy has been found in California.	None known	2.2.2 Moderate	2635	California Dept. of Fish and Game 1997

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
471SS1	16, D4	BLM Sensitive Species	Desert bearpoppy has been found in California.	None known	2.2.2 Moderate	4551	California Dept. of Fish and Game 1997
468SS1	16, D4	BLM Sensitive Species	Desert bearpoppy has been found in California.	None known	2.2.2 Moderate	3072	California Dept. of Fish and Game 1997
470SS1	16, D4	BLM Sensitive Species	Desert bearpoppy has been found in California.	None known	2.2.2 Moderate	4699	California Dept. of Fish and Game 1997
465SS1	16, D4	BLM Sensitive Species	Desert bearpoppy has been found in California.	None known	2.2.2 Moderate	3699	California Dept. of Fish and Game 1997
467SS1	16, D4	BLM Sensitive Species	Rusby's globemallow has been found in California.	None known	2.2.2 Moderate	4762	California Dept. of Fish and Game 1997
464SS1	16, C4	BLM Sensitive Species	Pahrump Valley buckwheat has been found southwest of the corridor in Sandy Valley, in California.	None known	2.2.2 Moderates	3012	California Dept. of Fish and Game 1997
388SS1	16, C4	BLM Sensitive Species	Pahrump Valley buckwheat has been found southwest of the corridor in Sandy Valley.	None known	2.2.2 Moderate	3644	NNHP 1997
389SS1	16, B4	BLM Sensitive Species	Pahrump Valley buckwheat has been found in the Mesquite Valley at the town of Sandy Valley.	None known	2.2.2 Moderate	451	NNHP 1997
37PA3	16, A2	Crucial Game Habitat/Use Area	Crucial quail habitat is located west of the corridor, between the Nevada/California border and the Nye/Clark county lines.	Avoid when possible	2.1.3 Moderate	2832	BLM 1998
3PA5	16, A2	ACEC	The Stump Spring ACEC is located southwest of the corridor, between the corridor and the Nevada/California border.	Land-disturbing activities prohibited in ACECs	2.1.3 High or Moderate	3730	BLM 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Pahrump To Yucca Mountain							
35PA3	14, D1	Crucial Game Habitat/Use Area	The corridor crosses crucial quail habitat east of Pahrump.	Avoid when possible	2.1.3 Moderate	within	BLM 1998
32PA3	14, D1	Crucial Game Habitat/Use Area	Crucial quail habitat is located east of Pahrump, along the western slopes of the Spring Mountains.	Avoid when possible	2.1.3 Moderate	879	BLM 1998
604SW	14, D1	Spring	Younis Spring is located near S.R. 160 in Pahrump.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2083	USGS 1998
21PA2	14, D1	Seasonal Game Habitat/Use Area	The corridor crosses the southern tip of mule deer winter range northeast of Pahrump, south of Wheeler Wash	None known	2.2.2 Low	within	BLM 1998
420SS1	14, D1	BLM Sensitive Species	Pinto (rosy) beardtongue has been found near Wheeler Wash, northeast of Pahrump.	None known	2.2.2 Moderate	2491	NNHP 1997
320SS1	14, D1	BLM Sensitive Species	Desert bearpoppy has been found near Wheeler Wash, northeast of Pahrump.	None known	2.2.2 Moderate	3403	NNHP 1997
31PA3	14, C1	Crucial Game Habitat/Use Area	Crucial quail habitat is located around Wheeler Wash on the northwestern side of the Spring Mountains.	Avoid when possible	2.1.3 Moderate	3998	BLM 1998
602SW	14, C1	Spring	Horse Springs, a group of five springs, is located on the Nye/Clark county line, in the northwestern Spring Mountains.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3236	USGS 1998
600SW	14, C1	Spring	Rainbow Spring is located northeast of the corridor, southeast of Mt. Stirling, in the northwestern Spring Mountains.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3323	USGS 1998
Not mapped	14	Herd Management Area	The corridor crosses the Johnnie wild horse and burrow management area west of the Spring Mountains, north of Pahrump.	Mitigation may be necessary	2.2.2 Low	within	BLM 1998
254SS1	14, C1	BLM Sensitive Species	Death Valley beardtongue has been found south of Mt. Stirling.	None known	2.2.2 Moderate	2195	BLM 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
424SS1	14, C1	BLM Sensitive Species	Death Valley beardtongue has been found south of Mt. Stirling.	None known	2.2.2 Moderate	2404	NNHP 1997
599SW	14, C1	Spring	Crystal Spring and associated unnamed springs are located south of Mt. Stirling.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3652	USGS 1998
598SW	14, B1 13, B4	Spring	Horseshutem Springs are located east of Mt. Stirling.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3137	USGS 1998
20PA3	13, B4	Crucial Game Habitat/Use Area	Mule deer crucial summer habitat is located at the northwestern end of the Spring Mountains.	Avoid when possible	2.1.3 Moderate	607	BLM 1998
30PA3	13, C4	Crucial Game Habitat/Use Area	Crucial quail habitat is located northeast of Johnnie, around and east of Mt. Schader.	Avoid when possible	2.1.3 Moderate	within	BLM 1998
390SS1	13, C4	BLM Sensitive Species	The redheaded sphecid wasp was observed adjacent to S.R. 160, near Johnnie.	None known	2.2.2 Moderate	1196	NNHP 1997
9PA2	13, C4	Seasonal Game Habitat/Use Areas	Bighorn sheep winter range is located on Mt. Montgomery, south and east of S.R. 160.	None known	2.2.2 Low	501	BLM 1998
not mapped	13, C4	Seasonal Game Habitat/Use Areas	The corridor crosses a potential migration corridor for bighorn sheep from Mt. Montgomery (9PA2) to currently unoccupied habitat in the northern end of the Spring Mountains.	None known	2.2.2 Low	within	BLM 1992b
461SS1	13, C4	BLM Sensitive Species	Woolly sage has been found on Mt. Montgomery.	None known	2.2.2 Moderate	1702	NNHP 1997
597SW	13, B4	Spring	Grapevine Spring is located east of Mt. Schader.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	3322	USGS 1998
454SS1	13, B4	BLM Sensitive Species	The Oasis Valley springsnail has been found in Grapevine Spring.	None known	2.2.2 Moderate	3246	NNHP 1997

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
596SW	13, B4	Spring	Kwichup Spring is located northeast of Mt. Schader.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4303	USGS 1998
1PA5	13, B3	ACEC	The Amargosa Mesquite ACEC is located west of S.R. 160 and south of U.S. 95.	Land-disturbing activities prohibited in ACEC	2.1.3 High or Moderate	1049	BLM 1998
252SS1	13, B3	BLM Sensitive Species	The desert bearpoppy has been found along the southern edge of the Specter Range just north of U.S. 95	None known	2.2.2 Moderate	5000	Blomquist, et al. 1995
253SS1	13, B3	BLM Sensitive Species	The white-margined beardtongue has been found south of the Specter Range and south of U.S. 95.	None known	2.2.2 Moderate	2798	Blomquist, et al. 1995
4PA2	13, A3	Seasonal Game Habitat/Use Areas	Bighorn sheep winter range is located in the western half of the Specter Range.	None known	2.2.2 Low	2537	BLM 1998
7PA2	13, A2	Seasonal Game Habitat/Use Areas	Bighorn sheep winter range is located south of U.S. 95 in the Skeleton Hills.	None known	2.2.2 Low	444	BLM 1998
5PA2	13, A3	Seasonal Game Habitat/Use Areas	Bighorn sheep winter range is located in the Striped Hills near the northwestern corner of the Nevada Test Site.	None known	2.2.2 Low	1870	BLM 1998
423SS1	13, A2	BLM Sensitive Species	The Death Valley beardtongue has been found in the Striped Hills, northeast of the town of Amargosa Valley.	None known	2.2.2 Moderate	3830	NNHP 1997

APPENDIX I

BIOLOGICAL RESOURCES WITHIN 5 KM OF THE POTENTIAL VALLEY MODIFIED RAIL CORRIDOR

(Map ID numbers in the table are shown on maps YMP-97-077.3 through YMP-97-080.3, Attachment 1)

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Not mapped		Federally Threatened Species	The entire route is within the range of the desert tortoise.	Mitigation may be necessary	2.1.1 Moderate	within	Bury et al. 1994
296SS1	15, C3	BLM Sensitive Species	California bearpoppy has been found just west of I-15, about 1–2 km northeast of the Apex interchange.	None known	2.2.2 Moderate	3065	NNHP 1997
306SS1	15, C3	BLM Sensitive Species	California bearpoppy has been found 0.6 km northeast of the Apex interchange, just west of I-15.	None known	2.2.2 Moderate	1769	NNHP 1997
301SS1	15, C3	BLM Sensitive Species	California bearpoppy has been found southeast of I-15, 1.4 km east to 1.4 km southeast of the Apex interchange.	None known	2.2.2 Moderate	2470	NNHP 1997
302SS1	15, C3	BLM Sensitive Species	California bearpoppy has been found 2 km east-southeast of the Apex interchange.	None known	2.2.2 Moderate	3453	NNHP 1997
305SS1	15, C3	BLM Sensitive Species	California bearpoppy has been found from 0.4 to 1 km southwest of the Apex interchange between I-15 and Las Vegas Blvd.	None known	2.2.2 Moderate	853	NNHP 1997
303SS1	15, C3	BLM Sensitive Species	California bearpoppy has been found 1.4 km south-southwest of the Apex interchange, west of Las Vegas Blvd.	None known	2.2.2 Moderate	2025	NNHP 1997
257SS1	15, C3	BLM Sensitive Species	California bearpoppy has been found 1.4 km south-southwest of the Apex interchange.	None known	2.2.2 Moderate	2745	BLM 1998
304SS1	15, D3	BLM Sensitive Species	California bearpoppy has been found 3.9 km south-southeast of the Apex interchange.	None known	2.2.2 Moderate	4539	NNHP 1997
258SS1	15, C3	BLM Sensitive Species	California bearpoppy has been found just east of I-15 between that highway and Las Vegas Blvd.	None known	2.2.2 Moderate	2238	BLM 1998
2PA5	15, D3	ACEC	Rainbow Gardens ACEC is found east of the route, northeast of Las Vegas.	Land-disturbing activities prohibited	2.1.3 High or Moderate	3700	BLM 1998
307SS1	15, D2	BLM Sensitive Species	California bearpoppy has been found in northern Las Vegas Valley, between I-15 and the railroad tracks and north of Range Road.	None known	2.2.2 Moderate	27	NNHP 1997
294SS1	15, D2	BLM Sensitive Species	California bearpoppy has been found adjacent to I-15 at Lamb Blvd.	None known	2.2.2 Moderate	1562	NNHP 1997
295SS1	15, D3	BLM Sensitive Species	California bearpoppy has been adjacent to Las Vegas Blvd.	None known	2.2.2 Moderate	3898	NNHP 1997

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
259SS1	15, C2	BLM Sensitive Species	California bearpoppy has been found south of the corridor, north of North Las Vegas, and northwest of the Valley Siding.	None known	2.2.2 Moderate	4952	BLM 1998
297SS1	15, C2	BLM Sensitive Species	California bearpoppy has been found in a semi-residential area in northern Las Vegas Valley.	None known	2.2.2 Moderate	2544	NNHP 1997
298SS1	15, C2	BLM Sensitive Species	California bearpoppy has been found in a semi-residential area in northern Las Vegas Valley, northwest of North Las Vegas.	None known	2.2.2 Moderate	2375	NNHP 1997
256SS1	15, C2	BLM Sensitive Species	Pinto (rosy) beardtongue has been found in northern Las Vegas Valley.	None known	2.2.2 Moderate	3084	BLM 1998
299SS1	15, C2	BLM Sensitive Species	California bearpoppy has been found in northern Las Vegas Valley.	None known	2.2.2 Moderate	1979	NNHP 1997
255SS1	15, C2	BLM Sensitive Species	Pinto (rosy) beardtongue has been found about 8 km east of Floyd Lamb State Park.	None known	2.2.2 Moderate	2347	BLM 1998
300SS1	15, C1	BLM Sensitive Species	California bearpoppy has been in northeastern Las Vegas Valley, northeast of Floyd Lamb State Park.	None known	2.2.2 Moderate	2005	NNHP 1997
630SW	15, C1	Stream/ Waterbody	Tule Spring, Mulberry Pond, and other water bodies are located in Floyd Lamb State Park, northwest Las Vegas.	Avoid streams or waterbodies by at least 0.4 km	1.1.1 Moderate	3962	USGS 1998
92TE1	15, C1	Federally Endangered Species	The Pahrump poolfish has been introduced into ponds at Tule Springs at Floyd Lamb State Park, northwestern Las Vegas.	Mitigation may be necessary	2.2.1 High	4160	BLM 1998
93TE1	15, C1	Federally Endangered Species	The razorback sucker has been introduced into Mulberry Pond, at Floyd Lamb State Park, south of the corridor.	Mitigation may be necessary	2.2.1 High	4281	NNHP 1997
605SW	15, B1	Spring	Corn Creek Spring is located north of the corridor within Desert National Wildlife Range, about 40 km northwest of Las Vegas.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	4518	USGS 1998
450SS1	15, B1	BLM Sensitive Species	The Townsend's big-eared bat has been observed near Corn Creek Springs pond.	None known	2.2.2 Moderate	4453	NNHP 1997
91TE1	15, B1	Federally Endangered Species	The Pahrump poolfish has been introduced into the ponds at Corn Creek Springs, about 40 km northwest of Las Vegas.	Mitigation may be necessary	2.2.1 High	4165	NNHP 1997, BLM 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
335SS1	14, C4	BLM Sensitive Species	Mojave milkvetch has been found at the mouth of Lucky Strike Canyon in the Spring Mountains, south of S.R. 156.	None known	2.2.2 Moderate	2755	NNHP 1997
19PA2	14, C4	Seasonal Game Habitat/Use Area	Mule deer winter habitat in the eastern slopes of the Spring Mountains borders the corridor from north of Las Vegas to south of Mercury.	None known	2.2.2 Low	525	BLM 1998
8PA2	14, C4	Seasonal Game Habitat/Use Areas	Bighorn sheep winter range is between S.R. 156 and S.R. 157, on the northeastern slopes of the Spring Mountains.	Avoid when possible	2.2.2 Low	3370	BLM 1998
Not mapped	14	Herd Management Area	The Indian Springs secondary corridor crosses the Wheeler Pass wild horse and burrow management area south of U.S. 95 around Indian Springs.	Mitigation may be necessary	2.2.2 Low	within	BLM 1998
336SS1	14, B3	BLM Sensitive Species	Mojave milkvetch has been found in the Spring Mountains southeast of Indian Springs, west of U.S. 95.	None known	2.2.2 Moderate	4381	NNHP 1997
337SS1	14, B3	BLM Sensitive Species	Mojave milkvetch has been found on Indian Ridge, south of the town of Indian Springs.	None known	2.2.2 Moderate	3398	NNHP 1997
338SS1	14, B3	BLM Sensitive Species	Mojave milkvetch has been found in the foothills south of the town of Indian Springs.	None known	2.2.2 Moderate	1905	NNHP 1997
339SS1	14, B2	BLM Sensitive Species	Mojave milkvetch has been found in the foothills south of the town of Indian Springs.	None known	2.2.2 Moderate	4397	NNHP 1997
309SS1	14, B2	BLM Sensitive Species	Desert bearpoppy has been found in the foothills south of the town of Indian Springs in the Spring Mountains.	None known	2.2.2 Moderate	1769	NNHP 1997
601SW	14, B3	Spring	Indian Spring is located south of U.S. 95, in the town of Indian Springs.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, High if jurisdictional wetland	2157	USGS 1998
310SS1	14, B3	BLM Sensitive Species	Desert bearpoppy has been found approximately 5 km east of Indian Springs, at the southern tip of the Pintwater Range.	None known	2.2.2 Moderate	1791	NNHP 1997
312SS1	14, A3	BLM Sensitive Species	Desert bearpoppy has been found about 6.4 km east of Indian Springs, at the southern tip of the Pintwater Range.	None known	2.2.2 Moderate	3545	NNHP 1997

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
314SS1	14, B3	BLM Sensitive Species	Desert bearpoppy has been found approximately 5 km east of Indian Springs, at the southern tip of the Pintwater Range.	None known	2.2.2 Moderate	993	NNHP 1997
313SS1	14, B3	BLM Sensitive Species	Desert bearpoppy has been found approximately 5 km east of Indian Springs, at the southern tip of the Pintwater Range.	None known	2.2.2 Moderate	1561	NNHP 1997
315SS1	14, A1 20, B4	BLM Sensitive Species	Desert bearpoppy has been found on the south slope of Spotted Range, southeast of Mercury.	None known	2.2.2 Moderate	1754	NNHP 1997
29PA3	14, B1 20, C4	Crucial Game Habitat/Use Area	Crucial quail habitat is found south of the route on the northern slope of the Spring Mountains, south of Mercury.	Avoid when possible	2.1.3 Moderate	4566	BLM 1998
318SS1	14, A1 20, B4	BLM Sensitive Species	Desert bearpoppy has been found north of Mercury.	None known	2.2.2 Moderate	3601	NNHP 1997
317SS1	14, A1 20, B4	BLM Sensitive Species	Desert bearpoppy has been found north of Mercury.	None known	2.2.2 Moderate	3539	NNHP 1997
244SS1	14, A1 20, B4	BLM Sensitive Species	Desert bearpoppy has been found north of Mercury.	None known	2.2.2 Moderate	4970	Blomquist et al. 1995
242SS1	14, A1 20, B4	BLM Sensitive Species	Desert bearpoppy has been found in Mercury Valley, north of Mercury.	None known	2.2.2 Moderate	4610	Blomquist et al. 1995 NNHP 1997
251SS1	13, A4 20, B4	BLM Sensitive Species	Desert bearpoppy has been found in Mercury Valley, west of Mercury.	None known	2.2.2 Moderate	605	Blomquist et al. 1995
316SS1	13, A4 20, B4	BLM Sensitive Species	Desert bearpoppy has been found northeast of Mercury.	None known	2.2.2 Moderate	1914	NNHP 1997
232SS1	13, A4 20, B3	BLM Sensitive Species	Parish's scorpionweed has been found in 3 areas north of the corridor, southeast of Skull Mountain.	None known	2.2.2 Moderate	658	Blomquist et al. 1995
445SS1	13, A4 20, B3	BLM Sensitive Species	Parish's scorpionweed has been found in eastern Rock Valley, southeast of Skull Mountain.	None known	2.2.2 Moderate	1828	NNHP 1997
234SS1	13, A4 20, B3	BLM Sensitive Species	Parish's scorpionweed has been found north of the corridor, southeast of Skull Mountain.	None known	2.2.2 Moderate	230	NNHP 1997, Blomquist et al. 1995
446SS1	13, A4 20, B3	BLM Sensitive Species	Parish's scorpionweed has been found on the ridge that separates Mercury Valley from Rock Valley.	None known	2.2.2 Moderate	815	NNHP 1997

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
239SS1	13, A4 20, B3	BLM Sensitive Species	Parish's scorpionweed has been found on the south edge of the corridor, southeast of Skull Mountain.	None known	2.2.2 Moderate	within	Blomquist et al. 1995
447SS1	13, A4 20, B3	BLM Sensitive Species	Parish's scorpionweed has been found on the in Rock Valley, south of Skull Mountain.	None known	2.2.2 Moderate	400	NNHP 1997
448SS1	13, A4 20, B3	BLM Sensitive Species	Parish's scorpionweed has been found in Rock Valley, south of Skull Mountain.	None known	2.2.2 Moderate	within	NNHP 1997
28PA3	13, A4 20, B3	Crucial Game Habitat/Use Area	Crucial quail habitat is located south of the corridor, in the Specter Range.	Avoid when possible	2.1.3 Moderate	4955	BLM 1998
6PA3	13, A4 20, B3	Crucial Game Habitat/Use Area	Crucial bighorn sheep habitat is located south of the corridor, in the Specter Range.	Avoid when possible	2.1.3 Moderate	4258	BLM 1998
4PA2	13, A3 20, B2	Seasonal Game Habitat/Use Areas	Bighorn sheep winter range is located south of the corridor, in the Specter Range.	None known	2.2.2 Low	2537	BLM 1998
383SS1	13, A4 20, B3	BLM Sensitive Species	Ripley's springparsley has been found in Rock Valley, north of the Specter Range.	None known	2.2.2 Moderate	within -260	NNHP 1997; Blomquist et al. 1995
229SS1	13, A3 20, B2	BLM Sensitive Species	Ripley's springparsley has been found south of the corridor, south of Skull Mountain in Rock Valley.	None known	2.2.2 Moderate	560	Blomquist et al. 1995
449SS1	13, A3 20, B2	BLM Sensitive Species	Parish's scorpionweed has been found south of Skull Mountain, in Rock Valley.	None known	2.2.2 Moderate	within	NNHP 1997
215SS1	13, A3 20, A2	BLM Sensitive Species	Beatley's scorpionweed has been found in two areas north of Rock Valley, southwest of Skull Mountain.	None known	2.2.2 Moderate	2810	NNHP 1997; Blomquist et al. 1995
218SS1	13, A3 20, A2	BLM Sensitive Species	Parish's scorpionweed has been found in six locations north of the corridor, west of Skull Mountain.	None known	2.2.2 Moderate	913	Blomquist et al. 1995
220SS1	13, A3 20, A2	BLM Sensitive Species	Largeflower suncup has been found north of the corridor, west of Skull Mountain.	None known	2.2.2 Moderate	1894	Blomquist et al. 1995
224SS1	13, A3 20, A2	BLM Sensitive Species	Largeflower suncup has been found north of the corridor, west of Skull Mountain.	None known	2.2.2 Moderate	786	Blomquist et al. 1995
217SS1	13, A3 20, A2	BLM Sensitive Species	Largeflower suncup has been found north of the corridor, west of Skull Mountain.	None known	2.2.2 Moderate	1607	Blomquist et al. 1995

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
408SS1	13, A2 20, B2	BLM Sensitive Species	White-margin beardtongue has been found in the Striped Hills, northeast of the town of Amargosa Valley.	None known	2.2.2 Moderate	4328	NNHP 1997
422SS1	13, A2 20, B2	BLM Sensitive Species	Death Valley beardtongue has been found in the Striped Hills, northeast of the town of Amargosa Valley.	None known	2.2.2 Moderate	3762	NNHP 1997
423SS1	13, A2 20, B2	BLM Sensitive Species	Death Valley beardtongue has been found in the Striped Hills, northeast of the town of Amargosa Valley.	None known	2.2.2 Moderate	3830	NNHP 1997
5PA2	13, A2 20, B2	Seasonal Game Habitat/Use Areas	Bighorn sheep winter range is located east of the corridor, northeast of the town of Amargosa Valley.	None known	2.2.2 Low	4050	BLM 1998

APPENDIX J

BIOLOGICAL RESOURCES WITHIN 1 KM OF THE POTENTIAL APEX/DRY LAKE HEAVY-HAUL ROUTE

(Map ID numbers used in the table are shown on maps YMP-97-260.3 through YMP-97-261.3, Attachment 1)

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Not mapped		Federally Threatened Species	The entire Apex/Dry Lake route is potential desert tortoise habitat.	Mitigation may be necessary	2.1.1 Moderate	within	Bury et al. 1994
Dry Lake to U.S. 93/I-15 Junction via I-15							
748SS1	11, D3	BLM Sensitive Species	Geyer's milkvetch has been found near the beginning of the route, west of I-15, about 12 km north of the I-15/U.S. 93 interchange.	None known	2.2.2 Moderate	338	NNHP 1997
750SS1	11, D3	BLM Sensitive Species	Geyer's milkvetch has been found west of I-15, about 8 km north of the I-15/U.S. 93 interchange.	None known	2.2.2 Moderate	749	NNHP 1997
813SS1	11, D3	BLM Sensitive Species	Geyer's milkvetch has been found west of I-15, about 7 km north of the U.S. 93/I-15 interchange.	None known	2.2.2 Moderate	521	BLM 1998
749SS1	11, D3	BLM Sensitive Species	Geyer's milkvetch has been found west of I-15, about 10 km north of the I-15/U.S. 93 interchange.	None known	2.2.2 Moderate	425	NNHP 1997
See Appendix M, U.S. 93/I-15 Junction to U.S. 95 via the Northern Beltway							
See Appendix M, U.S. 95 to Yucca Mountain							

APPENDIX K

BIOLOGICAL RESOURCES WITHIN 1 KM OF THE POTENTIAL CALIENTE HEAVY-HAUL ROUTE

(Map ID numbers used in the table are shown on maps YMP-97-250.3 through YMP-97-258.3. Attachment 1)

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Caliente to Crystal Springs							
837SS1	1, B2-C2	Riparian Area	The Meadow Valley Wash runs adjacent to and to the east of the Caliente ITS. An adjacent stream and riparian area was field verified 8/97.	Avoid riparian areas by 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	165	USGS 1998; Field Verified 8/98
		BLM Sensitive Species	The Meadow Valley Wash speckled dace has been found in Meadow Valley Wash in Caliente Canyon.	None known	2.2.2 Moderate	165	NNHP 1997
		BLM Sensitive Species	The Meadow Valley Wash desert sucker has been found in Meadow Valley Wash.	None known	2.2.2 Moderate	165	NNHP 1997
Not mapped	1, B2-C2	Game Habitat	Gambel's quail habitat is found throughout Meadow Valley Wash. The area is also important habitat for waterfowl.	None known	2.2.2 Low	within	BLM 1979
906SW	1, B2	Spring	An unnamed spring is located 0.3 km from U.S. 93, west of Caliente.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	275	USGS 1998
908SW	1, B1	Spring	An unnamed spring is located 0.4 km south of U.S. 93 in Newman Canyon.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	480	USGS 1998
905SW	1,B1	Spring	An unnamed spring is located 0.4 km south of U.S. 93 in Newman Canyon.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	800	USGS 1998
Not mapped	1, B1	Game Habitat	The route passes through about 15 km of a mule deer year-round use area in Newman Canyon along U.S. 93.	None known	2.2.2 Low	within	BLM 1979

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Crystal Springs to Rachel							
881SW	2, A2	Spring	Crystal Springs is a group of thermal springs located along S.R. 375, west of U.S. 93. The springs are about 75 m south of S.R. 375, but the outflow passes within about 10 m of the highway shoulder.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	10-74	USGS 1998
726TE1	2, A2	Federally Endangered Species	The Hiko White River springfish is found in Crystal Springs. The spring and outflow are critical habitat for this species.	Avoid	2.2.1 High	10-74	NNHP 1997, USFWS 1998
760SS1	2, A2	BLM Sensitive Species	The Pahranagat speckled dace is found in Crystal Springs.	None known	2.2.2 Moderate	10-74	FWS 1998
778SS1	2, A2	BLM Sensitive Species	The Pahranagat Valley montane vole is found near Crystal Springs.	None known	2.2.2 Moderate	143	NNHP 1997
713PA2	2, A3	Seasonal Game Habitat/Use Area	The route crosses a mule deer winter use area for 5 km near the Pahroc Summit Pass.	None known	2.2.2 Low	within	BLM 1979
Not mapped	2	Game Habitat	In the Pahranagat Range, the route crosses a bighorn sheep year round use area for 10 km.	None known	2.2.2 Low	within	BLM 1979
712PA2	2, B2 3, D4	Seasonal Game Habitat/Use Area	The route crosses a mule deer winter use area for 15 km in the Pahranagat Range.	None known	2.2.2 Low	within	BLM 1979
Rachel to Yucca Mountain via Tonopah							
Not mapped	3, C3	Game Habitat	The route passes through approximately 10 km of a pronghorn year round use area northwest of the Groom Range.	None known	2.2.2 Low	within	BLM 1979
921RA	4, A4	Riparian area	Twin Spring Slough and Echo Canyon Reservoir are located along State Route 375, east of Warm Springs.	Avoid riparian areas by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	30 - 250	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
770SS1	4, A4	BLM Sensitive Species	The Railroad Valley tui chub is found in Twin Spring Slough, along State Route 375, east of Warm Springs.	None known	2.2.2 Moderate	99	NNHP 1997
903SW	4, A4	Spring	Twin Springs is located on Twin Springs Ranch along State Route 375 about 15 km east of Warm Springs.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	250	USGS 1998
769SS1	4, A4	BLM Sensitive Species	The Hot Creek Valley tui chub is located in Twin Springs and its outflow.	None known	2.2.2 Moderate	211	NNHP 1997
901SW	4, A2	Spring and outflow	Warm Springs is a group of thermal springs and its outflow located west of U.S. 6, near the town of Warm Springs, in the southern Railroad Valley. The outflow crosses the route.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	within - 220	USGS 1998
724TE2	4, A2	Federally Threatened Species	An introduced population of the Railroad Valley springfish is found in the Warm Springs, just off U.S. 6, in the southern Railroad Valley.	Mitigation may be necessary	2.2.1 High	100-200	NNHP 1997
899SW	4, A1	Springs	Fivemile Spring is located in Stone Cabin Valley north of U.S. 6.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	390	USGS 1998
Not mapped	4	Game Habitat	The route crosses pronghorn habitat from west of Sand Spring Valley through Railroad, Stone Cabin, and Ralston Valleys.	None known	2.2.2 Low	within	BLM 1994a
890SW	5, D1	Spring	Rabbit Spring is located west of the route, west of Goldfield.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	952	USGS 1998
782SS1	6, D3	BLM Sensitive Species	A population of Nevada sanddune beardtongue has been found below Tolicha Peak, about 16 km northwest of Oasis Valley.	None known	2.2.2 Moderate	402	NNHP 1997
891SW	6, D4	Spring	An unnamed spring is located east of U.S. 95, in the upper Oasis Valley, northwest of Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	132	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
892SW	6, D4	Spring	An unnamed spring is located east of U.S. 95 in the upper Oasis Valley.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	315	USGS 1998
752SS1, 756SS1, 757SS1	6, D4 7, A3	BLM Sensitive Species	The Amargosa toad has been found in the upper Oasis Valley in the intermittent Amargosa River and the associated springs.	None known	2.2.2 Moderate	within – 250	NNHP 1997
801SS1 – 806SS1	6, D4 7, A3	BLM Sensitive Species	The Oasis Valley speckled dace has been found throughout the Oasis Valley in the Amargosa River and its associated springs.	None known	2.2.2 Moderate	within – 850	NNHP 1997
893SW	6, D4	Spring	An unnamed spring has been found east of the route, in the upper Oasis Valley, northwest of Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	380	USGS 1998
711PA5	6, D4	ACEC	The Amargosa-Oasis ACEC is located in the upper Oasis Valley, northwest of Springdale.	Avoid	2.1.3 High	690	BLM 1994a
894SW	6, D4	Spring	An unnamed spring is located east of U.S. 95 in the upper Oasis Valley.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	360	USGS 1998
799SS1	6, D4	BLM Sensitive Species	The Oasis Valley springsnail is found in an unnamed spring (902SW) in the upper Oasis Valley, northwest of Beatty.	None known	2.2.2 Moderate	375	NNHP 1997
897SW	6, D4	Spring	Fleur-de-lis Spring is located at Springdale, 14.0 km north of Beatty, west of U.S. 95.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	350	USGS 1998
895SW	6, D4	Spring	An unnamed spring is located east of U.S. 95 in the upper Oasis Valley.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	131	USGS 1998
896SW	7, A3	Spring	An unnamed spring is located east of U.S. 95, north of Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	107	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
916SW	7, A3	Spring	An unnamed spring is located east of U.S. 95, north of Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	880	USGS 1998
915SW	7, A3	Spring	Goss Spring is located east of U.S. 95, north of Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	875	USGS 1998
920SW	6 D4, 7, A3	River	The Amargosa River runs parallel to U.S. 95 for approximately 23 km near Beatty.	Mitigation may be necessary	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	within	USGS 1998
914SW	7, A3	Spring	A group of thermal springs is located on the east border of U.S. 95, north of Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	158 – 260	USGS 1998
913SW	7, A3	Spring	Well Spring is located west of U.S. 95, north of Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	311	USGS 1998
912SW	7, A3	Spring	Ute Spring is located west U.S., north of Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	397	USGS 1998
838SS1	7, A3	BLM Sensitive Species	Amargosa toad habitat extends from 8.0 km north of Beatty to 3.5 km south of Beatty, along U.S. 95.	None known	2.2.2 Moderate	within	BLM 1994a; NNHP 1997
797SS1	7, A3	BLM Sensitive Species	Townsend's big-eared bat has been observed near the Amargosa River.	None known	2.2.2 Moderate	60	NNHP 1997
911SW	7, A3	Spring	An unnamed spring is located west of U.S. 95, north of Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	597	USGS 1998
910SW	7, A3	Spring	Revert Spring is located in Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	299	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
798SS1	7, A3	BLM Sensitive Species	The Oasis Valley springsnail has been found in an unnamed spring (891SW) north of Beatty.	None known	2.2.2 Moderate	338	NNHP 1997
747SS1	7, A3	BLM Sensitive Species	The Funeral Mountain milkvetch has been found in several locations in the hills northeast of Beatty, west of U.S. 95.	None known	2.2.2 Moderate	517	NNHP 1997
909SW	7, A3	Spring	An unnamed spring is located east of U.S. 95, south of Beatty.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	309	USGS 1998
Not mapped	7	Federally Threatened Species	From Beatty to Yucca Mountain, U.S. 95 passes through desert tortoise habitat.	Mitigation may be necessary	2.2.1 Moderate, widely-distributed threatened species	within	Bury et al. 1994
Not mapped	7	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located east of U.S. 95, just south of Beatty in the Bare Mountain area.	None known	2.2.2 Low	1000	BLM 1992b
780SS1	8, D1	BLM Sensitive Species	The fringed myotis has been observed on the Nevada Test Site in Fortymile Wash at Well J-13.	None known	2.2.2 Moderate	54	NNHP 1997

APPENDIX L

BIOLOGICAL RESOURCES WITHIN 1 KM OF THE POTENTIAL CALIENTE-CHALK MOUNTAIN HEAVY-HAUL ROUTE

(Map ID numbers in the table are shown on maps YMP-97-250.3 through YMP-97-252.3, YMP-97-257.3, and YMP-97-258.3, Attachment 1)

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
See Appendix K, Caliente to Crystal Springs							
See Appendix K, Crystal Springs to Rachel							
Rachel to Yucca Mountain via Nellis Air Force Range and Nevada Test Site							
Not mapped	3, D2	Game Habitat	The route passes through approximately 30 km of a mule deer year round use area in the Groom Range.	None known	2.2.2 Low	within	BLM 1979
822SS1	8, B4	BLM Sensitive Species	Ripley's springparsley has been found in Yucca Flat, on the Nevada Test Site.	None known	2.2.2 Moderate	250	Blomquist et al. 1995
823SS1	8, C3	BLM Sensitive Species	Ripley's springparsley has been found in Yucca Flat, on the Nevada Test Site.	None known	2.2.2 Moderate	247	Blomquist et al. 1995
824SS1	8, C3	BLM Sensitive Species	Ripley's springparsley has been found in Yucca Flat, on the Nevada Test Site.	None known	2.2.2 Moderate	within	Blomquist et al. 1995
825SS1	8, C3	BLM Sensitive Species	Ripley's springparsley has been found in Yucca Flat, on the Nevada Test Site.	None known	2.2.2 Moderate	within	Blomquist et al. 1995
Not mapped	8	Federally Threatened Species	Desert tortoise habitat occurs on the Nevada Test Site south from Yucca Lake.	Avoid when possible	2.2.1 Moderate	within	Rautenstrauch et al. 1994
759SS1	8, D3	BLM Sensitive Species	The largeflower suncup is found in the CP Hills, 1.3 km southwest of Yucca Pass, southwest of Yucca Lake on the Nevada Test Site.	None known	2.2.2 Moderate	986	NNHP 1997
918SW	8, D3	Spring	Cane Spring is located south of the route in Frenchman Flat, on the north face of Skull Mountain.	Avoid all springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland.	865	USGS 1998
800SS1	8, D3	BLM Sensitive Species	The Oasis Valley springsnail is found at Cane Spring.	None known	2.2.2 Moderate	865	NNHP 1997
826SS1	8, D3	BLM Sensitive Species	The largeflower suncup is found near Cane Spring.	None known	2.2.2 Moderate	555	Blomquist et al. 1995
780SS1	8, D1	BLM Sensitive Species	The fringed myotis has been observed on the Nevada Test Site in Fortymile Wash at Well J-13.	None known	2.2.2 Moderate	55	NNHP 1997

APPENDIX M

BIOLOGICAL RESOURCES WITHIN 1 KM OF THE POTENTIAL CALIENTE-LAS VEGAS HEAVY-HAUL ROUTE

(Map ID numbers in the table are shown on maps YMP-97-250.3 through YMP-97-251.3 and YMP-97-257.3 through YMP-97-261.3, Attachment 1)

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Caliente to Crystal Springs: See Appendix K							
Not mapped		Federally Threatened Species	The section of the route from about Crystal Springs to Yucca Mountain is potential desert tortoise habitat. A portion of this section, from Maynard Lake south to approximately 10 km north of I-15, is designated as Critical Habitat for desert tortoise.	Mitigation will be necessary to minimize take	2.1.3 High	within	Bury et al. 1994
Crystal Springs to I -15 via U.S. 93							
883SW	2, A2	Spring/Seep	Pedretti Seeps is located found on Gunther Ranch, about 3.5 km SE of Crystal Springs.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	685	USGS 1998
808SS1	2, A2	BLM Sensitive Species	The Pahranagat speckled dace has been found in Pedretti Seeps.	None Known	2.2.2 Moderate	685	NNHP 1997
884SW	2, A2	Spring	An unnamed spring is located west of the route, slightly south of Pedretti Seeps.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	700	USGS 1998
885SW	2, A2	Spring	Deacon Spring is located west of U.S. Highway 93, about 5 km southeast of State Highway 375.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	820	USGS 1998
809SS1	2, A2	BLM Sensitive Species	The Pahranagat speckled dace has been found in Deacon Spring.	None Known	2.2.2 Moderate	753	NNHP 1997
886SW	2, A2	Spring	Brownie Spring is located 1.0 km west of U.S. 93, about 5 km southeast of State Highway 375.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	940	USGS 1998
887SW	2, B2	Spring	Ash Springs is located 76 m east of U.S. 93, about 7 km southeast of State Highway 375.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	76	USGS 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
922SW	2, B2	Spring outflow	The Ash Springs outflow flows from Ash Springs, into Ash Springs pool, under U.S. 93, and into Pahranagat Creek (White River) and the irrigation ditches.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	within – 500	USGS 1998
725TE1	2, B2	Federally Endangered Species	The White River springfish has been found in the spring pool at Ash Springs.	Avoid	2.2.1 High	74	NNHP 1997, FWS 1998
727TE1	2, B2	Federally Endangered Species	The Pahranagat roundtail chub has been found in Ash Springs and in the associated Pahranagat Creek (White River) and the irrigation ditches.	Avoid	2.2.1 High	19	NNHP 1997, FWS 1998
767SS1	2, B2	BLM Sensitive Species	The Pahranagat pebblesnail has been found in Ash Springs, near the town of Ash Springs in the Pahranagat Valley.	None Known	2.2.2 Moderate	78	NNHP 1997
781SS1	2, B2	BLM Sensitive Species	The Pahranagat naucorid has been found in Ash Springs, near the town of Ash Springs in the Pahranagat Valley.	None Known	2.2.2 Moderate	78	NNHP 1997
811SS1	2, B2	BLM Sensitive Species	The grated tryonia has been found in Ash Springs, near the town of Ash Springs in the Pahranagat Valley.	None Known	2.2.2 Moderate	78	NNHP 1997
807SS1	2, B2	BLM Sensitive Species	The Pahranagat speckled dace has been found in the Ash Springs outflow, from the outlet of Ash Springs to roughly 20 km downstream, and in the East Ditch (an additional 5.6 km).	None Known	2.2.2 Moderate	within – 510	NNHP 1997
Not mapped	2	Game Habitat/Use Area	U.S. 93 runs through 28 km of Gambel's quail habitat in the Pahranagat Valley.	None Known	2.1.3 Low	within	BLM 1979
888SW	2, C2	Spring	Grove Spring is located 1.0 km west of the route and 1.5 km north of Upper Pahranagat Lake.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	722	USGS 1998
777SS1	2, C3	BLM Sensitive Species	The Pahranagat Valley montane vole has been found in the Pahranagat National Wildlife Refuge, near the north border of the North Marsh.	None Known	2.2.2 Moderate	49	NNHP 1997

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
None	2, C3	Wildlife Refuge	The route is along the edge of Pahranagat National Wildlife Refuge from north of Upper Pahranagat Lake to just southeast of Maynard Lake.	Avoid impacts if possible	2.2.2 Low	within – 5000	BLM 1998
779SS1	2, C3	BLM Sensitive Species	Pahranagat Valley montane vole has been found in the Pahranagat National Wildlife Refuge, east of the Upper Lake/North Marsh Dike.	None Known	2.2.2 Moderate	195	NNHP 1997
925SW 926SW	2, C3	Upper Lake Lower Lake	U.S. 93 parallels Upper and Lower Pahranagat Lakes and associated inundated areas (marshes) for approximately 15 km.	Avoid if possible	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	100	USGS 1998
889SW	2, C3	Spring	An unnamed spring is located 0.2 km west of U.S. 93 and Maynard Lake.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	124	USGS 1998
927SW	2, C3	Lake/Marsh	U.S. 93 borders Maynard Lake for approximately 1 km. The lake is 0.1 km east of the route.	Avoid if possible	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	100	USGS 1998
Not mapped	2	Game Habitat	The area around Maynard Lake, approximately 40 km south of the junction of U.S. 93 and SR 375, is a year round mule deer use area.	None known	2.1.3 Low	within	BLM 1979
898SW	11, A2	Spring	Coyote Spring is located 1.0 km west of U.S. 93, 21.5 km north of the junction of the route and SR 168.	Avoid springs by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	761	USGS 1988
702PA2	11, C3	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located east of U.S. 93 and south of State Route 168 in Arrow Canyon Range.	None Known	2.2.2 Low	348	BLM 1998
Not mapped	11, C2	Seasonal Game Habitat/Use Area	U.S. 93 crosses a bighorn sheep migration corridor between 702PA2 and 703PA2.	None Known	2.2.2 Low	within	BLM 1992b
703PA2	11, C3	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located west of U.S. 93 and north of Dry Lake in the Las Vegas Range.	None Known	2.2.2 Low	630	BLM 1998

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
704PA2	11, C3	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located west of U.S. 93, north of Dry Lake in the Las Vegas Range.	None Known	2.2.2 Low	450	BLM 1998
705PA3	11, C3, D3	Crucial Game Habitat/Use Area	U.S. 93 crosses the southwestern edge of bighorn sheep crucial habitat in the Arrow Canyon Range. The northern portion of the habitat is 635 meters from U.S. 93.	Avoid when possible	2.1.3 Moderate	within – 600	BLM 1998
710PA3	11, C3, D3	Crucial Game Habitat/Use Area	Crucial Quail habitat is located east of U.S. 93, within the area of 705PA3, in Arrow Canyon Range.	None Known	2.2.2 Low	within	BLM 1998
783SS1	11, D3	BLM Sensitive Species	Pinto (yellow) beardtongue has been found northwest of Dry Lake near U.S. 93.	None Known	2.2.2 Moderate	126	NNHP 1997
706PA2	11, D3	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located east of U.S. Highway 93, in the southern portion of Arrow Canyon Range.	None Known	2.2.2 Low	284	BLM 1998
Not mapped	11, D3	Seasonal Game Habitat/Use Area	U.S. 93 crosses a bighorn sheep migration corridor between the Arrow Canyon and Las Vegas ranges, 3.5 km N of the intersection with I-15.	None Known	2.2.2 Low	within	BLM 1992b
793SS1	11, D3	BLM Sensitive Species	Pinto (rosy) beardtongue has been found west of U.S. 93, 13.3 km north of the U.S. 93/ I-15 interchange.	None Known	2.2.2 Moderate	384	NNHP 1997
812SS1	11, D3	BLM Sensitive Species	Pinto (rosy) beardtongue has been found west of U.S. 93.	None Known	2.2.2 Moderate	331	BLM 1998
792SS1	11, D3	BLM Sensitive Species	Pinto (rosy) beardtongue has been found southwest of U.S. 93, 3.7 to 8.2 km north of the U.S. 93/ Interstate 15 interchange.	None Known	2.2.2 Moderate	139	NNHP 1997
795SS1	11, D3	BLM Sensitive Species	Pinto (rosy) beardtongue has been found next to U.S. 93, 1.6 to 2.4 km north of the Interstate 15/U.S. 93 interchange.	None Known	2.2.2 Moderate	31	NNHP 1997
U.S. 93/I-15 junction to U.S. 95 via the Northern Beltway							
742SS1	12, A4	BLM Sensitive Species	California bearpoppy has been found north of I-15 about 2 km northeast of Apex.	None Known	2.2.2 Moderate	147	NNHP 1997
745SS1	12, A4	BLM Sensitive Species	California bearpoppy has been found on the northwest side of I-15, 0.6 km northeast of Apex.	None Known	2.2.2 Moderate	309	NNHP 1997
743SS1	12, A4	BLM Sensitive Species	California bearpoppy is found southeast of I-15 about 1 km south of Apex.	None Known	2.2.2 Moderate	836	NNHP 1997

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
744SS1	12, A4	BLM Sensitive Species	California bearpoppy has been found at the junction of I-15 and Las Vegas Boulevard, about 2 km southwest of Apex.	None Known	2.2.2 Moderate	108	NNHP 1997
814SS1	12, A3	BLM Sensitive Species	California bearpoppy has been found east of I-15, about 7 km southwest of Apex.	None Known	2.2.2 Moderate	567	BLM 1998
746SS1	12, A3	BLM Sensitive Species	California bearpoppy has been found in the northeastern portion of the Las Vegas Valley along the proposed northern beltway.	None Known	2.2.2 Moderate	715	NNHP 1997
741SS1	12, A2	BLM Sensitive Species	California bearpoppy has been found in the northern portion of the Las Vegas Valley along the proposed northern beltway.	None Known	2.2.2 Moderate	734	NNHP 1997
U.S. 95 to Yucca Mountain							
836SS1	9, A3	BLM Sensitive Species	Ripley's springparsley has been found northeast of the route in eastern Rock Valley.	None known	2.2.2 Moderate	760	Blomquist et al. 1995
834SS1	9, A3	BLM Sensitive Species	A population of Parish's scorpionweed has been found northeast of the route in eastern Rock Valley.	None known	2.2.2 Moderate	956	Blomquist et al. 1995
833SS1	9, A3	BLM Sensitive Species	Ripley's springparsley has been found northeast of the route in eastern Rock Valley.	None known	2.2.2 Moderate	902	Blomquist et al. 1995
835SS1	9, A3	BLM Sensitive Species	Ripley's springparsley has been found on the southern edge of the route in East Rock Valley.	None known	2.2.2 Moderate	40	Blomquist et al. 1995
832SS1	9, A2	BLM Sensitive Species	Parish's scorpionweed has been found on the eastern edge of the route, south of Skull Mountain.	None known	2.2.2 Moderate	134	Blomquist et al. 1995
831SS1	9, A2	BLM Sensitive Species	Parish's scorpionweed has been found west of the route, west of Skull Mountain.	None known	2.2.2 Moderate	817	Blomquist et al. 1995
829SS1	9, A2	BLM Sensitive Species	Parish's scorpionweed has been found west of the route, west of Skull Mountain.	None known	2.2.2 Moderate	980	Blomquist et al. 1995
830SS1	9, A2	BLM Sensitive Species	Parish's scorpionweed has been found west of the route, west of Skull Mountain.	None known	2.2.2 Moderate	904	Blomquist et al. 1995
827SS1	9, A2	BLM Sensitive Species	Beatley's scorpionweed has been found east of the route, near Skull Mountain.	None known	2.2.2 Moderate	617	Blomquist et al. 1995
828SS1	9, A2	BLM Sensitive Species	Beatley's scorpionweed has been found east of the route, near Skull Mountain.	None known	2.2.2 Moderate	960	Blomquist et al. 1995
780SS1	8, D1	BLM Sensitive Species	The fringed myotis has been observed on the Nevada Test Site in Fortymile Wash at Well J-13.	None Known	2.2.2 Moderate	54	NNHP 1997

APPENDIX N

BIOLOGICAL RESOURCES WITHIN 1 KM OF THE POTENTIAL SLOAN/JEAN HEAVY-HAUL ROUTE

(Map ID numbers in the table are shown on maps YMP-97-257.3 through YMP-97-261.3, Attachment 1)

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Not mapped		Federally Threatened Species	The entire Sloan/Jean route is potential desert tortoise habitat.	Mitigation may be necessary	2.1.1 Moderate	within	Bury et al. 1994
Sloan to U.S. 95 via I-15 and the Western Beltway							
784SS1	12, D2	BLM Sensitive Species	Pinto (yellow) beardtongue has been found about 3 km northeast of Jean.	None known	2.2.2 Moderate	991	NNHP 1997
820SS1	12, D2	BLM Sensitive Species	Pinto (rosy) beardtongue has been found east of I-15, about 3 km northeast of Jean.	None known	2.2.2 Moderate	596	BLM 1998
794SS1	12, D2	BLM Sensitive Species	Pinto (rosy) beardtongue has been found on the west side of I-15, about 8 km southwest of Sloan siding.	None known	2.2.2 Moderate	274	NNHP 1997
791SS1	12, D2	BLM Sensitive Species	Pinto (rosy) beardtongue has been found west of I-15 about 5 km southwest of Sloan siding.	None known	2.2.2 Moderate	332	NNHP 1997
819SS1	12, D2	BLM Sensitive Species	Pinto (rosy) beardtongue has been found about 3 km south of Sloan siding .	None known	2.2.2 Moderate	993	BLM 1998
818SS1	12, C2	BLM Sensitive Species	Pinto (rosy) beardtongue has been found near the Sloan siding.	None known	2.2.2 Moderate	737	BLM 1998
708PA2	12, C2	Seasonal Game Habitat/Use Area	Big horn sheep winter range is located south of S.R. 160, near the spur leading from the Sloan siding.	None known	2.2.2 Low	125	BLM 1998
817SS1	12, C2	BLM Sensitive Species	California bearpoppy has been found north of S.R. 160, west of I-15.	None known	2.2.2 Moderate	424	BLM 1998
790SS1	12, B2	BLM Sensitive Species	Pinto (yellow) beardtongue has been found west of Las Vegas.	None known	2.2.2 Moderate	546	NNHP 1997
789SS1	12, B2	BLM Sensitive Species	Pinto (yellow) beardtongue has been found south of Flamingo Road, north of Tropicana Avenue, and east of the proposed western beltway.	None known	2.2.2 Moderate	932	NNHP 1997
816SS1	12, B1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found southeast of Lone Mountain, south of Charleston Boulevard.	None known	2.2.2 Moderate	209	BLM 1998
788SS1	12, B1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found southeast of Lone Mountain, north of Charleston Boulevard.	None known	2.2.2 Moderate	218	NNHP 1997

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
787SS1	12, B1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found southwest of Lone Mountain.	None known	2.2.2 Moderate	81	NNHP 1997
786SS1	12, B1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found southwest of Lone Mountain.	None known	2.2.2 Moderate	32	NNHP 1997
785SS1	12, B1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found southwest of Lone Mountain.	None known	2.2.2 Moderate	226	NNHP 1997
707PA2	12, A1	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located west of the proposed western beltway.	None known	2.2.2 Low	300	BLM 1998
815SS1	12, A1	BLM Sensitive Species	Pinto (yellow) beardtongue has been found northeast of Lone Mountain.	None known	2.2.2 Moderate	222	BLM 1998
U.S. 95 to Yucca Mountain: See Appendix M							

APPENDIX O

BIOLOGICAL RESOURCES WITHIN 1 KM OF THE POTENTIAL INTERMODAL TRANSFER STATIONS

(Map ID numbers used in the table are shown on maps YMP-97-250.3, YMP-97-260.3, and YMP-97-261.3, Attachment 1)

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Apex/Dry Lake Intermodal Transfer Station							
Not mapped	11	Federally Threatened Species	All three portions of this ITS are within desert tortoise habitat, but the area has not been identified as critical habitat.	Mitigation may be necessary	2.1.2 Moderate, widely distributed threatened species	within	Bury et al. 1994
750SS1	11, D3	BLM Sensitive Species	Geyer's milkvetch has been found west of I-15, within the southern edge of the ITS.	None known	2.2.2 Moderate	within	NNHP 1997
748SS1	11, D3	BLM Sensitive Species	Geyer's milkvetch has been found near the beginning of the route, west of I-15.	None known	2.2.2 Moderate	170	NNHP 1997
813SS1	11, D3	BLM Sensitive Species	Geyer's milkvetch has been found west of I-15, about 7 km north of the U.S. 93/I-15 interchange.	None known	2.2.2 Moderate	901	BLM 1998
749SS1	11, D3	BLM Sensitive Species	Geyer's milkvetch has been found west of I-15, about 10 km north of the U.S. 93/I-15 interchange.	None known	2.2.2 Moderate	856	NNHP 1997
Caliente Intermodal Transfer Station							
907SW	1, B2	Spring	An unnamed spring is located southwest of Caliente, northwest of the Caliente ITS.	Avoid springs by at least 0.4 km.	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	537	USGS 1998
837SS1	1, B2-C2	Riparian Area	The Meadow Valley Wash runs adjacent and to the east of the Caliente ITS. An adjacent stream and riparian area was field verified 8/97.	Avoid riparian areas by at least 0.4 km	1.1.3 High, 2.1.2 Moderate, or High if jurisdictional wetland	170	USGS 1998; Field Verified 8/97
		BLM Sensitive Species	The Meadow Valley Wash speckled dace has been found in Meadow Valley Wash in Caliente Canyon.	None known	2.2.2 Moderate	170	NNHP 1997
		BLM Sensitive Species	The Meadow Valley Wash desert sucker has been found in Meadow Valley Wash.	None known	2.2.2 Moderate	170	NNHP
Not mapped	1, B2	Crucial game habitat/use area	Meadow Valley Wash is classified as habitat for Gambel's quail. Areas less than 0.4 km from existing springs, seeps, and stock watering developments are classified as crucial for quail.	Avoid when possible	2.1.3 Moderate	170	BLM 1979

Map ID	Plate, Quad	Resource Category	Description	Policy/ Restriction	Constraint Category and Level	Distance (m)	Source
Sloan/Jean Intermodal Transfer Station							
Not mapped	12	Federally Threatened Species	All three potential locations for this facility are within desert tortoise habitat, but the areas have not been identified as critical habitat.	Mitigation may be necessary	2.1.2 Moderate, widely distributed threatened species	within	Bury et al. 1994
708PA2	12, C2	Seasonal Game Habitat/Use Area	Bighorn sheep winter range is located west of the route, south of S.R. 160 and west of I-15.	None Known	2.2.2 Low	125	BLM 1998
818SS1	12, C2	BLM Sensitive Species	Pinto (rosy) beardtongue has been found south of Sloan Siding.	None Known	2.2.2 Moderate	within	BLM 1998
819SS1	12, D2	BLM Sensitive Species	Pinto (rosy) beardtongue has been found about 3 km south of Sloan Siding .	None Known	2.2.2 Moderate	583	BLM 1998
784SS1	12, D2	BLM Sensitive Species	Pinto (yellow) beardtongue has been found on the edge of the southern-most site, about 3 km north-northeast of Jean.	None Known	2.2.2 Moderate	208	NNHP 1997
820SS1	12, D2	BLM Sensitive Species	Pinto (rosy) beardtongue has been found within the southern-most site, northeast of Jean.	None Known	2.2.2 Moderate	within	BLM 1998
821SS1	12, D2	BLM Sensitive Species	Pinto (yellow) beardtongue has been found adjacent to the southern site, east of Jean.	None Known	2.2.2 Moderate	55	BLM 1998

TRW Environmental
Safety Systems, Inc.

Environmental Baseline File for Biological Resources

Attachment 1: Maps of Biological Resources Along Transportation Corridors and Intermodal Transfer Stations

Civilian Radioactive Waste Management System

Management & Operating Contractor

B&W Federal Services
Duke Engineering & Services, Inc.
Fluor Daniel, Inc.
Framatome Cogema Fuels
Integrated Resources Group
INTERA, Inc.
JAI Corporation
JK Research Associates, Inc.
Lawrence Berkeley Laboratory
Lawrence Livermore National Laboratory
Los Alamos National Laboratory
Morrison-Knudsen Corporation
Sandia National Laboratories
Science Applications International Corporation
TRW Environmental Safety Systems Inc.
Winston & Strawn
Woodward-Clyde Federal Services
Cooperating Federal Agency:
U.S. Geological Survey

Prepared by:

TRW Environmental Safety
Systems, Inc.

Prepared for:

U.S. Department of Energy
Yucca Mountain Site Characterization Office
P.O. Box 30307
North Las Vegas, Nevada 89036-0307

PREFACE

This attachment to the Environmental Baseline File for Biological Resources includes maps of the locations of important biological resources found within and near potential rail corridors, heavy-haul routes, and intermodal transfer stations within Nevada. These routes and facilities are being considered for the transport of spent nuclear fuel and high-level nuclear waste to Yucca Mountain. The maps in this document are based on the best available information on route and station locations as of November 1, 1998.

The biological resources shown in these maps are those resources that have been identified as important potential receptors of impacts from construction of rail lines and intermodal transfer stations, modification or construction of roads along heavy-haul routes, and transport of spent nuclear fuel and high-level nuclear waste. These resources include springs, riparian areas, and other potential wetlands; areas that have been identified as important for the conservation of biological resources (e.g., designated game habitat); locations where threatened or endangered species occur; and locations where other special status species occur (e.g., state protected species, species considered sensitive by the U.S. Bureau of Land Management). Most of these biological resources were identified by reviewing a U.S. Geological Survey 1:100,000-scale database of water resources in Nevada, U.S. Bureau of Land Management Resource Management Plans, management plans and documents from other government agencies, the Nevada Natural Heritage Program database (NNHP 1997), and the California Natural Diversity database (University of California 1994). Detailed descriptions of the methods and sources of information used to identify these biological resources are described in Sections 2.4 and 3.2 of the Environmental Baseline File.

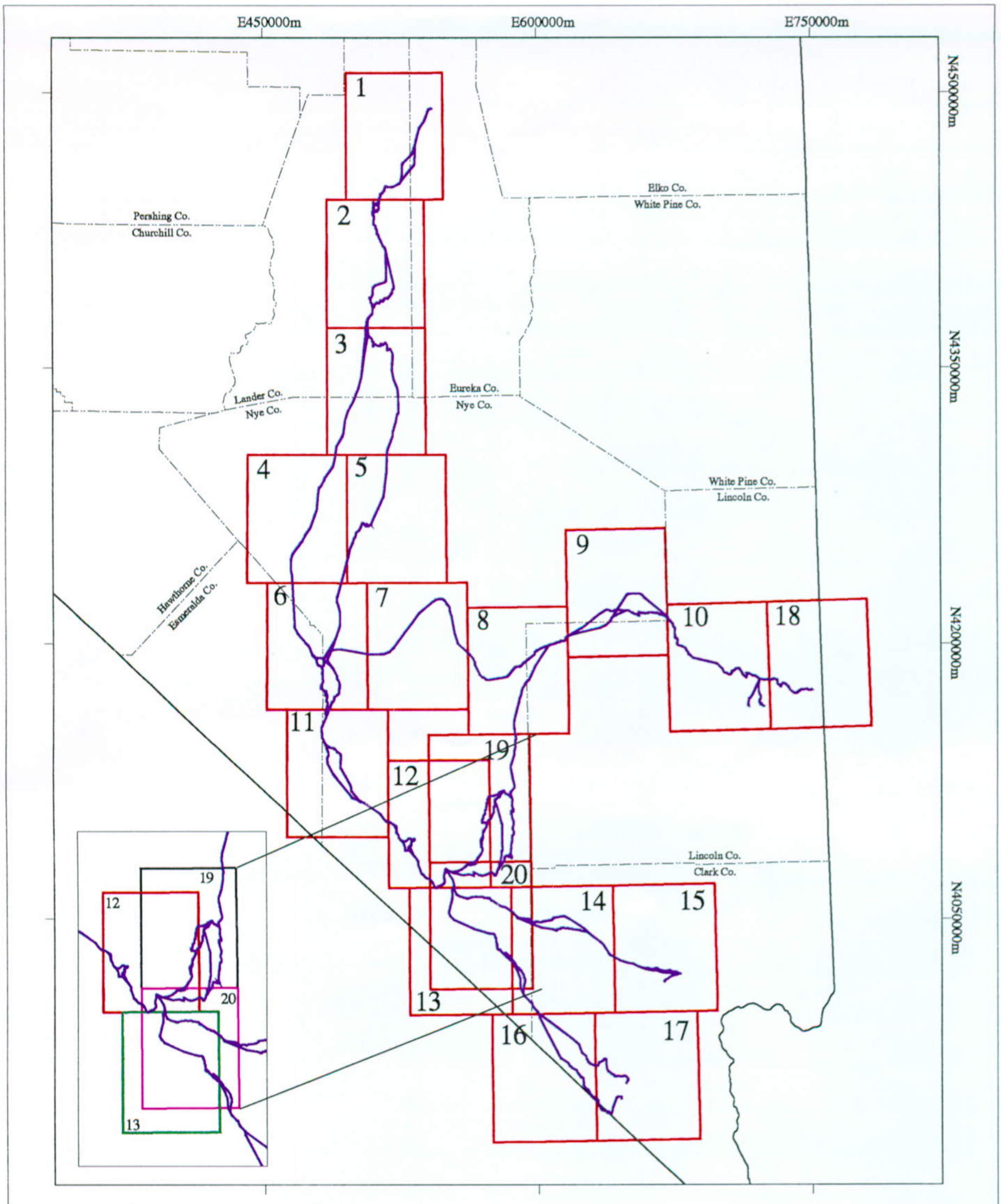
Some important biological resources within or near the routes and facilities are not shown on the maps, including habitat of wide ranging species (e.g., bats) or widely distributed species (e.g., desert tortoise), some designated game habitat, some U.S. Bureau of Land Management-designated riparian areas, and all U.S. Bureau of Land Management wild horse and burro herd management units. See Appendices E through O of the Environmental Baseline File for a complete list and description of the biological resources identified within 5 km of rail corridors and within 1 km of heavy-haul routes and intermodal transfer stations. Section 3.3.4 of the Environmental Baseline File describes the environmental setting along and near these routes and facilities and summarizes the important biological resources that are within and near them.

The code next to the location of each biological resource includes a unique number used to identify the resource and a two-letter code used to identify the type of resource (PA = protected area, RA = riparian area, SS = special status species, SW = spring or water body, TE = Federally threatened or endangered species).

The first 21 pages in this attachment present information on biological resources along potential rail corridors. The first of these is a map index showing the area covered by the other 20 maps. The final 13 pages present information on the potential heavy-haul routes and intermodal transfer facilities, including a map index and 12 maps.

The data tracking number for these maps is MO9903YMP99EBF.000 (CRWMS M&O 1999g).

CONTENTS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Churchill Co.
Elko Co.
White Pine Co.
Lander Co.
Nye Co.
Eureka Co.
Nye Co.
White Pine Co.
Lincoln Co.
Hawthorne Co.
Esmeralda Co.
Lincoln Co.
Clark Co.
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15
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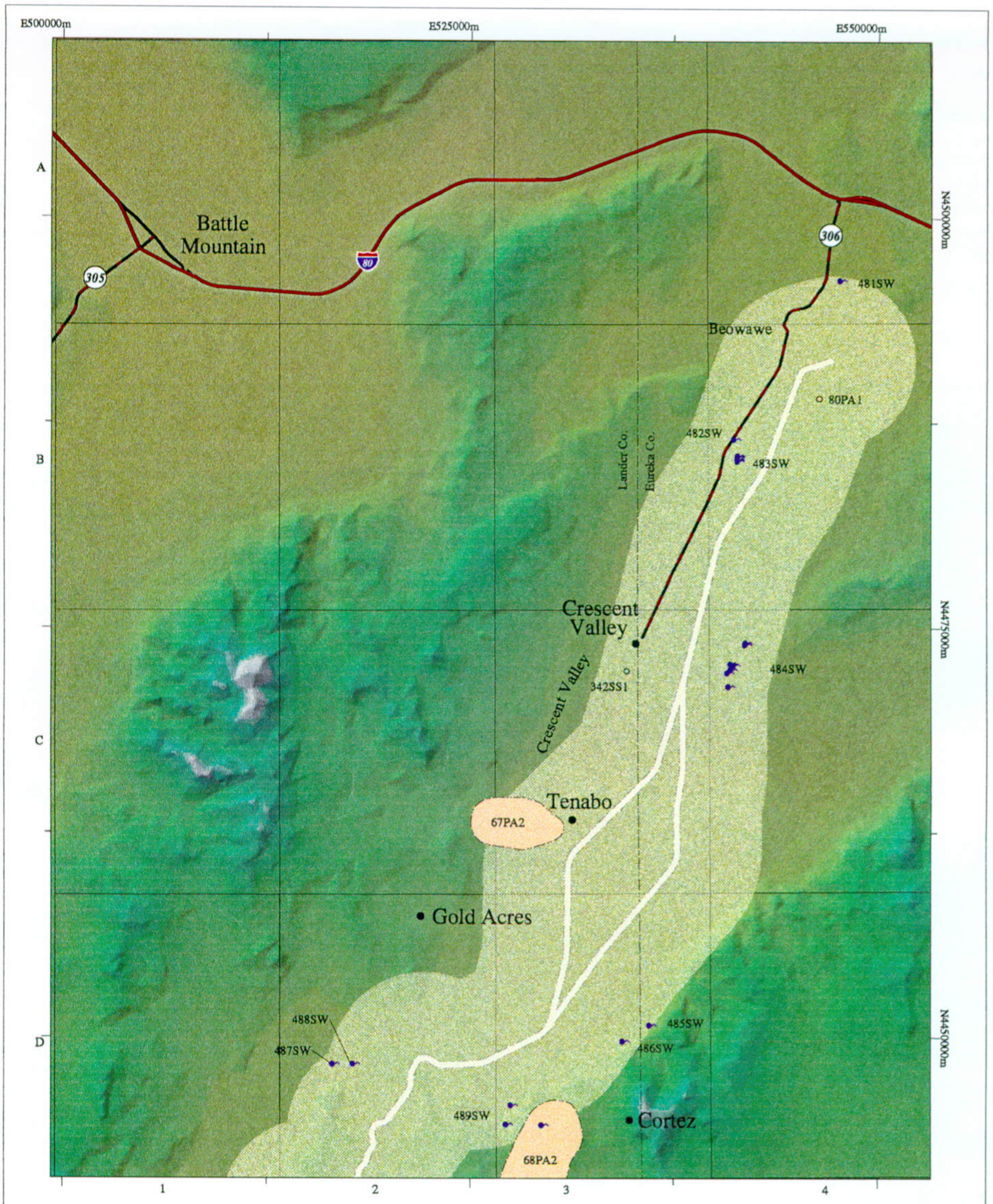
17
18
19
20
Nevada
Utah
Nevada
California
Arizona
Yucca Mountain Site
Characterization Project
Potential Rail Corridors
Index Map
LEGEND
Transportation Corridor
Plate Map Boundaries
N
20 0 20 40 60 Miles
20 0 20 40 60 80 Kilometers
Map created by CRWMS M&O/TDM on December 23, 1998.
YMP-97-280.3

Plate 1

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
67PA2	C3	Seasonal Game Habitat	Mule deer spring use area
68PA2	D3	Seasonal Game Habitat	Mule deer summer habitat
80PA1	B4	Important Game Habitat	Sage grouse strutting ground
342SS1	C3	U.S. Bureau of Land Management (BLM) Sensitive Species	Pygmy rabbit
481SW	A4	Spring	Unnamed hot spring
482SW	B4	Spring	Unnamed spring
483SW	B4	Spring	Four unnamed springs
484SW	C4	Spring	Cold Springs
485SW	D3	Spring	Unnamed spring
486SW	D3	Spring	Unnamed spring
487SW	D2	Spring	Wells Spring
488SW	D2	Spring	Unnamed spring
489SW	D3	Spring	Three unnamed springs

[1] PA = Protected Area, SS = Sensitive Species, SW = Spring or Water body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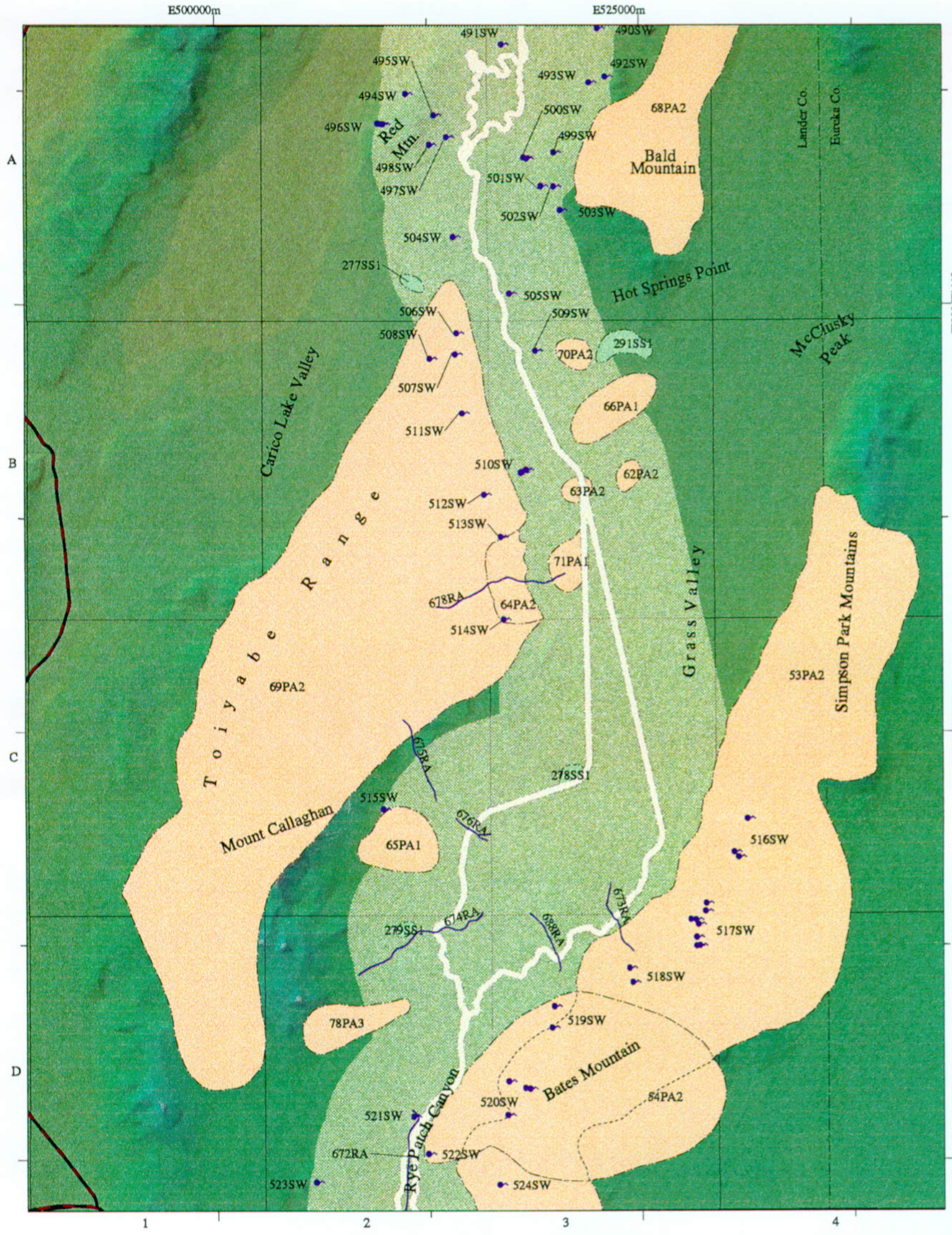
E525000m
E550000m
N4500000m
N4475000m
N4450000m
A
B
C
D
1
2
3
4
Battle Mountain
305
80
306
481SW
Beowawe
80PA1
482SW
483SW
Lander Co.
Eureka Co.
Crescent Valley
342SS1
484SW
Crescent Valley
Tenabo
67PA2
Gold Acres
488SW
487SW
485SW
486SW
489SW
Cortez
68PA2
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
UTAH
NEVADA
CALIFORNIA
ARIZONA
1
2
3
4 5
6 7 8 9 10 18
11 12 19 20
13 14 15
16 17
Plate 1
Carlin Route
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-066.3

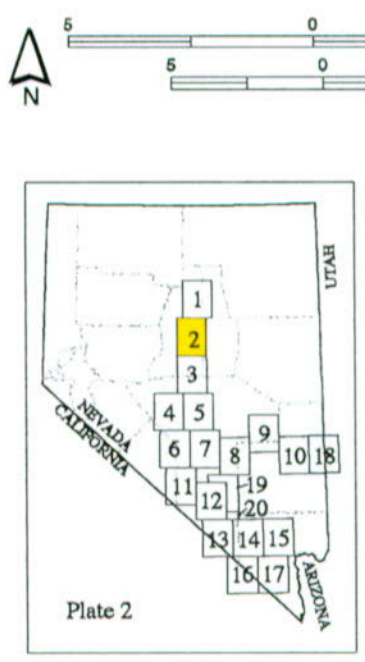
Plate 2

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
53PA2	C4	Seasonal Game Habitat	Mule deer summer habitat
54PA2	D2	Seasonal Game Habitat	Pronghorn summer range
62PA2	B3	Seasonal Game Habitat	Mule deer spring range
63PA2	B3	Seasonal Game Habitat	Mule deer spring range
64PA2	B3	Seasonal Game Habitat	Mule deer winter use area
65PA1	C2	Important Game Habitat	Sage grouse strutting ground
66PA1	B3	Important Game Habitat	Sage grouse strutting ground
68PA2	A3	Seasonal Game Habitat	Mule deer summer habitat
69PA2	C3	Seasonal Game Habitat	Mule deer summer habitat
70PA2	B3	Seasonal Game Habitat	Mule deer spring range
71PA1	B3	Important Game Habitat	Sage grouse strutting ground
78PA3	D2	Crucial Game Habitat	Sage grouse nesting area
277SS1	A2	BLM Sensitive Species	Ferruginous hawk nesting area
278SS1	C3	BLM Sensitive Species	Ferruginous hawk nesting area
279SS1	D2	BLM Sensitive Species	Ferruginous hawk nesting area
291SS1	B3	BLM Sensitive Species	Ferruginous hawk nesting area
490SW	A3	Spring	Unnamed spring
491SW	A3	Spring	Tub Spring
492SW	A3	Spring	House Spring
493SW	A3	Spring	Wilson Spring
494SW	A2	Spring	Wholey Spring
495SW	A2	Spring	Red Mountain Spring No. 2
496SW	A2	Spring	Wholey Spring No. 2
497SW	A2	Spring	Red Mountain Spring
498SW	A2	Spring	Red Mountain Spring No. 3
499SW	A3	Spring	Blind Spring
500SW	A3	Spring	Wood Springs
501SW	A3	Spring	Upper Wood Spring
502SW	A3	Spring	Upper Wood Spring No.2
503SW	A3	Spring	Mud Spring
504SW	A2	Spring	Summit Spring
505SW	A3	Spring	Dry Canyon Spring
506SW	B2	Spring	Unnamed spring
507SW	B2	Spring	Unnamed spring
508SW	B2	Spring	Unnamed spring
509SW	B3	Spring	Unnamed spring
510SW	B3	Spring	Three unnamed springs
511SW	B2	Spring	Unnamed spring
512SW	B2	Spring	Corral Spring
513SW	B3	Spring	Cowboy Rest Spring
514SW	C3	Spring	Unnamed spring
515SW	C2	Spring	Unnamed spring
516SW	C4	Spring	Three unnamed springs
517SW	D3	Spring	Cottonwood Springs, and five unnamed springs
518SW	D3	Spring	Unnamed springs
519SW	D3	Spring	Unnamed springs
520SW	D3	Spring	Bates Mountain Springs
521SW	D2	Spring	Rye Patch Spring
522SW	D2	Spring	Bullrush Spring
523SW	D2	Spring	Box Spring
524SW	D3	Spring	Long and Dry Creek springs
672RA	D2	Riparian Area	Rye Patch Canyon riparian area
673RA	D3	Riparian Area	Water Canyon riparian area
674RA	D2	Riparian Area	Ox Corral Creek riparian area
675RA	C2	Riparian Area	North Fork Creek riparian area
676RA	C2	Riparian Area	Skull Creek riparian areas
678RA	B3	Riparian Area	Rosebush Creek riparian area
688RA	D3	Riparian Area	Steiner Creek riparian area

[1] PA = Protected Area, RA = Riparian Area, SS = Sensitive Species, SW = Spring or Water body





Carlin Route

5 0 5 10 Miles

5 0 5 10 Kilometers

N

BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS

BIOLOGICAL RESOURCES CATEGORIES

Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern

Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species

Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species

Riparian Area (RA)

Spring or Waterbody (SW)

INFRASTRUCTURE

Primary Road

Secondary Road

TRANSPORTATION CORRIDOR

5-km Buffer Around Potential Rail Corridor

Coordinates are displayed in Universal Transverse Mercator meters.

Map created by CRWMS M&O/TDM on February 25, 1999.

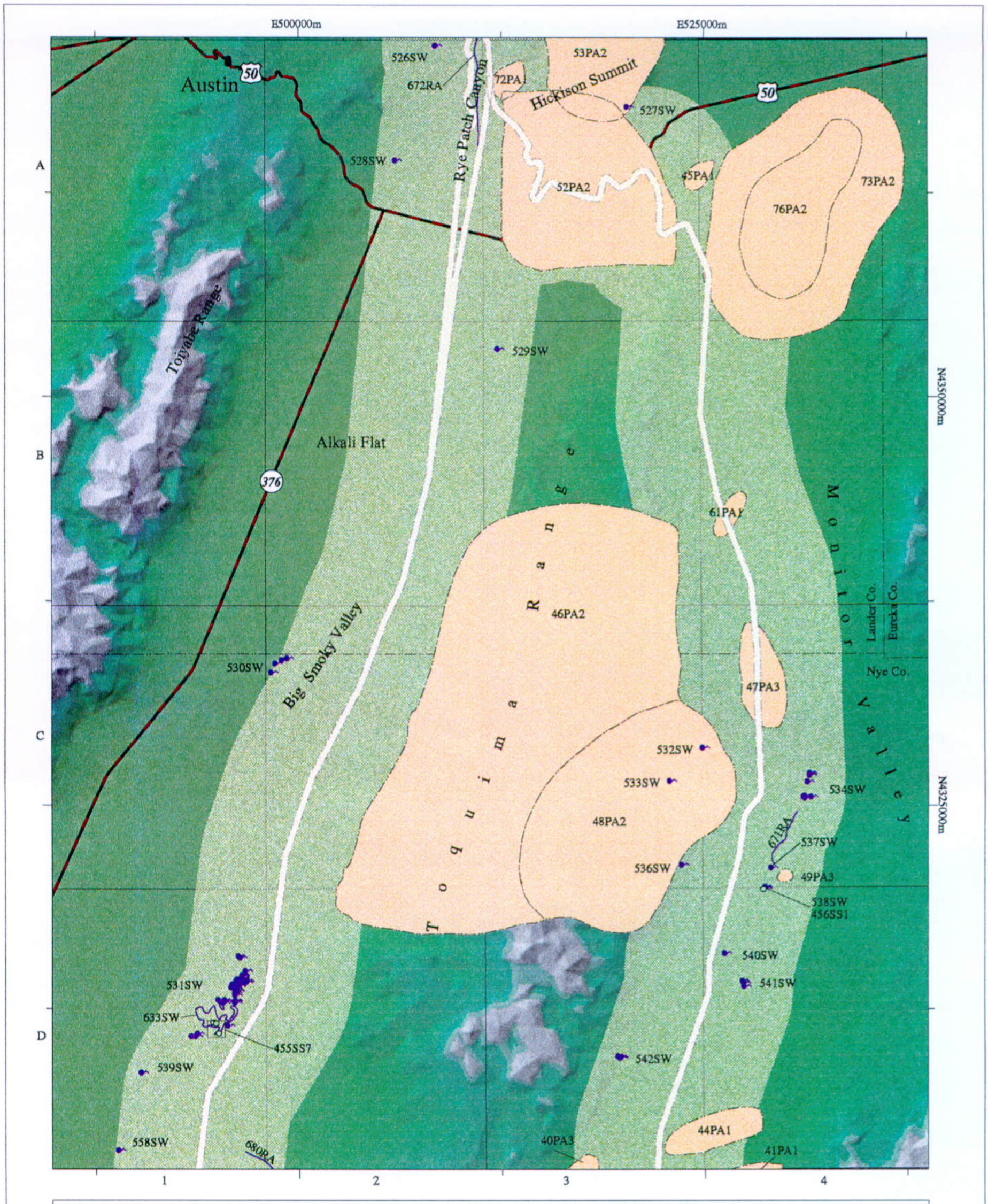
YMP-97-067.3

Plate 3

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
44PA1	D3	Game Habitat	Sage grouse habitat
45PA1	A3	Important Game Habitat	Sage grouse strutting ground
46PA2	C2-C3	Seasonal Game Habitat	Mule deer winter use area
47PA3	C4	Crucial Game Habitat	Sage grouse nesting area
48PA2	C3	Seasonal Game Habitat	Mule deer winter use area
49PA3	C4	Crucial Game Habitat	Sage grouse nesting area
52PA2	A3	Seasonal Game Habitat	Pronghorn winter range, and Ungulate migration corridor
53PA2	A3	Seasonal Game Habitat	Mule deer summer habitat
61PA1	B3	Important Game Habitat	Sage grouse strutting ground
72PA1	A3	Important Game Habitat	Sage grouse strutting ground
73PA2	A4	Seasonal Game Habitat	Mule deer spring range
76PA2	A4	Seasonal Game Habitat	Mule deer winter range
455SS7	D1	BLM Sensitive Species	Big Smoky Valley speckled dace
456SS1	D4	BLM Sensitive Species	Speckled dace
526SW	A2	Spring	Unnamed spring
527SW	A3	Spring	Ackerman Springs
528SW	A2	Spring	Windlass Spring
529SW	B2	Spring	Spencer Hot Springs
530SW	C2	Spring	Unnamed springs
531SW	D1	Spring	35 unnamed springs
532SW	C3	Spring	Mud Spring
533SW	C3	Spring	Johnny Potts Spring
534SW	C4	Spring	Seven unnamed springs
536SW	C3	Spring	Unnamed spring
537SW	C4	Spring	Unnamed hot spring
538SW	D4	Spring	Diana's Punch Bowl
539SW	D1	Spring	Unnamed spring
540SW	D4	Spring	Unnamed hot spring
541SW	D4	Spring	Three unnamed springs
542SW	D3	Spring	Three unnamed springs
558SW	D1	Spring	Unnamed spring
633SW	D1	Riparian Area	Wet meadow
671RA	C4	Riparian Area	Riparian area
672RA	A2	Riparian Area	Rye Patch Canyon riparian area
680RA	D1	Riparian Area	Moores Creek riparian area

[1] PA = Protected Area, RA = Riparian Area, SS = Sensitive Species, SW = Spring or Water body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C
D
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Rye Patch Canyon
53PA2
72PA1
Hickison Summit
527SW
528SW
52PA2
45PA1
73PA2
76PA2
Toiyabe Range
529SW
Alkali Flat
Toquima Range
46PA2
61PA1
Monitor Valley
Lander Co.
Eureka Co.
Nye Co.
Big Smoky Valley
530SW
47PA3
532SW
533SW
534SW
48PA2
671RA
537SW
536SW
49PA3
538SW
456SS1
540SW
541SW
531SW
633SW
455SS7
539SW
542SW
44PA1
40PA3
41PA1
558SW
680RA
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-068.3
UTAH
NEVADA
CALIFORNIA
ARIZONA
1
2
3
4 5
6 7 8 9 10 18
11 12 19 20
13 14 15
16 17
Plate 3
Carlin Route

Plate 4

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
280SS2	C3	Seasonal Game Habitat	Waterfowl habitat
322SS1	D4	BLM Sensitive Species	Eastwood milkweed
411SS1	C2	BLM Sensitive Species	Nevada sanddune beardtongue
463SS1	C3	BLM Sensitive Species	San Antonio pocket gopher
543SW	A3	Spring	Nine unnamed springs
544SW	B3	Spring	Antelope Spring
545SW	B3	Spring	Boyd Canyon Spring
546SW	B3	Spring	Three unnamed springs
547SW	B3	Spring	Coyote Hole Spring
548SW	C3	Spring	Four unnamed springs
549SW	C4	Spring	Spanish Spring
628SW	C3	Riparian Area	Seyler Reservoir
629SW	C3	Spring	Mustang Spring
679RA	A4	Riparian Area	Shipley (Barker) Creek riparian area

[1] RA = Riparian Area, SS = Sensitive Species, SW = Spring or Water body

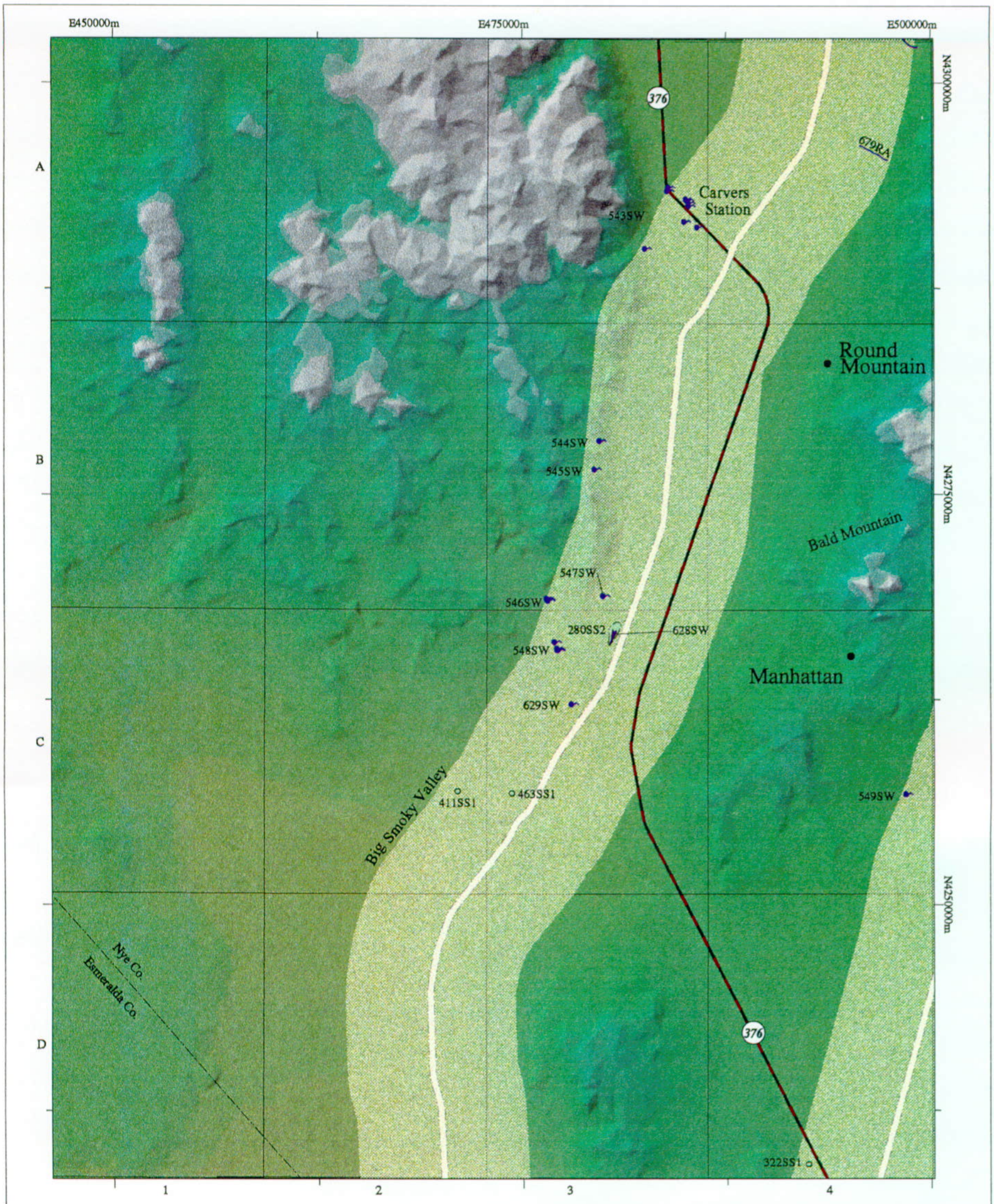

E450000m
E475000m
E500000m
N4300000m
N4275000m
N4250000m
A
B
C
D
1
2
3
4
376
679RA
Carvers Station
543SW
Round Mountain
544SW
545SW
547SW
546SW
280SS2
628SW
548SW
Manhattan
629SW
Big Smoky Valley
411SS1
463SS1
549SW
Nye Co.
Esmeralda Co.
322SS1
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-069.3
UTAH
NEVADA
CALIFORNIA
ARIZONA
1 2 3 4 5 9 10 18 6 7 8 11 12 19 20 13 14 15 16 17
Plate 4
Carlin Route

Plate 5

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
40PA3	A2	Crucial Game Habitat	Sage grouse nesting area
41PA1	A2	Important Game Habitat	Sage grouse habitat
42PA1	A2	Important Game Habitat	Sage grouse habitat
43PA1	B2	Important Game Habitat	Sage grouse habitat
50PA1	B2	Important Game Habitat	Sage grouse habitat
56PA1	B2	Important game habitat/use	Sage grouse habitat
57PA1	C2	Important game habitat/use	Sage grouse habitat
343SS1	A2	BLM Sensitive Species	Pygmy rabbit
550SW	A2	Spring	Five unnamed springs
551SW	B2	Spring	Unnamed spring
552SW	B1	Spring	Combination Spring
553SW	B1	Spring	Mexican Spring
554SW	C1	Spring	Keller Spring
555SW	C1	Spring	Stewart Spring
556SW	C1	Spring	Four unnamed springs
557SW	C1	Spring	Unnamed Spring
681RA	C1	Riparian Area	Riparian area
682RA	B2	Riparian Area	Barley Creek riparian area
683RA	B2	Riparian Area	Riparian area

[1] PA = Protected Area, RA = Riparian Area, SS = Sensitive Species, SW = Spring or Water body

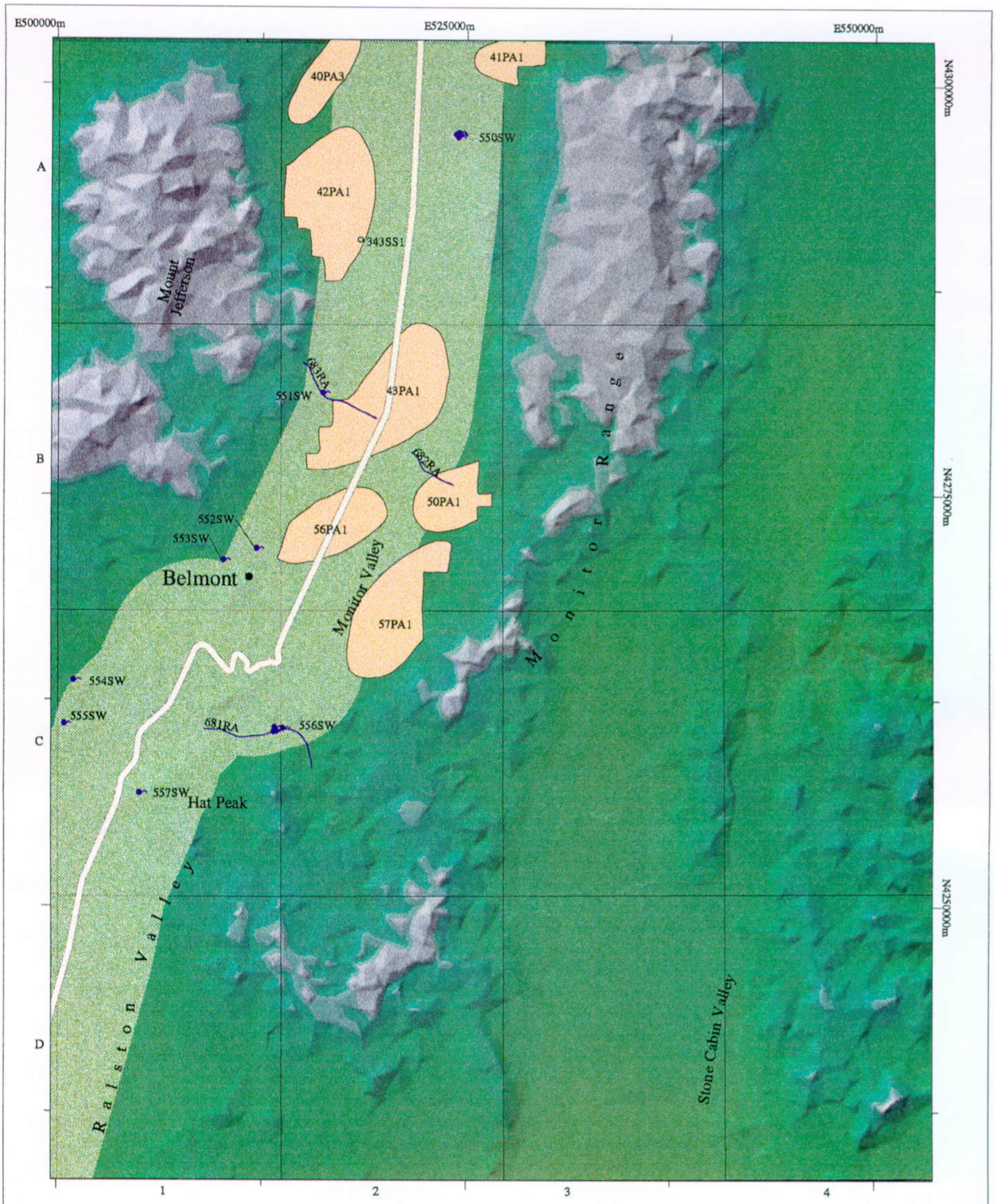

E500000m
E525000m
E550000m
N4300000m
N4275000m
N4250000m
A
B
C
D
1
2
3
4
41PA1
40PA3
550SW
42PA1
343SS1
Mount Jefferson
681RA
551SW
43PA1
682RA
50PA1
552SW
553SW
56PA1
Belmont
Monitor Valley
57PA1
Monitor Range
554SW
555SW
681RA
556SW
557SW
Hat Peak
Ralston Valley
Stone Cabin Valley
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
UTAH
NEVADA
CALIFORNIA
ARIZONA
1 2 3 4 5 6 7 8 9 10 18 11 12 19 20 13 14 15 16 17
Plate 5
Carlin Route
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-070.3

Plate 6

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
293SS1	A2	BLM Sensitive Species	Crescent Dune Aegialian Scarab
321SS1	C3	BLM Sensitive Species	Eastwood milkweed
462SS1	A2	BLM Sensitive Species	Crescent Dune Serican Scarab
589SW	D3	Spring	Tognoni Springs
590SW	D3	Spring	Wildhorse Spring
591SW	D3	Spring	Willow Spring
635SW	D3	Spring	Unnamed spring

[1] SS = Sensitive Species, SW = Spring or Water body

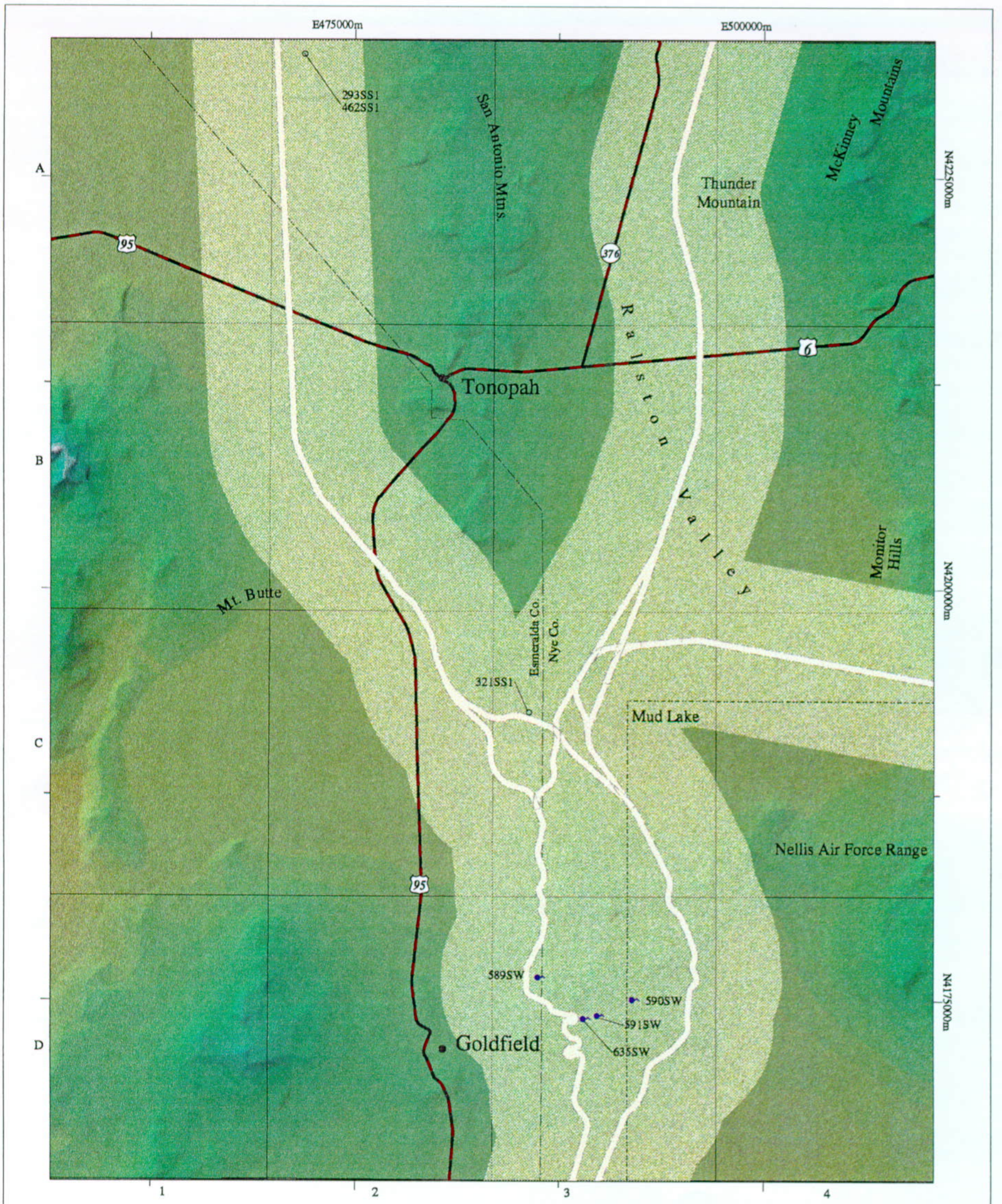

E475000m
E500000m
N4225000m
N4200000m
N4175000m
A
B
C
D
1
2
3
4
293SS1
462SS1
San Antonio Mtns.
Thunder Mountain
McKinney Mountains
95
376
6
Tonopah
Ralston Valley
Monitor Hills
Mt. Butte
Esmeralda Co.
Nye Co.
321SS1
Mud Lake
Nellis Air Force Range
95
589SW
590SW
591SW
635SW
Goldfield
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
UTAH
NEVADA
CALIFORNIA
ARIZONA
1 2 3 4 5 6 7 8 9 10 18 11 12 19 20 13 14 15 16 17
Plate 6
Carlin & Caliente Routes
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-071.3

Plate 7

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
94TE2	A4	Federally Threatened Species	Railroad Valley springfish
413SS1	B2	BLM Sensitive Species	Nevada sanddune beardtongue
582SW	A4	Spring	Hot Springs
583SW	A4	Spring	Warm Spring
584SW	A4	Spring	Black Spring
586SW	A3	Spring	Clifford Spring
587SW	B4	Spring	Unnamed spring
588SW	B2	Spring	Coyote Hole Spring
631SW	A4	Spring Outflow	Hot Springs and outflow
687RA	B4	Riparian Area	Riparian area

[1] RA = Riparian Area, SS = Sensitive Species, SW = Spring or Water body, TE = Federally Threatened or Endangered Species

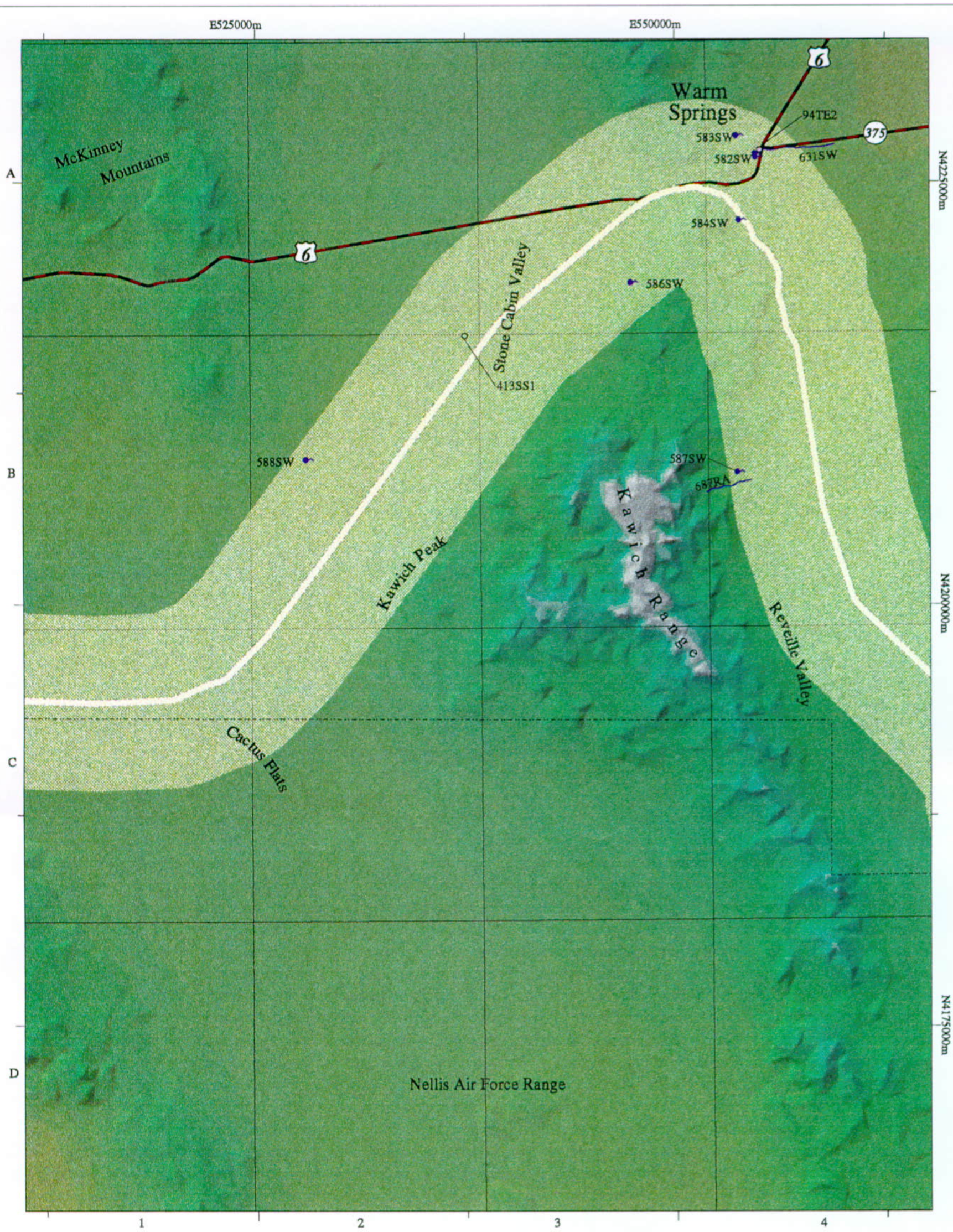

E525000m
E550000m
N4225000m
N4200000m
N4175000m
A
B
C
D
1
2
3
4
6
375
Warm Springs
94TE2
583SW
582SW
631SW
McKinney Mountains
584SW
586SW
Stone Cabin Valley
413SS1
588SW
587SW
687RA
Kawich Peak
Kawich Range
Reveille Valley
Cactus Flats
Nellis Air Force Range
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
UTAH
NEVADA
CALIFORNIA
ARIZONA
1 2 3 4 5 6 7 8 9 10 18 11 12 19 20 13 14 15 16 17
Plate 7
Caliente Route
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-072.3

Plate 8

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
60PA2	B4	Seasonal Game Habitat	Mule deer winter use area
572SW	B4	Spring	McCutchen Spring
573SW	A4	Spring	Quinn Canyon Spring
574SW	B4	Spring	Mud Spring
576SW	B3	Spring	Unnamed spring
577SW	B3	Spring	Unnamed spring
578SW	B3	Spring	Unnamed spring
579SW	B2	Spring	Unnamed spring
580SW	D3	Spring	Unnamed spring
581SW	D3	Spring	White Blotch Spring

[1] PA = Protected Area, SW = Spring or Water body

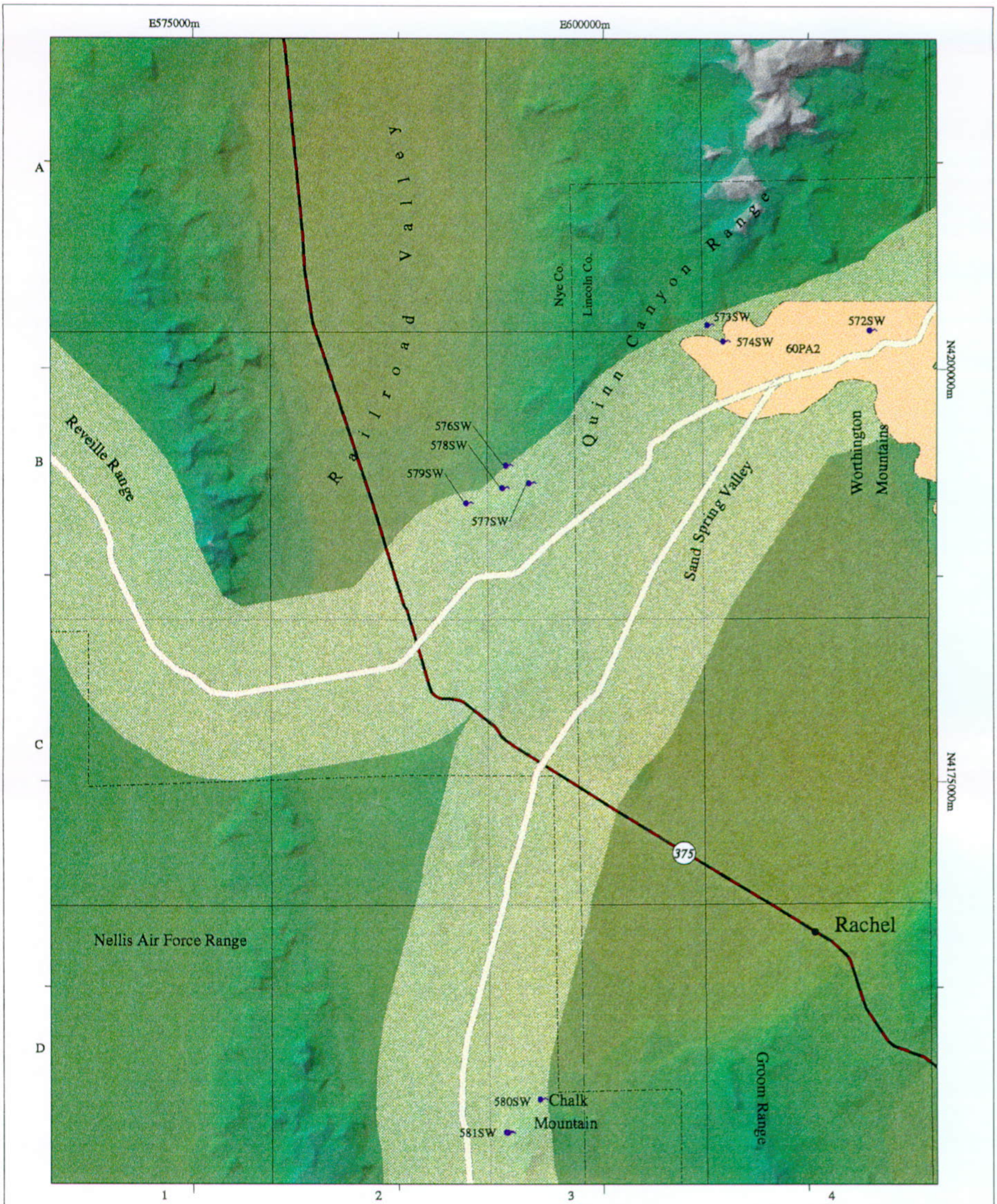

E575000m
E600000m
N4200000m
N4175000m
A
B
C
D
1
2
3
4
Railroad Valley
Nye Co.
Lincoln Co.
Quinn Canyon Range
573SW
572SW
574SW
60PA2
576SW
578SW
579SW
577SW
Reveille Range
Sand Spring Valley
Worthington Mountains
375
Rachel
Nellis Air Force Range
580SW
Chalk Mountain
581SW
Groom Range
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
UTAH
NEVADA
CALIFORNIA
ARIZONA
1 2 3 4 5 6 7 8 9 10 18 11 12 19 20 13 14 15 16 17
Plate 8
Caliente Route
Caliente - Chalk Mountain Route
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-073.3

Plate 9

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
60PA2	D 1	Seasonal Game Habitat	Mule deer winter use area
341SS1	B4	BLM Sensitive Species	Pygmy rabbit
372SS1	B4	BLM Sensitive Species	Welsh's catseye
373SS1	C2	BLM Sensitive Species	Welsh's catseye
634SW	C1	Spring	Unnamed spring
684RA	C4	Riparian Area	White River

[1] PA = Protected Area, RA = Riparian Area, SS = Sensitive Species, SW = Spring or Water body

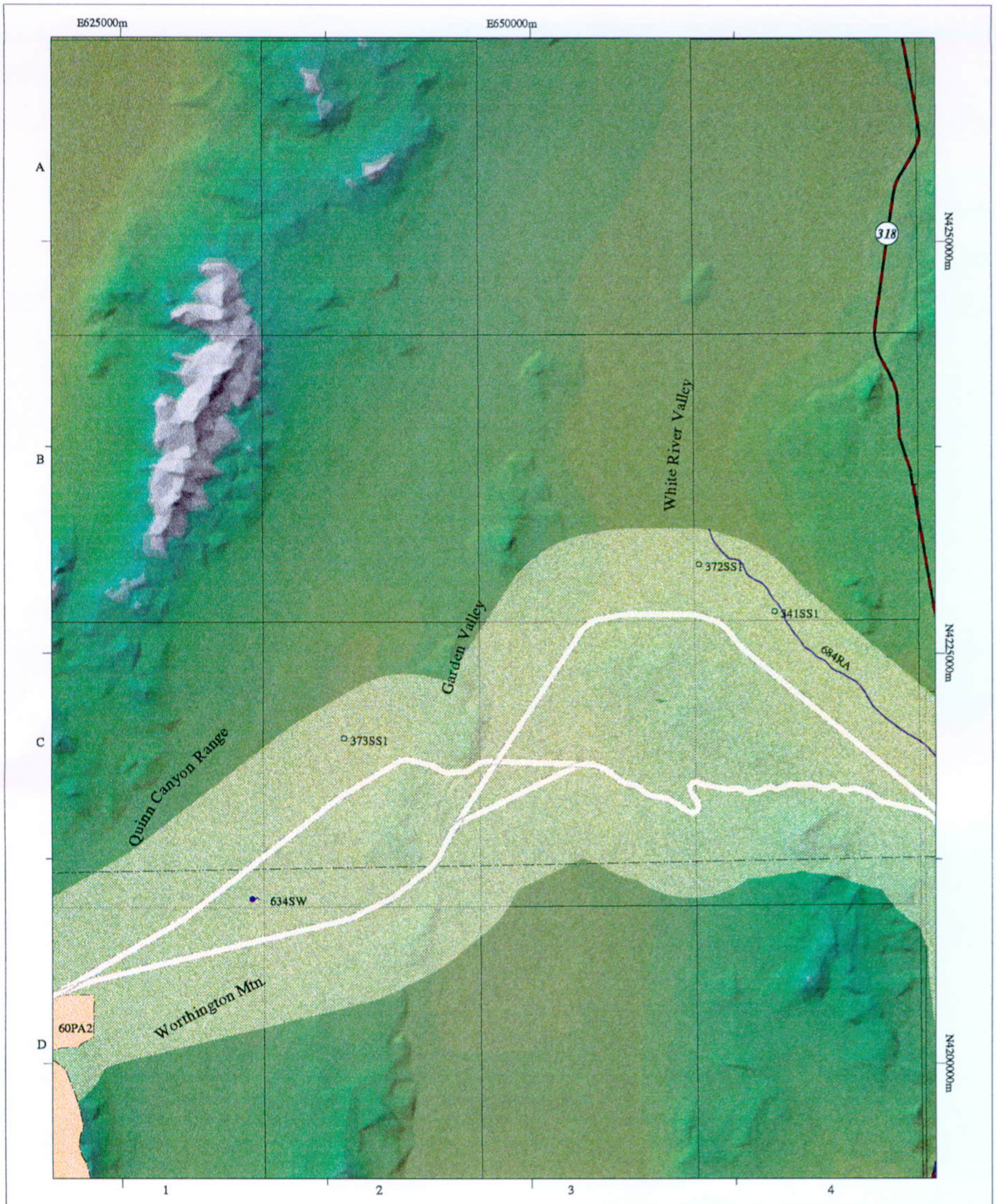

E625000m
E650000m
N4250000m
N4225000m
N4200000m
A
B
C
D
1
2
3
4
318
White River Valley
372SS1
341SS1
684RA
Garden Valley
373SS1
Quinn Canyon Range
634SW
Worthington Mtn.
60PA2
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-074.3
UTAH
NEVADA
CALIFORNIA
ARIZONA
1 2 3 4 5 6 7 8 9 10 18 11 12 19 20 13 14 15 16 17
Plate 9
Caliente Route
Caliente - Chalk Mountain Route

Plate 10

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
55PA3	C4-D4	Crucial Game Habitat	Quail and waterfowl habitat; Crucial quail habitat
59PA2	B3-B4	Seasonal Game Habitat	Mule deer summer use area
275SS1	C4-D4	Riparian Area and BLM Sensitive Species	Meadow Valley Wash, Meadow Valley Wash speckled dace, Meadow Valley Wash desert sucker (with 458SS1)
292SS1	B3	BLM Sensitive Species	Hawk nesting area
326SS1	C4	BLM Sensitive Species	Needle Mountain milkvetch
327SS1	C4	BLM Sensitive Species	Needle Mountain milkvetch
374SS1	C4	BLM Sensitive Species	Welsh's catseye
458SS1	C4-D4	Riparian Area and BLM Sensitive Species	Meadow Valley Wash, Meadow Valley Wash speckled dace, Meadow Valley Wash desert sucker (with 275SS1)
560SW	B1	Spring	Deadman, Coal, Black Rock, and Hamilton springs
561SW	C4	Spring	Bennett Spring
562SW	C4	Spring	Two unnamed springs
563SW	C4	Spring	Unnamed spring
564SW	D4	Spring	Unnamed spring
565SW	D4	Spring	Unnamed spring
566SW	D4	Spring	Unnamed spring
567SW	D4	Spring	Oak Springs
569SW	D4	Spring	Unnamed spring
570SW	D4	Spring	Two unnamed springs
571SW	D4	Spring	Lower Ash Spring
684RA	A1	Riparian Area	White River

[1] PA = Protected Area, RA= Riparian Area, SS = Sensitive Species, SW = Spring or Water body

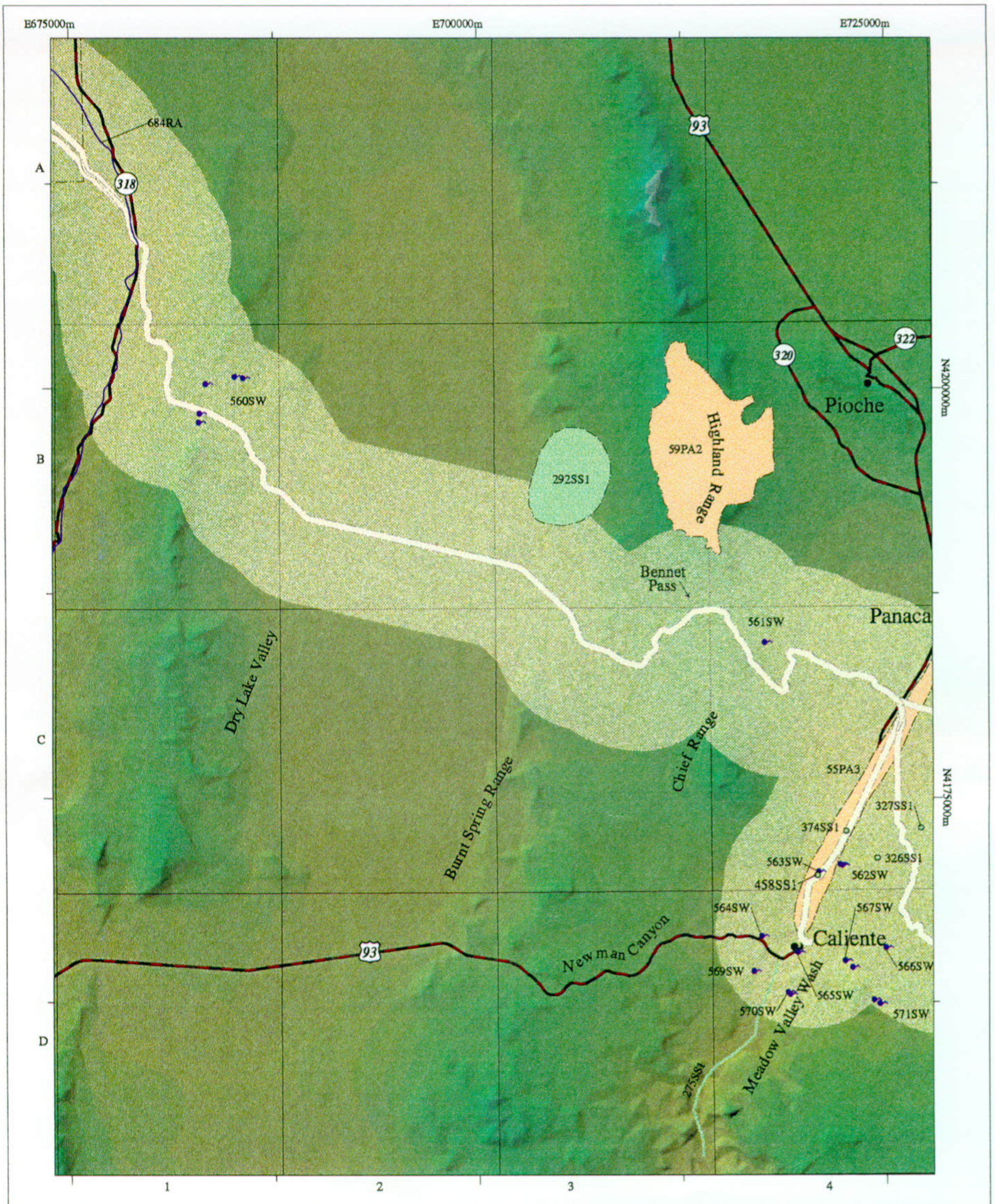
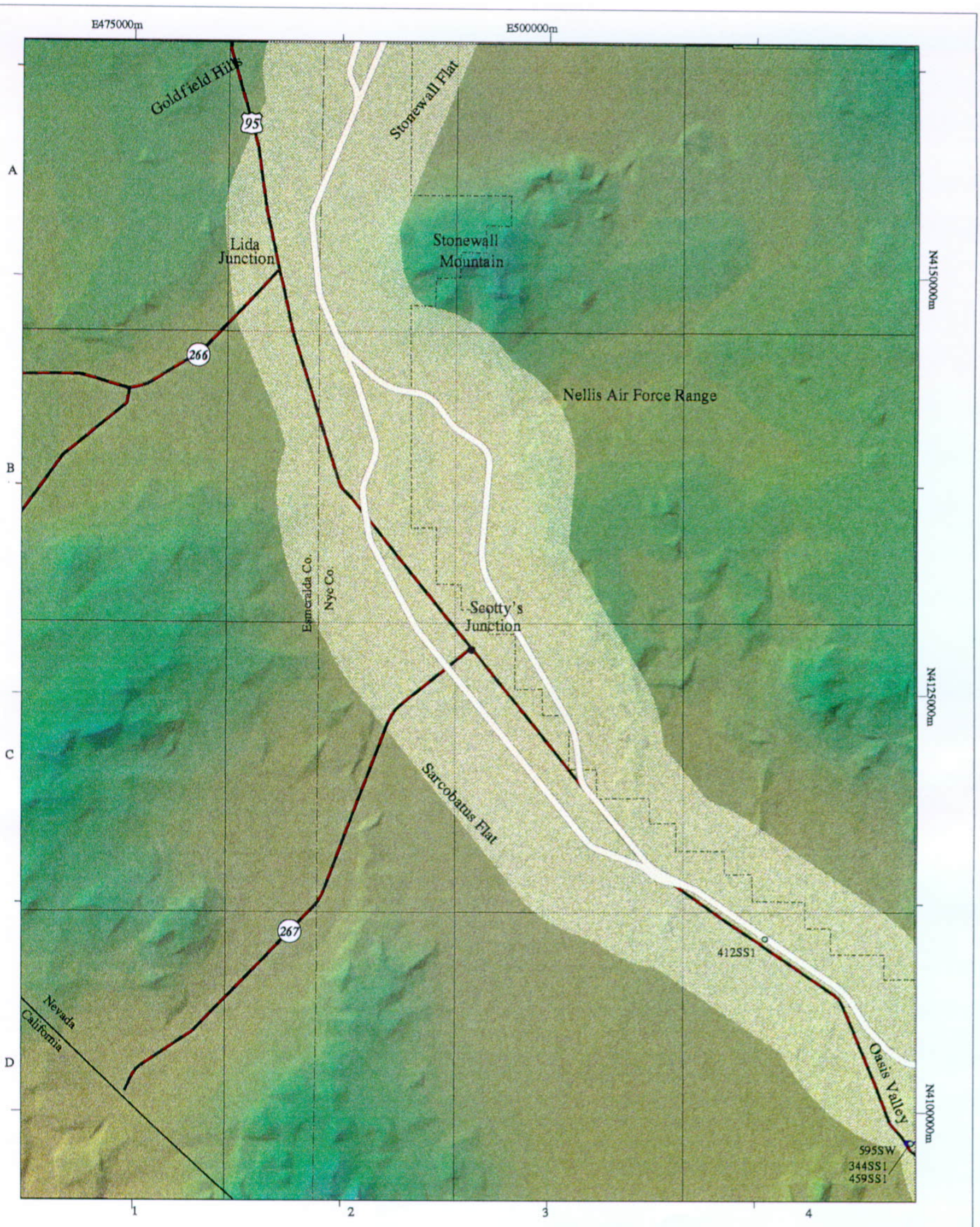

E675000m
E700000m
E725000m
N4200000m
N4175000m
A
B
C
D
1
2
3
4
684RA
318
93
322
320
560SW
292SS1
59PA2
Highland Range
Pioche
Bennet Pass
561SW
Panaca
Dry Lake Valley
Burnt Spring Range
Chief Range
55PA3
327SS1
374SS1
326SS1
563SW
562SW
458SS1
564SW
567SW
Caliente
Newman Canyon
566SW
569SW
565SW
570SW
571SW
Meadow Valley Wash
275SS1
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-075.3
UTAH
NEVADA
CALIFORNIA
ARIZONA
1
2
3
4 5
6 7 8 9 10 18
11 12 19 20
13 14 15
16 17
Plate 10
Caliente Route
Caliente - Chalk Mountain Route

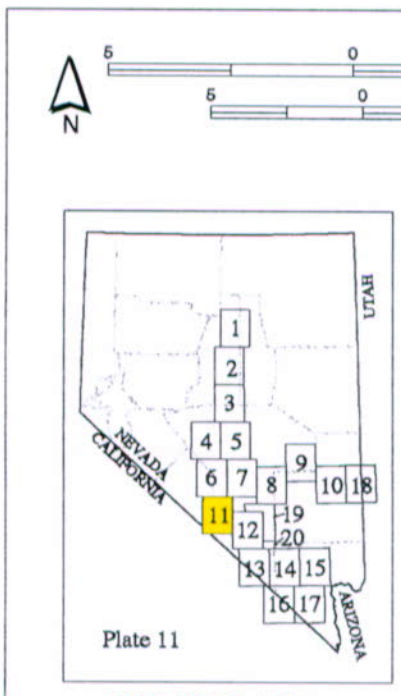
Plate 11

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
344SS1	D4	BLM Sensitive Species	Amargosa toad
412SS1	D4	BLM Sensitive Species	Nevada sanddune beardtongue
459SS1	D4	BLM Sensitive Species	Oasis Valley speckled dace
595SW	D4	Spring	Numerous springs and seeps

[1] SS = Sensitive Species, SW = Spring or Water body





Carlin & Caliente Routes

5 0 5 10 Miles

5 0 5 10 Kilometers

N

BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS

BIOLOGICAL RESOURCES CATEGORIES

Protected Areas (PA)
- 1 - Important Game Habitat/Use Area
- 2 - Seasonal Game Habitat/Use Area
- 3 - Crucial Game Habitat/Use Area
- 4 - Bureau of Land Management Study Plot
- 5 - Area of Critical Environmental Concern

Threatened & Endangered Species and their Habitat (TE)
- 1 - Federally Endangered Species
- 2 - Federally Threatened Species
- 3 - Federally Proposed Species

Special Status Species (SS)
- 1 - Bureau of Land Management Sensitive Species
- 2 - Waterfowl Habitat
- 3 - Candidate Species for Federal Listing
- 4 - State Endangered Species
- 5 - State Threatened Species
- 6 - State Protected Species
- 7 - State Sensitive Species
- 8 - Possible Occurence of Special Status Species

Riparian Area (RA)

Spring or Waterbody (SW)

INFRASTRUCTURE

Primary Road

Secondary Road

TRANSPORTATION CORRIDOR

5-km Buffer Around Potential Rail Corridor

Coordinates are displayed in Universal Transverse Mercator meters.

Map created by CRWMS M&O/TDM on February 25, 1999.

YMP-97-076.3

Plate 12

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
81PA5	C1	Area of Critical Environmental Concern (ACEC)	Amargosa-Oasis ACEC
113SS1	A4	BLM Sensitive Species	Paiute beardtongue
115SS1	B4	BLM Sensitive Species	Clokey's egg milkvetch
116SS1	B4	BLM Sensitive Species	Clokey's egg milkvetch
120SS1	B4	BLM Sensitive Species	Paiute beardtongue
121SS1	B4	BLM Sensitive Species	Paiute beardtongue
185SS1	C4	BLM Sensitive Species	Paiute beardtongue
188SS1	C4	BLM Sensitive Species	Funeral Mountain milkvetch
209SS1	D4	BLM Sensitive Species	Funeral Mountain milkvetch
210SS1	D4	BLM Sensitive Species	Funeral Mountain milkvetch
290SS1	C1	BLM Sensitive Species	Amargosa toad habitat
328SS1	C1	BLM Sensitive Species	Funeral Mountain milkvetch
329SS1	C1	BLM Sensitive Species	Funeral Mountain milkvetch
334SS1	D4	BLM Sensitive Species	Funeral Mountain milkvetch
345SS1	C1	BLM Sensitive Species	Amargosa toad
346SS1	C1	BLM Sensitive Species	Amargosa toad
347SS1	C1	BLM Sensitive Species	Amargosa toad
368SS1	D4	BLM Sensitive Species	Largeflower suncup
369SS1	D4	BLM Sensitive Species	Largeflower suncup
391SS1	B4	BLM Sensitive Species	Hilend's bedstraw
394SS1	B4	BLM Sensitive Species	Hilend's bedstraw
401SS1	D3	BLM Sensitive Species	Fringed myotis
403SS1	D3	BLM Sensitive Species	Long-legged myotis
425SS1	A4	BLM Sensitive Species	Paiute beardtongue
426SS1	C4	BLM Sensitive Species	Paiute beardtongue
452SS1	C1	BLM Sensitive Species	Oasis Valley springsnail
460SS1	C1	BLM Sensitive Species	Oasis Valley speckled dace
592SW	C1	Spring	Thirteen unnamed springs
594SW	C1	Spring	Goss Springs
595SW	C1	Spring	Numerous springs and seeps
623SW	B4	Spring	Unnamed spring
624SW	B4	Spring	Captain Jack Spring
626SW	C4	Spring	Tippipah Spring
632SW	C1	Stream/Riparian Area	Amargosa River
685RA	C1	Riparian Area	Riparian area

[1] PA = Protected Area, RA = Riparian Area, SS = Sensitive Species, SW = Spring or Water body

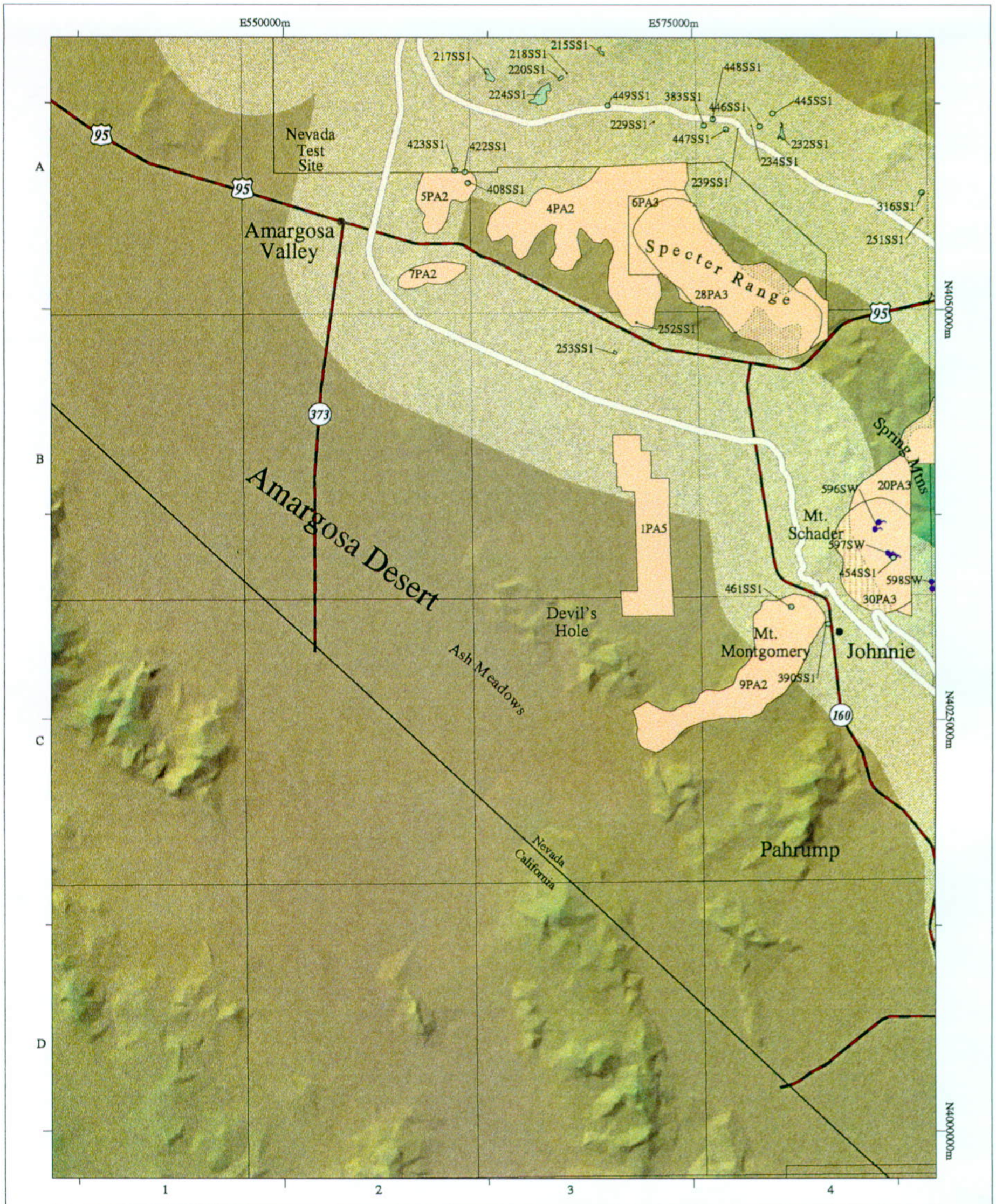

E525000m
E550000m
E575000m
N4125000m
N4100000m
N4075000m
A
B
C
D
1
2
3
4
Nellis Air Force Range
Nevada Test Site
Gold Meadows
425SS1
113SS1
116SS1
394SS1
391SS1
115SS1
120SS1
121SS1
624SW
623SW
Eleana Range
81PA5
452SS1
685RA
345SS1
595SW
592SW
346SS1
632SW
460SS1
595SW
347SS1
594SW
81PA5
595SW
328SS1
329SS1
290SS1
Oasis Valley
Beatty
Bare Mountain
Yucca Mountain
Fortymile Wash
Shoshone Mountain
626SW
185SS1
426SS1
188SS1
334SS1
210SS1
209SS1
368SS1
369SS1
Potential Repository Site
401SS1
403SS1
Skull Mountain
Crater Flat
95
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
UTAH
NEVADA
CALIFORNIA
ARIZONA
1
2
3
4 5
6 7 8
9
10 18
11
12
19
20
13 14 15
16 17
Plate 12
All Routes
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-077.3

Plate 13

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
1PA5	B3	ACEC	Amargosa Mesquite ACEC
4PA2	A3	Seasonal Game Habitat	Bighorn sheep winter range
5PA2	A2-A3	Seasonal Game Habitat	Bighorn sheep winter range
6PA3	A4	Crucial Game Habitat	Crucial bighorn sheep habitat
7PA2	A2	Seasonal Game Habitat	Bighorn sheep winter range
9PA2	C4	Seasonal Game Habitat	Bighorn sheep winter range
20PA3	B4	Crucial Game Habitat	Mule deer crucial summer habitat
28PA3	A4	Crucial Game Habitat	Crucial quail habitat
30PA3	C4	Crucial Game Habitat	Crucial quail habitat
215SS1	A3	BLM Sensitive Species	Beatley's scorpionweed
217SS1	A3	BLM Sensitive Species	Largeflower suncup
218SS1	A3	BLM Sensitive Species	Parish's scorpionweed
220SS1	A3	BLM Sensitive Species	Largeflower suncup
224SS1	A3	BLM Sensitive Species	Largeflower suncup
229SS1	A3	BLM Sensitive Species	Ripley's springparsley
232SS1	A4	BLM Sensitive Species	Parish's scorpionweed
234SS1	A4	BLM Sensitive Species	Parish's scorpionweed
239SS1	A4	BLM Sensitive Species	Parish's scorpionweed
251SS1	A4	BLM Sensitive Species	Desert bearpoppy
252SS1	B3	BLM Sensitive Species	Desert bearpoppy
253SS1	B3	BLM Sensitive Species	White-margined beardtongue
316SS1	A4	BLM Sensitive Species	Desert bearpoppy
383SS1	A4	BLM Sensitive Species	Ripley's springparsley
390SS1	C4	BLM Sensitive Species	Redheaded sphecid wasp
408SS1	A2	BLM Sensitive Species	White-margin beardtongue
422SS1	A2	BLM Sensitive Species	Death Valley beardtongue
423SS1	A2	BLM Sensitive Species	Death Valley beardtongue
445SS1	A4	BLM Sensitive Species	Parish's scorpionweed
446SS1	A4	BLM Sensitive Species	Parish's scorpionweed
447SS1	A4	BLM Sensitive Species	Parish's scorpionweed
448SS1	A4	BLM Sensitive Species	Parish's scorpionweed
449SS1	A3	BLM Sensitive Species	Parish's scorpionweed
454SS1	B4	BLM Sensitive Species	Oasis Valley springsnail
461SS1	C4	BLM Sensitive Species	Woolly sage
596SW	B4	Spring	Kwichup Spring
597SW	B4	Spring	Grapevine Spring
598SW	B4	Spring	Horseshutem Springs

[1] PA = Protected Area, SS = Sensitive Species, SW = Spring or Water body


E550000m
E575000m
N4050000m
N4025000m
N4000000m
A
B
C
D
1
2
3
4
95
373
160
Nevada Test Site
Amargosa Valley
Amargosa Desert
Devil's Hole
Ash Meadows
Nevada
California
Specter Range
Spring Mtns
Mt. Schader
Mt. Montgomery
Johnnie
Pahrump
217SS1
218SS1
215SS1
220SS1
224SS1
448SS1
449SS1
383SS1
446SS1
445SS1
229SS1
447SS1
232SS1
234SS1
423SS1
422SS1
408SS1
5PA2
4PA2
6PA3
239SS1
316SS1
251SS1
7PA2
28PA3
252SS1
253SS1
1PA5
596SW
20PA3
597SW
454SS1
598SW
30PA3
461SS1
9PA2
390SS1
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-078.3
UTAH
NEVADA
CALIFORNIA
ARIZONA
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2
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4 5
6 7 8
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10 18
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12
19
20
13 14 15
16 17
Plate 13
Valley Modified & Jean Routes

Plate 14

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
8PA2	C4	Seasonal Game Habitat	Bighorn sheep winter range
19PA2	C4	Seasonal Game Habitat	Mule deer winter habitat
21PA2	D1	Seasonal Game Habitat	Mule deer winter range
22PA2	D2	Seasonal Game Habitat	Mule deer winter range
29PA3	B1	Crucial Game Habitat	Crucial quail habitat
31PA3	C1	Crucial Game Habitat	Crucial quail habitat
32PA3	D1	Crucial Game Habitat	Crucial quail habitat
33PA3	D4	Crucial Game Habitat	Crucial quail habitat
34PA3	D2	Crucial Game Habitat	Crucial quail habitat
35PA3	D1	Crucial Game Habitat	Crucial quail habitat
242SS1	A1	BLM Sensitive Species	Desert bearpoppy
244SS1	A1	BLM Sensitive Species	Desert bearpoppy
254SS1	C1	BLM Sensitive Species	Death Valley beardtongue
309SS1	B2	BLM Sensitive Species	Desert bearpoppy
310SS1	B3	BLM Sensitive Species	Desert bearpoppy
312SS1	A3	BLM Sensitive Species	Desert bearpoppy
313SS1	B3	BLM Sensitive Species	Desert bearpoppy
314SS1	B3	BLM Sensitive Species	Desert bearpoppy
315SS1	A1	BLM Sensitive Species	Desert bearpoppy
317SS1	A1	BLM Sensitive Species	Desert bearpoppy
318SS1	A1	BLM Sensitive Species	Desert bearpoppy
320SS1	D1	BLM Sensitive Species	Desert bearpoppy
335SS1	C4	BLM Sensitive Species	Mojave milkvetch
336SS1	B3	BLM Sensitive Species	Mojave milkvetch
337SS1	B3	BLM Sensitive Species	Mojave milkvetch
338SS1	B3	BLM Sensitive Species	Mojave milkvetch
339SS1	B2	BLM Sensitive Species	Mojave milkvetch
420SS1	D1	BLM Sensitive Species	Pinto (rosy) beardtongue
424SS1	C1	BLM Sensitive Species	Death Valley beardtongue
598SW	B1	Spring	Horseshutem Springs
599SW	C1	Spring	Crystal Spring
600SW	C1	Spring	Rainbow Spring
601SW	B3	Spring	Indian Spring
602SW	C1	Spring	Horse Springs
604SW	D1	Spring	Younis Spring

[1] PA = Protected Area, SS = Sensitive Species, SW = Spring or Water body

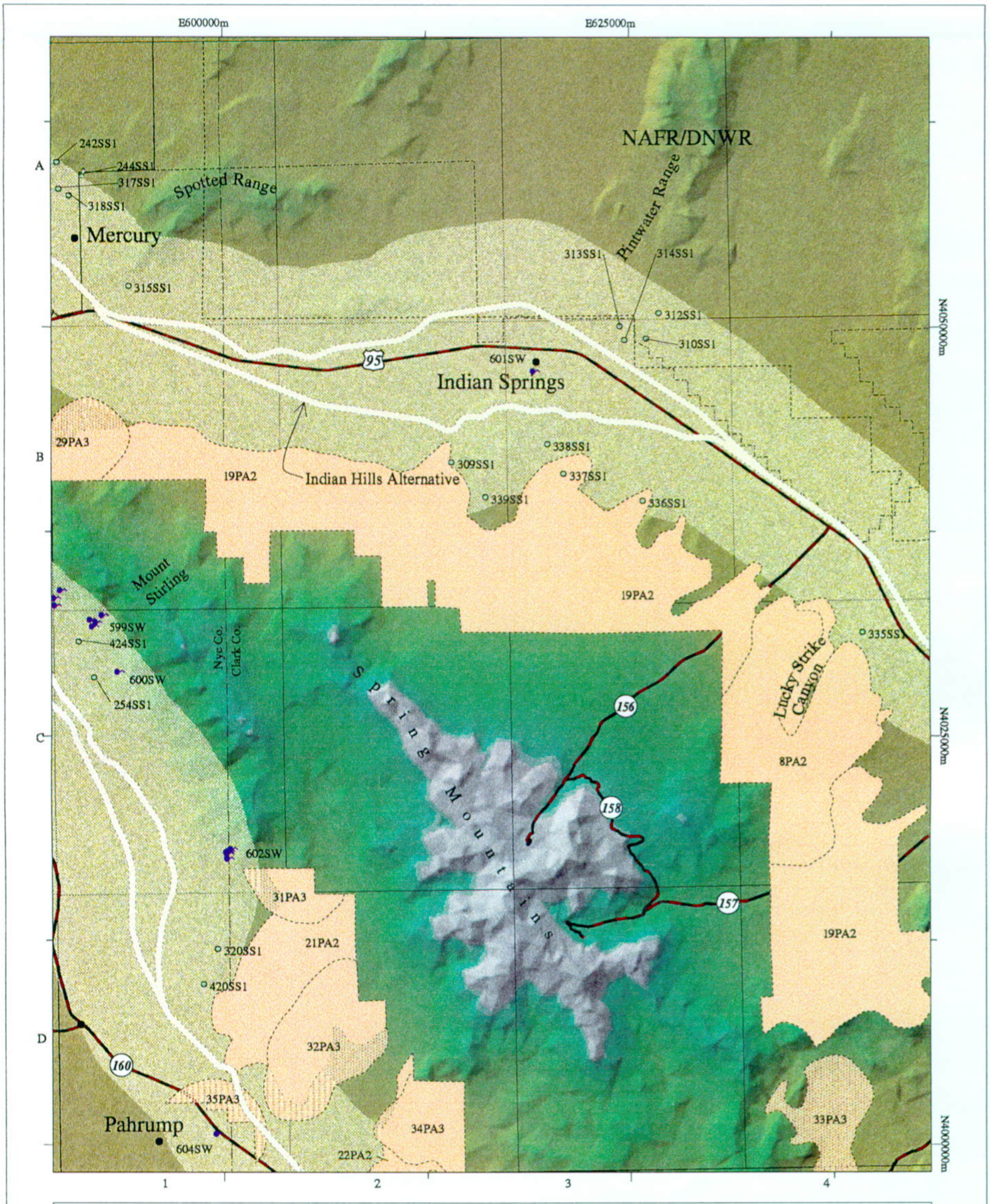

E600000m
E625000m
N4050000m
N4025000m
N4000000m
A
B
C
D
1
2
3
4
242SS1
244SS1
317SS1
318SS1
Spotted Range
Mercury
315SS1
NAFR/DNWR
Pintwater Range
313SS1
314SS1
312SS1
310SS1
95
601SW
Indian Springs
29PA3
19PA2
Indian Hills Alternative
309SS1
338SS1
337SS1
339SS1
336SS1
Mount Stirling
599SW
424SS1
600SW
254SS1
Nye Co.
Clark Co.
Spring Mountains
156
Lucky Strike Canyon
335SS1
8PA2
158
602SW
31PA3
21PA2
320SS1
420SS1
157
19PA2
32PA3
160
35PA3
Pahrump
604SW
34PA3
22PA2
33PA3
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-079.3
UTAH
NEVADA
CALIFORNIA
ARIZONA
Plate 14
Valley Modified & Jean Routes

Plate 15

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
2PA5	D3	ACEC	Rainbow Gardens ACEC
91TE1	B1	Federally Endangered Species	Pahrump poolfish
92TE1	C1	Federally Endangered Species	Pahrump poolfish
93TE1	C1	Federally Endangered Species	Razorback sucker
255SS1	C2	BLM Sensitive Species	Pinto (rosy) beardtongue
256SS1	C2	BLM Sensitive Species	Pinto (rosy) beardtongue
257SS1	C3	BLM Sensitive Species	California bearpoppy
258SS1	C3	BLM Sensitive Species	California bearpoppy
259SS1	C2	BLM Sensitive Species	California bearpoppy
294SS1	D2	BLM Sensitive Species	California bearpoppy
295SS1	D3	BLM Sensitive Species	California bearpoppy
296SS1	C3	BLM Sensitive Species	California bearpoppy
297SS1	C2	BLM Sensitive Species	California bearpoppy
298SS1	C2	BLM Sensitive Species	California bearpoppy
299SS1	C2	BLM Sensitive Species	California bearpoppy
300SS1	C1	BLM Sensitive Species	California bearpoppy
301SS1	C3	BLM Sensitive Species	California bearpoppy
302SS1	C3	BLM Sensitive Species	California bearpoppy
303SS1	C3	BLM Sensitive Species	California bearpoppy
304SS1	D3	BLM Sensitive Species	California bearpoppy
305SS1	C3	BLM Sensitive Species	California bearpoppy
306SS1	C3	BLM Sensitive Species	California bearpoppy
307SS1	D2	BLM Sensitive Species	California bearpoppy
450SS1	B1	BLM Sensitive Species	Townsend's big-eared bat
605SW	B1	Spring	Corn Creek Spring
630SW	C1	Stream/ Waterbody	Tule Spring, Mulberry Pond, other water bodies

[1] PA = Protected Area, SS = Sensitive Species, SW = Spring or Water body, TE = Federally Threatened or Endangered Species

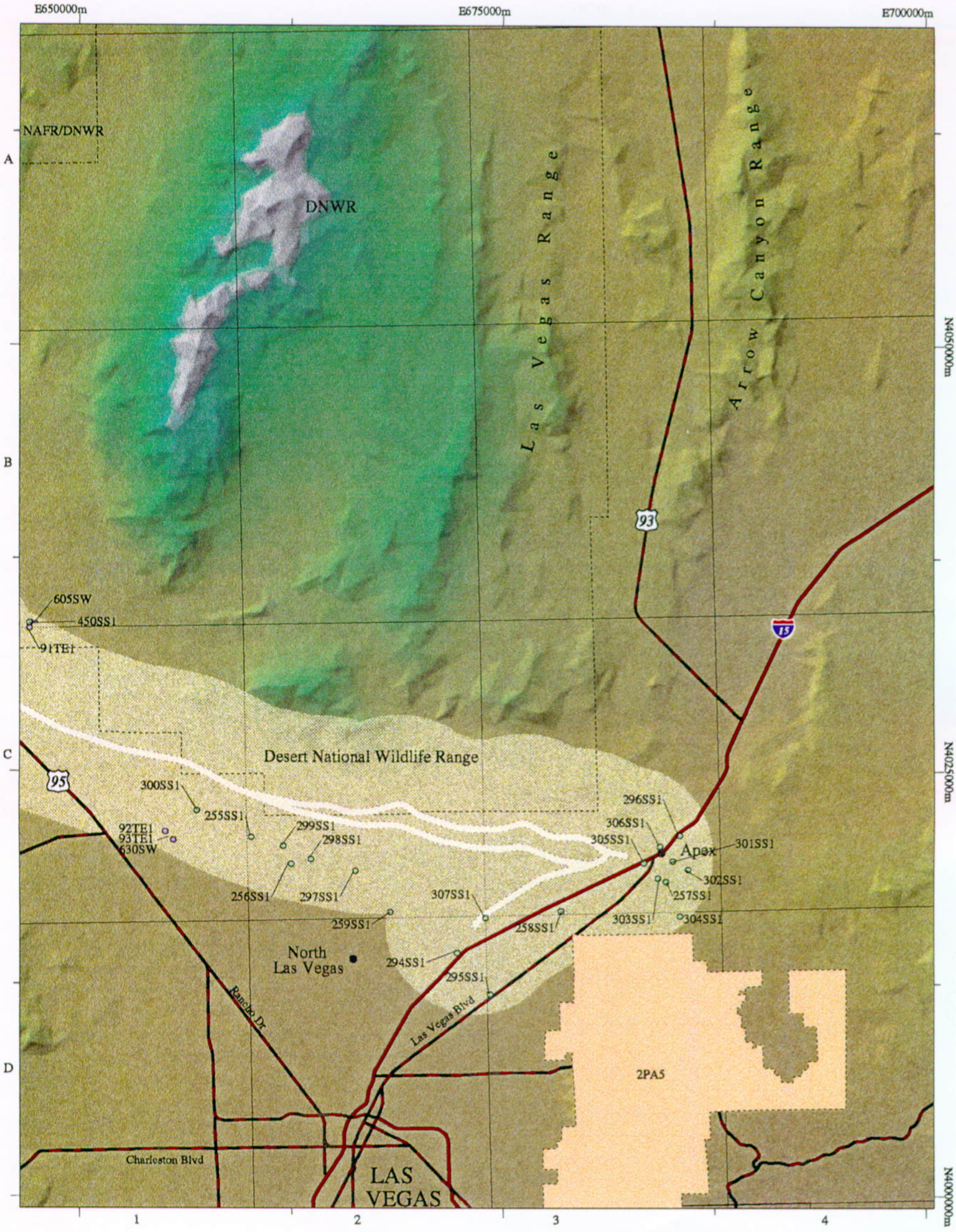
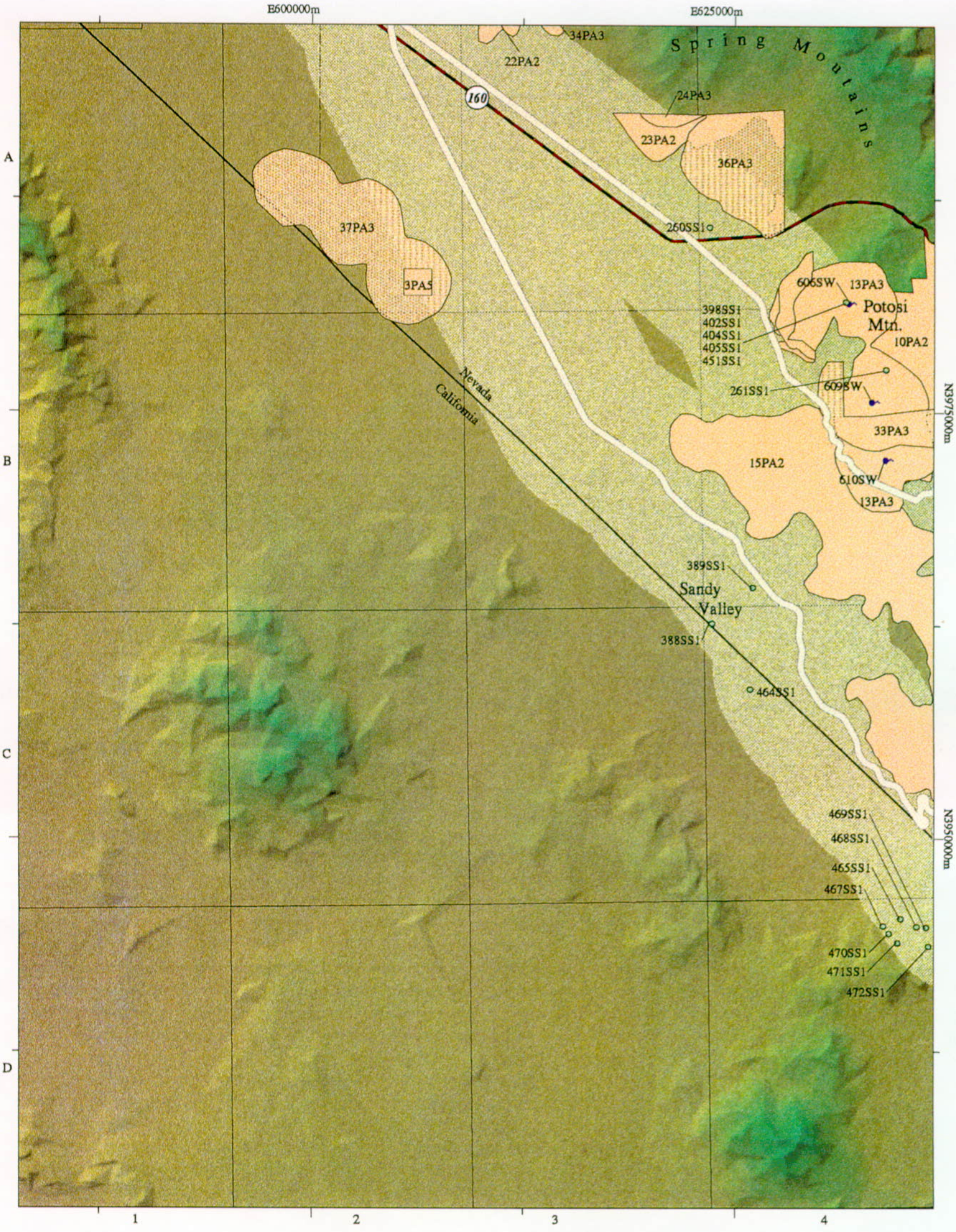

E650000m
E675000m
E700000m
N4050000m
N4025000m
N4000000m
A
B
C
D
1
2
3
4
NAFR/DNWR
DNWR
Las Vegas Range
Arrow Canyon Range
93
15
95
605SW
450SS1
91TE1
Desert National Wildlife Range
300SS1
255SS1
92TE1
93TE1
630SW
299SS1
298SS1
256SS1
297SS1
259SS1
307SS1
258SS1
294SS1
295SS1
296SS1
306SS1
305SS1
Apex
301SS1
302SS1
257SS1
303SS1
304SS1
North
Las Vegas
Rancho Dr
Las Vegas Blvd
2PA5
Charleston Blvd
LAS
VEGAS
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN
5KM OF POTENTIAL
RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around
Potential Rail Corridor
UTAH
NEVADA
CALIFORNIA
ARIZONA
1
2
3
4 5
6 7 8 9 10 18
11 12 19 20
13 14 15
16 17
Plate 15
Valley Modified Route
Coordinates are displayed in
Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM
on February 25, 1999.
YMP-97-080.3

Plate 16

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
3PA5	A2	ACEC	Stump Spring ACEC
10PA2	B4	Seasonal Game Habitat	Bighorn sheep winter range
13PA3	B4	Crucial Game Habitat	Crucial bighorn sheep habitat
15PA2	B4	Seasonal Game Habitat	Bighorn sheep winter range
22PA2	A3	Seasonal Game Habitat	Mule deer winter range
23PA2	A3	Seasonal Game Habitat	Mule deer winter range
24PA3	A3	Crucial Game Habitat	Mule deer crucial summer habitat
33PA3	B4	Crucial Game Habitat	Crucial quail habitat
34PA3	A3	Crucial Game Habitat	Crucial quail habitat
36PA3	A4	Crucial Game Habitat	Crucial quail habitat
37PA3	A2	Crucial Game Habitat	Crucial quail habitat
260SS1	A4	BLM Sensitive Species	Pinto (yellow) beardtongue
261SS1	B4	BLM Sensitive Species	Spring Mountain milkvetch
388SS1	C4	BLM Sensitive Species	Pahrump Valley buckwheat
389SS1	B4	BLM Sensitive Species	Pahrump Valley buckwheat
398SS1	A4	BLM Sensitive Species	Allen's big-eared bat
402SS1	A4	BLM Sensitive Species	Fringed myotis
404SS1	A4	BLM Sensitive Species	Long-legged myotis
405SS1	A4	BLM Sensitive Species	Yumamyotis
451SS1	A4	BLM Sensitive Species	Townsend's big-eared bat
464SS1	C4	BLM Sensitive Species	Pahrump Valley buckwheat
465SS1	D4	BLM Sensitive Species	Desert bearpoppy
467SS1	D4	BLM Sensitive Species	Rusby's globemallow
468SS1	D4	BLM Sensitive Species	Desert bearpoppy
469SS1	D4	BLM Sensitive Species	Desert bearpoppy
470SS1	D4	BLM Sensitive Species	Desert bearpoppy
471SS1	D4	BLM Sensitive Species	Desert bearpoppy
472SS1	D4	BLM Sensitive Species	Desert bearpoppy
606SW	A4	Spring	Potosi Spring
609SW	B4	Spring	Mexican Spring
610SW	B4	Spring	Cave Spring

[1] PA = Protected Area, SS = Sensitive Species, SW = Spring or Water body

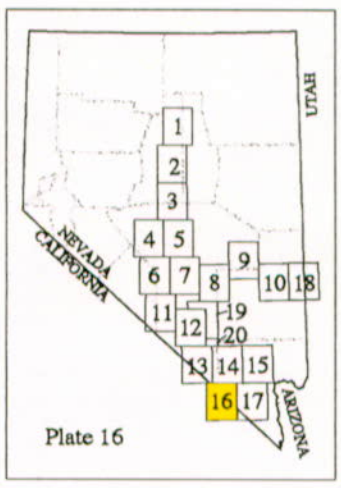


5 0 5 10 Miles

5 0 5 10 Kilometers

N

BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS



Jean Route

BIOLOGICAL RESOURCES CATEGORIES

Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern

Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species

Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species

Riparian Area (RA)

Spring or Waterbody (SW)

INFRASTRUCTURE

Primary Road

Secondary Road

TRANSPORTATION CORRIDOR

5-km Buffer Around Potential Rail Corridor

Coordinates are displayed in Universal Transverse Mercator meters.

Map created by CRWMS M&O/TDM on February 25, 1999.

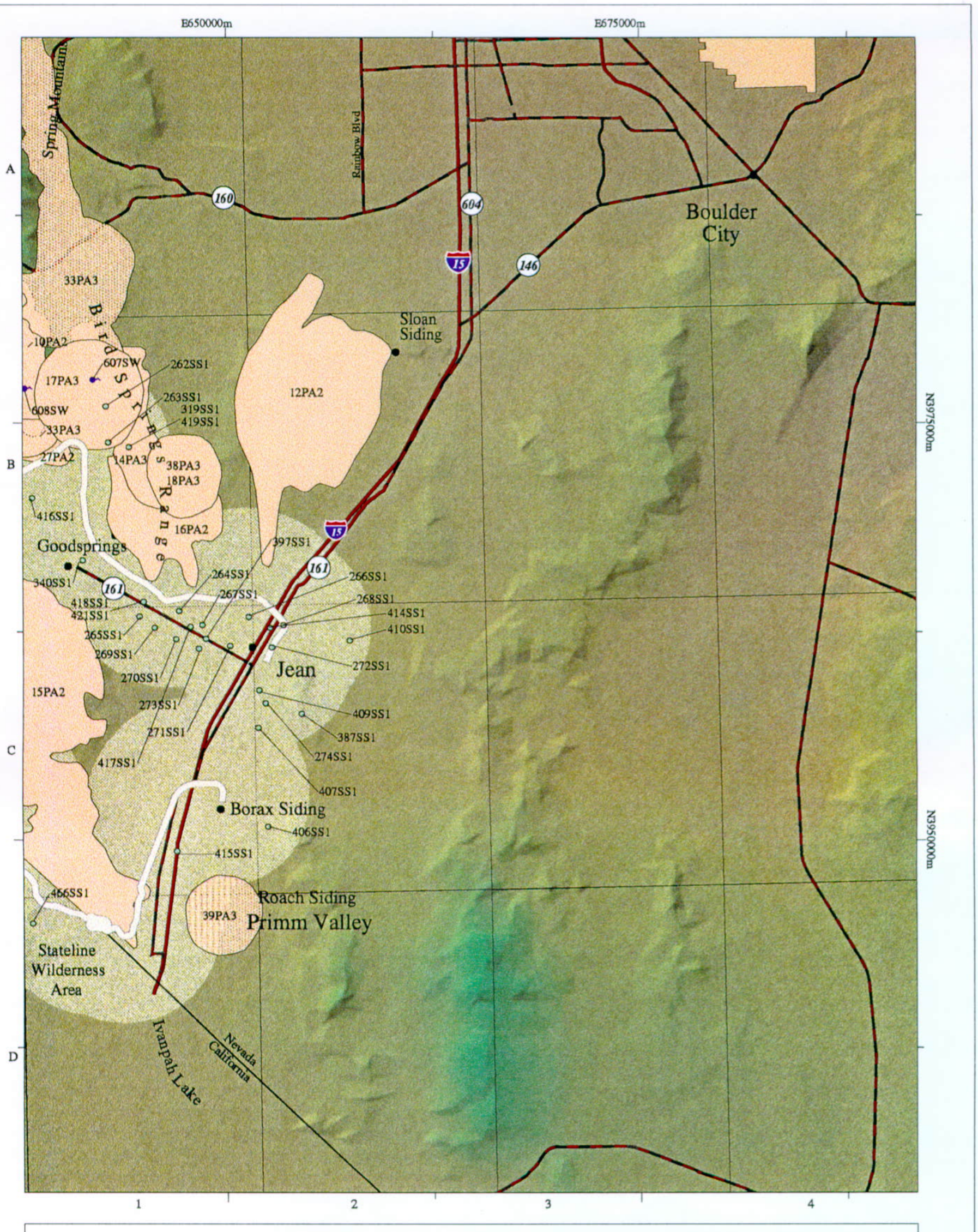
YMP-97-081.3

Plate 17

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
10PA2	A1	Seasonal Game Habitat	Bighorn sheep winter range
12PA2	B2	Seasonal Game Habitat	Bighorn sheep winter range
14PA3	B1	Crucial Game Habitat	Crucial bighorn sheep habitat
15PA2	C1	Seasonal Game Habitat	Bighorn sheep winter range
16PA2	B1	Seasonal Game Habitat	Bighorn sheep winter range
17PA3	B1	Crucial Game Habitat	Crucial chukar habitat
18 PA3	B1	Crucial Game Habitat	Crucial chukar habitat
27PA2	B1	Seasonal Game Habitat	Mule deer winter habitat
33PA3	A1	Crucial Game Habitat	Crucial quail habitat
38PA3	B1	Crucial Game Habitat	Crucial quail habitat
39PA3	C1	Crucial Game Habitat	Crucial quail habitat
262SS1	B1	BLM Sensitive Species	Pinto (rosy) beardtongue
263SS1	B1	BLM Sensitive Species	Pinto (yellow) beardtongue
264SS1	C1	BLM Sensitive Species	Pinto (rosy) beardtongue
265SS1	C1	BLM Sensitive Species	Pinto (yellow) beardtongue
266SS1	C1	BLM Sensitive Species	Pinto (rosy) beardtongue
267SS1	C1	BLM Sensitive Species	Pinto (yellow) beardtongue
268SS1	C2	BLM Sensitive Species	Pinto (rosy) beardtongue
269SS1	C1	BLM Sensitive Species	Pinto (yellow) beardtongue
270SS1	C1	BLM Sensitive Species	Pinto (rosy) beardtongue
271SS1	C1	BLM Sensitive Species	Pinto (yellow) beardtongue
272SS1	C2	BLM Sensitive Species	Pinto (yellow) beardtongue
273SS1	C1	BLM Sensitive Species	Pinto (rosy) beardtongue
274SS1	C2	BLM Sensitive Species	White-margined beardtongue
319SS1	B1	BLM Sensitive Species	Desert bearpoppy
340SS1	B1	BLM Sensitive Species	Spring Mountain milkvetch
387SS1	C2	BLM Sensitive Species	Sheep fleabane
397SS1	C1	BLM Sensitive Species	Banded gila monster
406SS1	C2	BLM Sensitive Species	White-margined beardtongue
407SS1	C2	BLM Sensitive Species	White-margined beardtongue
409SS1	C2	BLM Sensitive Species	White-margined beardtongue
410SS1	C2	BLM Sensitive Species	White-margined beardtongue
414SS1	C2	BLM Sensitive Species	Pinto (yellow) beardtongue
415SS1	C1	BLM Sensitive Species	Pinto (yellow) beardtongue
416SS1	B1	BLM Sensitive Species	Pinto (yellow) beardtongue
417SS1	C1	BLM Sensitive Species	Pinto (yellow) beardtongue
418SS1	B1	BLM Sensitive Species	Pinto (yellow) beardtongue
419SS1	B1	BLM Sensitive Species	Pinto (rosy) beardtongue
421SS1	B1	BLM Sensitive Species	Pinto (rosy) beardtongue
466SS1	D1	BLM Sensitive Species	Desert bearpoppy
607SW	B1	Spring	Wilson Tank
608SW	B1	Spring	Aztec Tank

[1] PA = Protected Area, SS = Sensitive Species, SW = Spring or Water body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E675000m
N3975000m
N3950000m
A
B
C
D
1
2
3
4
Spring Mountains
Rainbow Blvd
160
604
15
146
Boulder City
Sloan Siding
33PA3
10PA2
607SW
262SS1
17PA3
263SS1
319SS1
608SW
419SS1
33PA3
27PA2
14PA3
38PA3
18PA3
12PA2
Bird Spring Range
416SS1
16PA2
Goodsprings
397SS1
340SS1
161
264SS1
266SS1
267SS1
268SS1
418SS1
414SS1
421SS1
410SS1
265SS1
272SS1
269SS1
Jean
270SS1
15PA2
273SS1
409SS1
271SS1
387SS1
274SS1
417SS1
407SS1
Borax Siding
406SS1
415SS1
466SS1
Roach Siding
39PA3
Primm Valley
Stateline Wilderness Area
Ivanpah Lake
Nevada
California

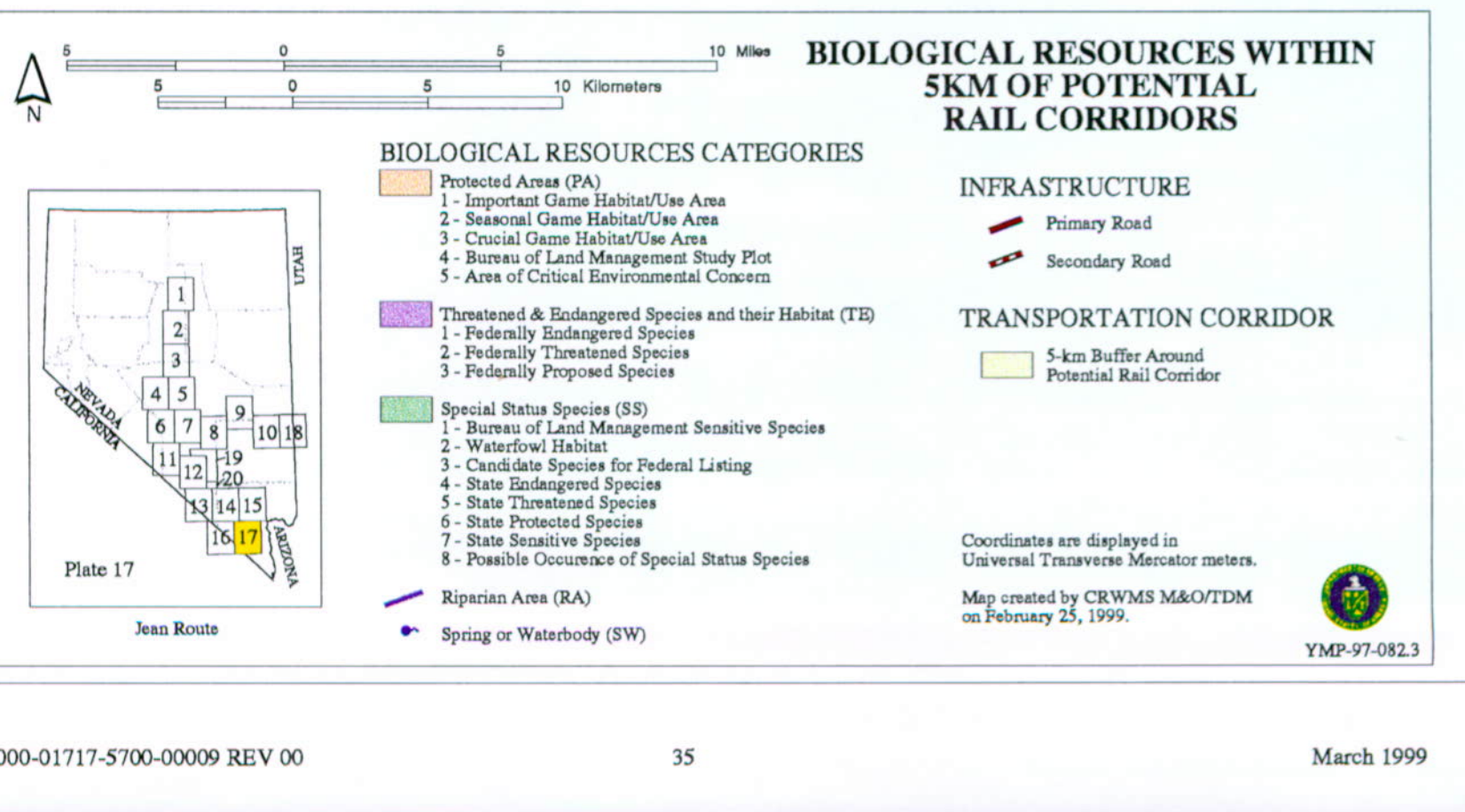
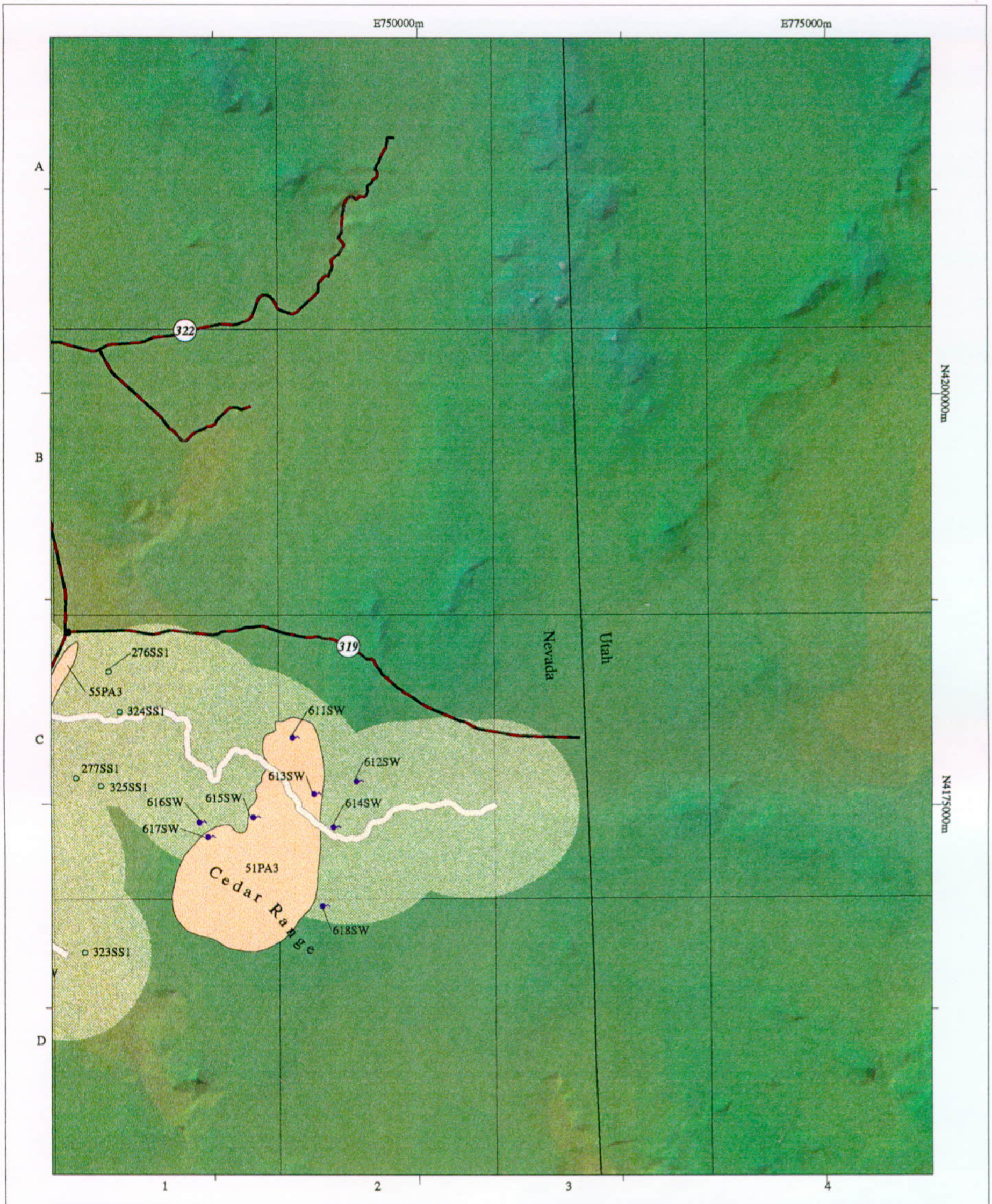

5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
TRANSPORTATION CORRIDOR
5-km Buffer Around Potential Rail Corridor
UTAH
NEVADA
CALIFORNIA
ARIZONA
1 2 3 4 5 6 7 8 9 10 18 11 12 19 20 13 14 15 16 17
Plate 17
Jean Route
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-082.3

Plate 18

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
51PA3	C1-C2	Crucial Game Habitat	Crucial bighorn sheep/mule deer winter area
55PA3	C1	Crucial Game Habitat	Quail and waterfowl habitat; Crucial quail habitat
276SS1	C1	BLM Sensitive Species	Needle Mountain milkvetch
277SS1	C1	BLM Sensitive Species	Needle Mountain milkvetch
323SS1	D1	BLM Sensitive Species	Needle Mountain milkvetch
324SS1	C1	BLM Sensitive Species	Needle Mountain milkvetch
325SS1	C1	BLM Sensitive Species	Needle Mountain milkvetch
611SW	C2	Spring	Dow Spring
612SW	C2	Spring	Sheep Spring
613SW	C2	Spring	Miser Spring
614SW	C2	Spring	Miller Spring
615SW	C1	Spring	Chokecherry Spring
616SW	C1	Spring	Keel Spring
617SW	C1	Spring	Buckboard Spring
618SW	D2	Spring	Oak Well

[1] PA = Protected Area, SS = Sensitive Species, SW = Spring or Water body



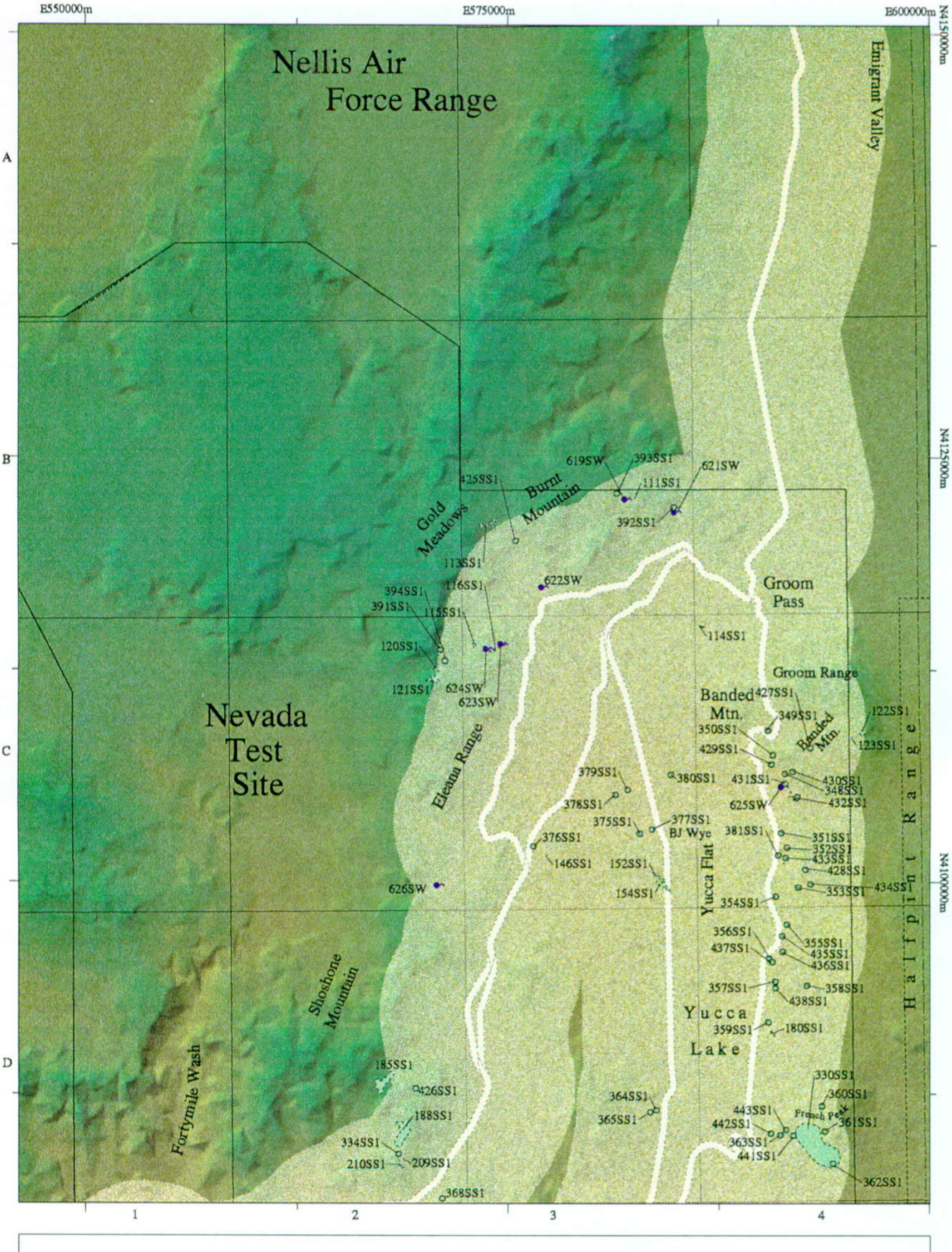
Caliente - Chalk Mtn Route

Plate 19

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
111SS1	B3	BLM Sensitive Species	Hilend's bedstraw
113SS1	B3	BLM Sensitive Species	Paiute beardtongue
114SS1	C4	BLM Sensitive Species	Ripley's springparsley
115SS1	C3	BLM Sensitive Species	Clokey's egg milkvetch
116SS1	C3	BLM Sensitive Species	Clokey's egg milkvetch
120SS1	C2	BLM Sensitive Species	Paiute beardtongue
121SS1	C2	BLM Sensitive Species	Paiute beardtongue
122SS1	C4	BLM Sensitive Species	Beatley's scorpionweed
123SS1	C4	BLM Sensitive Species	Beatley's scorpionweed
146SS1	C3	BLM Sensitive Species	Ripley's springparsley
152SS1	C3	BLM Sensitive Species	Ripley's springparsley
154SS1	C3	BLM Sensitive Species	Ripley's springparsley
180SS1	D4	BLM Sensitive Species	Largeflower suncup
185SS1	D2	BLM Sensitive Species	Paiute beardtongue
188SS1	D2	BLM Sensitive Species	Funeral Mountain milkvetch
209SS1	D2	BLM Sensitive Species	Funeral Mountain milkvetch
210SS1	D2	BLM Sensitive Species	Funeral Mountain milkvetch
330SS1	D4	BLM Sensitive Species	Funeral Mountain milkvetch
334SS1	D2	BLM Sensitive Species	Funeral Mountain milkvetch
348SS1	C4	BLM Sensitive Species	Largeflower suncup
349SS1	C4	BLM Sensitive Species	Largeflower suncup
350SS1	C4	BLM Sensitive Species	Largeflower suncup
351SS1	C4	BLM Sensitive Species	Largeflower suncup
352SS1	C4	BLM Sensitive Species	Largeflower suncup
353SS1	C4	BLM Sensitive Species	Largeflower suncup
354SS1	C4	BLM Sensitive Species	Largeflower suncup
355SS1	D4	BLM Sensitive Species	Largeflower suncup
356SS1	D4	BLM Sensitive Species	Largeflower suncup
357SS1	D4	BLM Sensitive Species	Largeflower suncup
358SS1	D4	BLM Sensitive Species	Largeflower suncup
359SS1	D4	BLM Sensitive Species	Largeflower suncup
360SS1	D4	BLM Sensitive Species	Largeflower suncup
361SS1	D4	BLM Sensitive Species	Largeflower suncup
362SS1	D4	BLM Sensitive Species	Largeflower suncup
363SS1	D4	BLM Sensitive Species	Largeflower suncup
364SS1	D3	BLM Sensitive Species	Largeflower suncup
365SS1	D3	BLM Sensitive Species	Largeflower suncup
368SS1	D2	BLM Sensitive Species	Largeflower suncup
375SS1	C3	BLM Sensitive Species	Ripley's springparsley
376SS1	C3	BLM Sensitive Species	Ripley's springparsley
377SS1	C3	BLM Sensitive Species	Ripley's springparsley
378SS1	C3	BLM Sensitive Species	Ripley's springparsley
379SS1	C3	BLM Sensitive Species	Ripley's springparsley
380SS1	C3	BLM Sensitive Species	Ripley's springparsley
381SS1	C4	BLM Sensitive Species	Ripley's springparsley
391SS1	C2	BLM Sensitive Species	Hilend's bedstraw
392SS1	B3	BLM Sensitive Species	Hilend's bedstraw
393SS1	B3	BLM Sensitive Species	Hilend's bedstraw
394SS1	C2	BLM Sensitive Species	Hilend's bedstraw
425SS1	B3	BLM Sensitive Species	Paiute beardtongue
426SS1	D2	BLM Sensitive Species	Paiute beardtongue
427SS1	C4	BLM Sensitive Species	Beatley's scorpionweed
428SS1	C4	BLM Sensitive Species	Beatley's scorpionweed
429SS1	C4	BLM Sensitive Species	Beatley's scorpionweed
430SS1	C4	BLM Sensitive Species	Beatley's scorpionweed
431SS1	C4	BLM Sensitive Species	Beatley's scorpionweed
432SS1	C4	BLM Sensitive Species	Largeflower suncup and Beatley's scorpionweed
433SS1	C4	BLM Sensitive Species	Beatley's scorpionweed
434SS1	C4	BLM Sensitive Species	Beatley's scorpionweed
435SS1	D4	BLM Sensitive Species	Beatley's scorpionweed
436SS1	D4	BLM Sensitive Species	Beatley's scorpionweed
437SS1	D4	BLM Sensitive Species	Beatley's scorpionweed
438SS1	D4	BLM Sensitive Species	Beatley's scorpionweed
441SS1	D4	BLM Sensitive Species	Beatley's scorpionweed
442SS1	D4	BLM Sensitive Species	Beatley's scorpionweed
443SS1	D4	BLM Sensitive Species	Beatley's scorpionweed
619SW	B3	Spring	Oak Springs
621SW	B3	Spring	Tub Spring
622SW	B3	Spring	Whiterock Spring
623SW	C3	Spring	Unnamed spring
624SW	C3	Spring	Captain Jack Spring
625SW	C4	Spring	Reitman's Seep
626SW	C2	Spring	Tippipah Spring

[1] SS = Sensitive Species, SW = Spring or Water body



5 0 5 10 Miles

5 0 5 10 Kilometers

N

BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS

BIOLOGICAL RESOURCES CATEGORIES

Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern

Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species

Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species

Riparian Area (RA)

Spring or Waterbody (SW)

INFRASTRUCTURE

Primary Road

Secondary Road

TRANSPORTATION CORRIDOR

5-km Buffer Around
Potential Rail Corridor

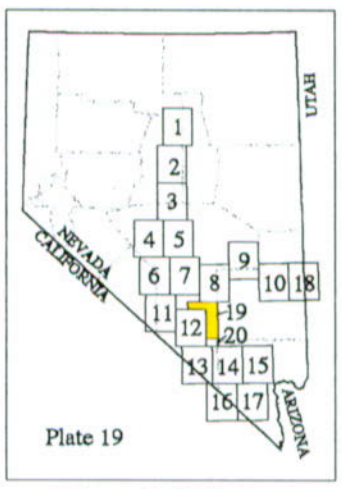


Plate 19

Caliente - Chalk Mtn Route

Coordinates are displayed in
Universal Transverse Mercator meters.

Map created by CRWMS M&O/TDM
on February 25, 1999.

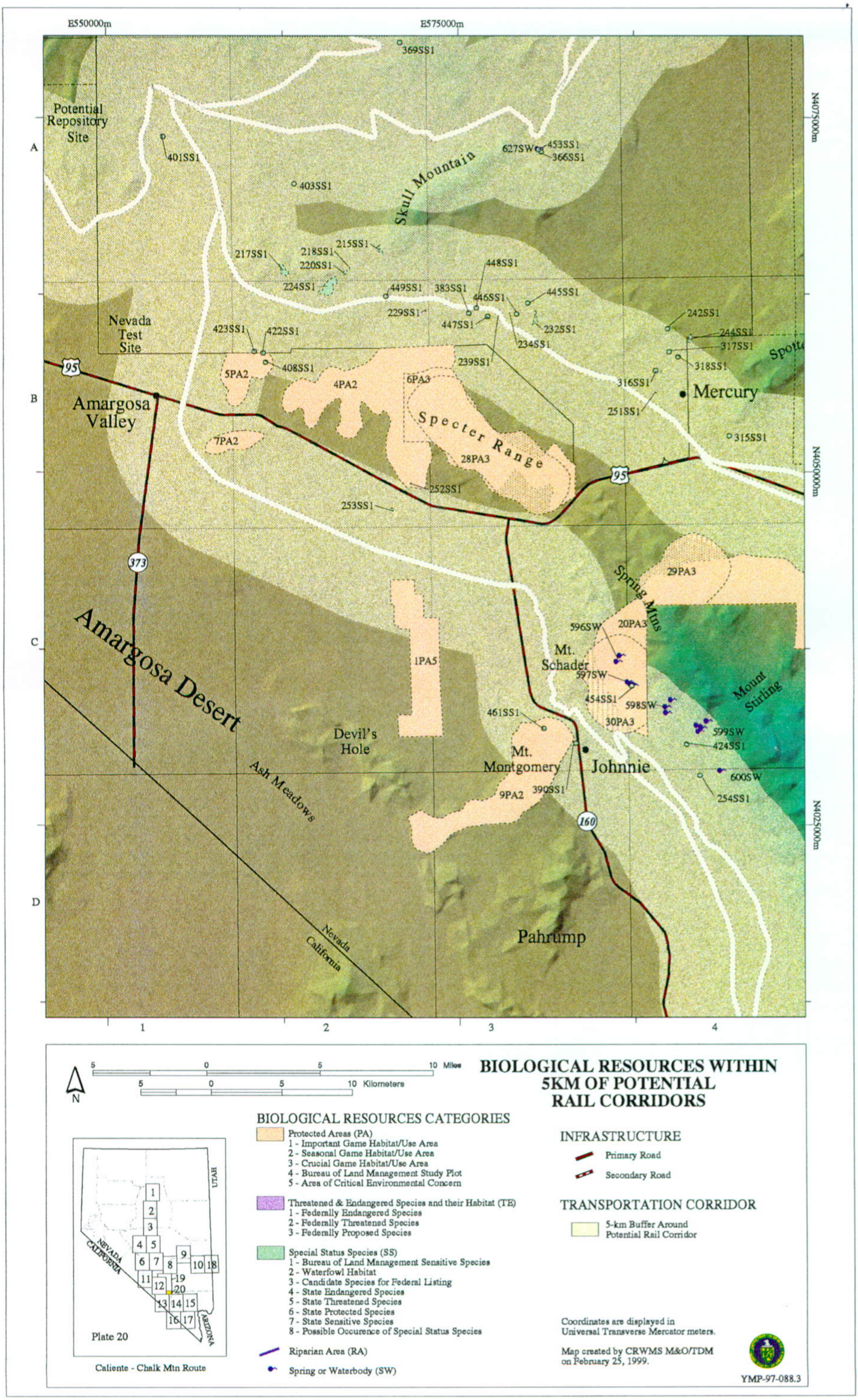
YMP-97-087.3

Plate 20

Important Biological Resources Identified within 5 km of the Rail Corridor(s)

Map ID[1]	Quad	Resource Category	Description
1PA5	C2	ACEC	Amargosa Mesquite ACEC
4PA2	B2	Seasonal Game Habitat	Bighorn sheep winter range
5PA2	B2	Seasonal Game Habitat	Bighorn sheep winter range
6PA3	B3	Crucial Game Habitat	Crucial bighorn sheep habitat
7PA2	B1	Seasonal Game Habitat	Bighorn sheep winter range
9PA2	D3	Seasonal Game Habitat	Bighorn sheep winter range
20PA3	C3	Crucial Game Habitat	Mule deer crucial summer habitat
28PA3	B3	Crucial Game Habitat	Crucial quail habitat
29PA3	C4	Crucial Game Habitat	Crucial quail habitat
30PA3	C3	Crucial Game Habitat	Crucial quail habitat
215SS1	A2	BLM Sensitive Species	Beatley's scorpionweed
217SS1	A2	BLM Sensitive Species	Largeflower suncup
218SS1	A2	BLM Sensitive Species	Parish's scorpionweed
220SS1	A2	BLM Sensitive Species	Largeflower suncup
224SS1	A2	BLM Sensitive Species	Largeflower suncup
229SS1	B2	BLM Sensitive Species	Ripley's springparsley
232SS1	B3	BLM Sensitive Species	Parish's scorpionweed
234SS1	B3	BLM Sensitive Species	Parish's scorpionweed
239SS1	B3	BLM Sensitive Species	Parish's scorpionweed
242SS1	B4	BLM Sensitive Species	Desert bearpoppy
244SS1	B4	BLM Sensitive Species	Desert bearpoppy
251SS1	B4	BLM Sensitive Species	Desert bearpoppy
252SS1	B2	BLM Sensitive Species	Desert bearpoppy
253SS1	B2	BLM Sensitive Species	White-margined beardtongue
254SS1	D4	BLM Sensitive Species	Death Valley beardtongue
315SS1	B4	BLM Sensitive Species	Desert bearpoppy
316SS1	B4	BLM Sensitive Species	Desert bearpoppy
317SS1	B4	BLM Sensitive Species	Desert bearpoppy
318SS1	B4	BLM Sensitive Species	Desert bearpoppy
366SS1	A3	BLM Sensitive Species	Largeflower suncup
369SS1	A2	BLM Sensitive Species	Largeflower suncup
383SS1	B3	BLM Sensitive Species	Ripley's springparsley
390SS1	C3	BLM Sensitive Species	Redheaded sphecid wasp
401SS1	A1	BLM Sensitive Species	Fringed myotis
403SS1	A2	BLM Sensitive Species	Long-legged myotis
408SS1	B2	BLM Sensitive Species	White-margin beardtongue
422SS1	B2	BLM Sensitive Species	Death Valley beardtongue
423SS1	B2	BLM Sensitive Species	Death Valley beardtongue
424SS1	C4	BLM Sensitive Species	Death Valley beardtongue
445SS1	B3	BLM Sensitive Species	Parish's scorpionweed
446SS1	B3	BLM Sensitive Species	Parish's scorpionweed
447SS1	B3	BLM Sensitive Species	Parish's scorpionweed
448SS1	B3	BLM Sensitive Species	Parish's scorpionweed
449SS1	B2	BLM Sensitive Species	Parish's scorpionweed
453SS1	A3	BLM Sensitive Species	Oasis Valley springsnail
454SS1	C4	BLM Sensitive Species	Oasis Valley springsnail
461SS1	C3	BLM Sensitive Species	Woolly sage
596SW	C3	Spring	Kwichup Spring
597SW	C3	Spring	Grapevine Spring
598SW	C4	Spring	Horseshutem Springs
599SW	C4	Spring	Crystal Spring
600SW	D4	Spring	Rainbow Spring
627SW	A3	Spring	Cane Spring

[1] PA = Protected Area, SS = Sensitive Species, SW = Spring or Water body



Caliente - Chalk Mtn Route

5 0 5 10 Miles

5 0 5 10 Kilometers

N

BIOLOGICAL RESOURCES WITHIN 5KM OF POTENTIAL RAIL CORRIDORS

BIOLOGICAL RESOURCES CATEGORIES

Protected Areas (PA)
- 1 - Important Game Habitat/Use Area
- 2 - Seasonal Game Habitat/Use Area
- 3 - Crucial Game Habitat/Use Area
- 4 - Bureau of Land Management Study Plot
- 5 - Area of Critical Environmental Concern

Threatened & Endangered Species and their Habitat (TE)
- 1 - Federally Endangered Species
- 2 - Federally Threatened Species
- 3 - Federally Proposed Species

Special Status Species (SS)
- 1 - Bureau of Land Management Sensitive Species
- 2 - Waterfowl Habitat
- 3 - Candidate Species for Federal Listing
- 4 - State Endangered Species
- 5 - State Threatened Species
- 6 - State Protected Species
- 7 - State Sensitive Species
- 8 - Possible Occurence of Special Status Species

Riparian Area (RA)

Spring or Waterbody (SW)

INFRASTRUCTURE

Primary Road

Secondary Road

TRANSPORTATION CORRIDOR

5-km Buffer Around Potential Rail Corridor

Coordinates are displayed in Universal Transverse Mercator meters.

Map created by CRWMS M&O/TDM on February 25, 1999.

YMP-97-088.3

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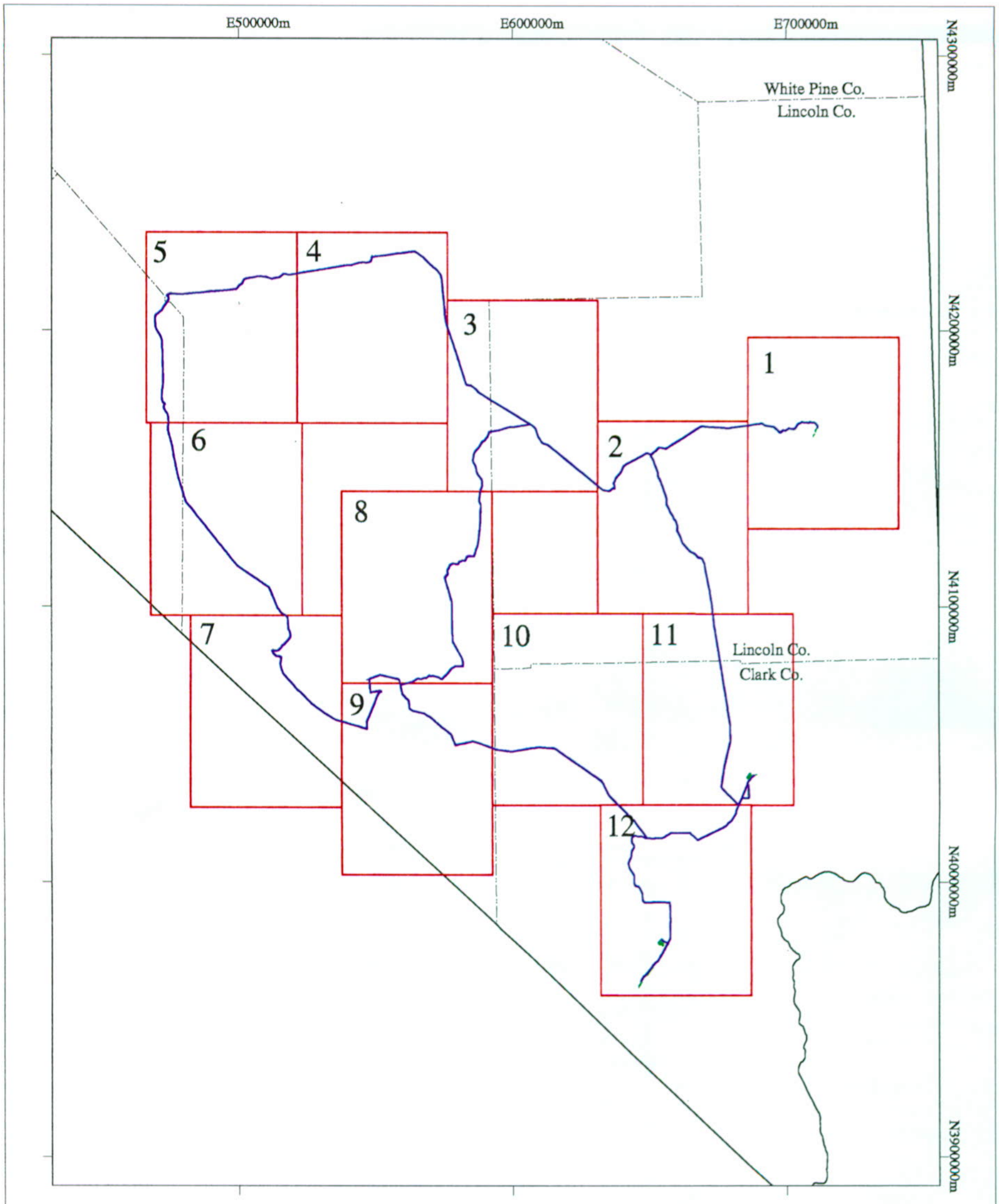
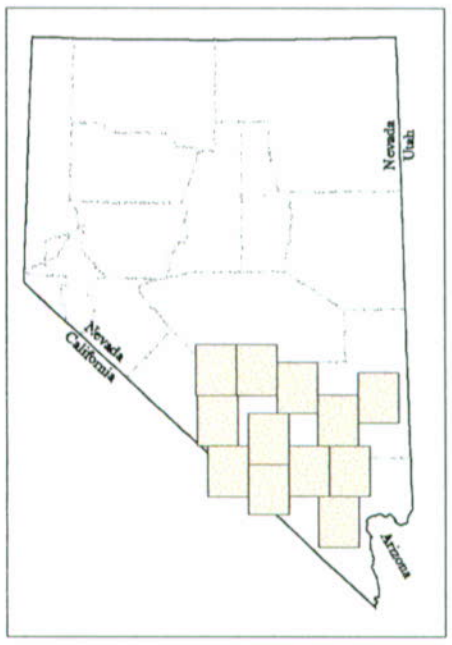




Yucca Mountain Site Characterization Project

Potential Heavy Haul Route and Intermodal Transfer Station Plate Map Index

LEGEND

- Transportation Corridor
- Intermodal Transfer Station
- Plate Map Boundaries

N

10 0 10 20 30 40 Miles

10 0 10 20 30 40 50 Kilometers

Map created by CRWMS M&O/TDM on February 25, 1999.

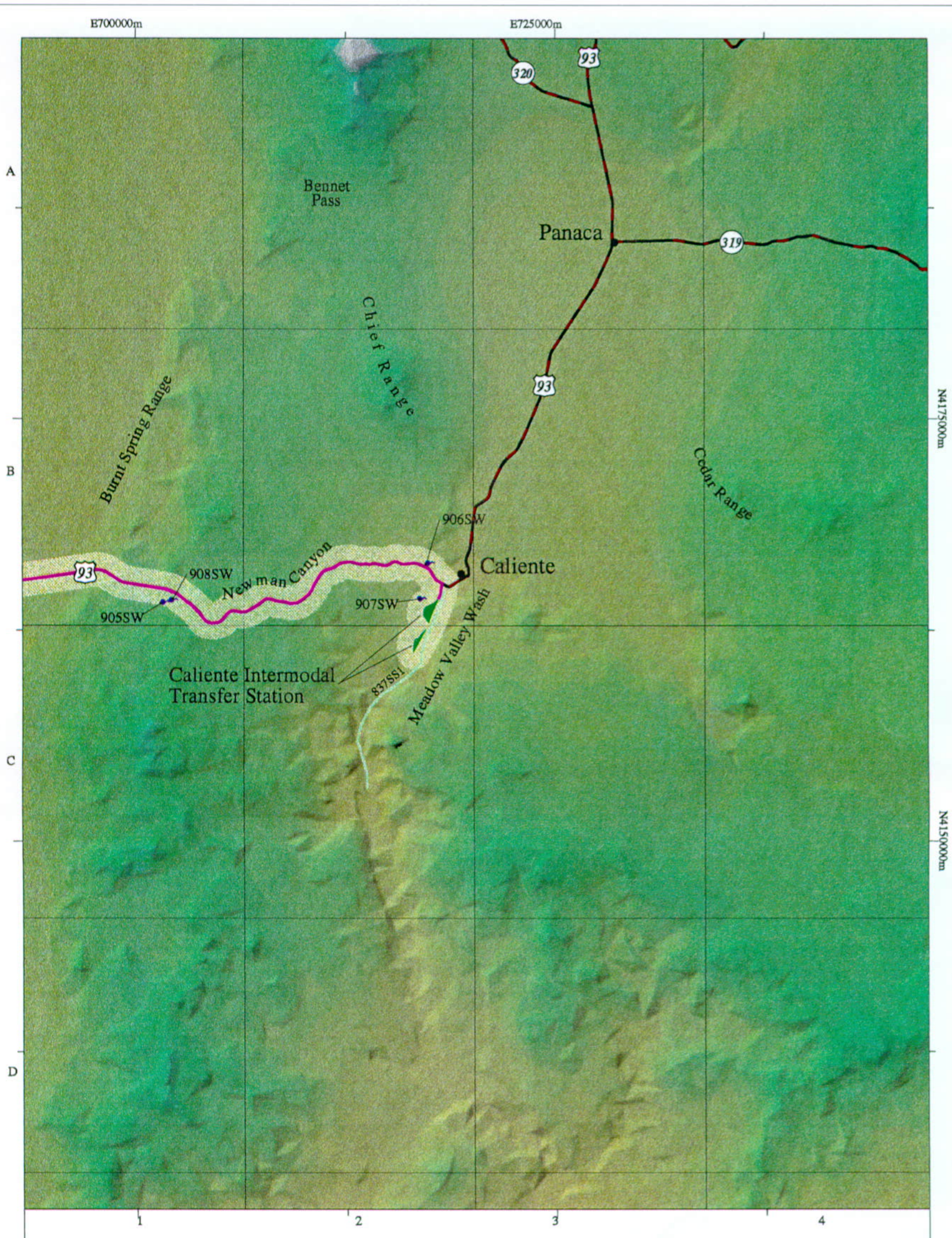
YMP-97-281.3

Plate 1

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

Map ID[1]	Quad	Resource Category	Description
837SS1	B2-C2	Riparian Area, BLM Sensitive Species, BLM Sensitive Species	Meadow Valley Wash, Meadow Valley Wash speckled dace, Meadow Valley Wash desert sucker
905SW	B1	Spring	Unnamed spring
906SW	B2	Spring	Unnamed spring
907SW	B2	Spring	Unnamed spring
908SW	B1	Spring	Unnamed spring

[1] SS = Sensitive Species, SW = Spring or Water body



BIOLOGICAL RESOURCES WITHIN 1KM OF POTENTIAL HEAVY HAUL ROUTES & ITS

BIOLOGICAL RESOURCES CATEGORIES

Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern

Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species

Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species

Riparian Area (RA)

Spring or Waterbody (SW)

INFRASTRUCTURE

Primary Road

Secondary Road

HEAVY HAUL ROUTE

Potential Heavy Haul Route

Intermodal Transfer Station (ITS)

Coordinates are displayed in Universal Transverse Mercator meters.

Map created by CRWMS M&O/TDM on February 25, 1999.

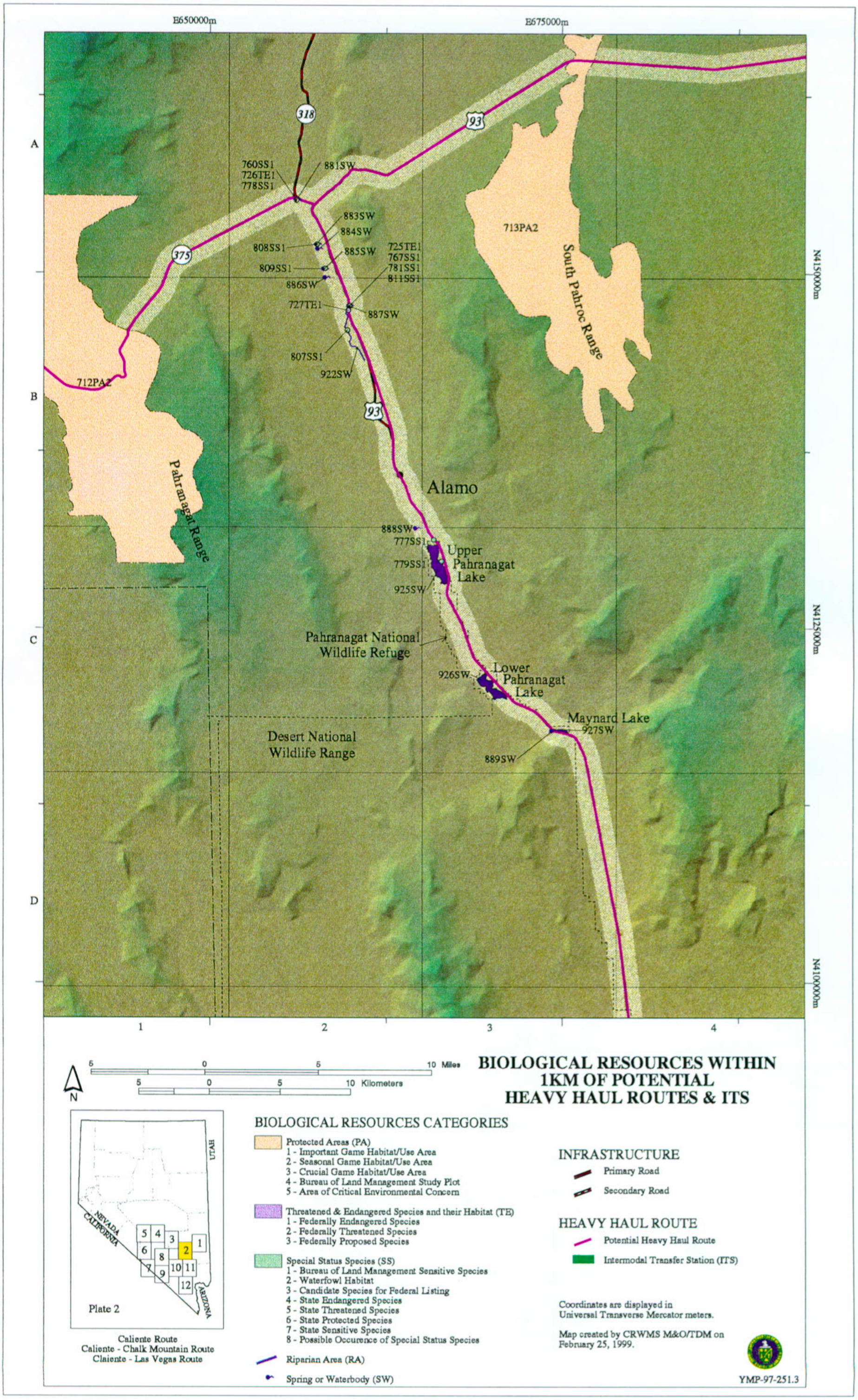
YMP-97-250.3

Plate 2

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

Map ID[1]	Quad	Resource Category	Description
712PA2	B2	Seasonal Game Habitat	Mule deer winter use area
713PA2	A3	Seasonal Game Habitat	Mule deer winter use area
725TE1	B2	Federally Endangered Species	White River springfish
726TE1	A2	Federally Endangered Species	Hiko White River springfish
727TE1	B2	Federally Endangered Species	Pahranagat roundtail chub
760SS1	A2	BLM Sensitive Species	Pahranagat speckled dace
767SS1	B2	BLM Sensitive Species	Pahranagat pebblesnail
777SS1	C3	BLM Sensitive Species	Pahranagat Valley montane vole
778SS1	A2	BLM Sensitive Species	Pahranagat Valley montane vole
779SS1	C3	BLM Sensitive Species	Pahranagat Valley montane
781SS1	B2	BLM Sensitive Species	Pahranagat naucorid
807SS1	B2	BLM Sensitive Species	Pahranagat speckled dace
808SS1	A2	BLM Sensitive Species	Pahranagat speckled dace
809SS1	A2	BLM Sensitive Species	Pahranagat speckled dace
811SS1	B2	BLM Sensitive Species	Grated tryonia
881SW	A2	Spring	Crystal Springs
883SW	A2	Spring/Seep	Pedretti seeps
884SW	A2	Spring	Unnamed spring
885SW	A2	Spring	Deacon Spring
886SW	A2	Spring	Brownie Spring
887SW	B2	Spring	Ash Springs
888SW	C2	Spring	Grove Spring
889SW	C3	Spring	Unnamed spring
922SW	B2	Spring outflow	Ash Springs
925SW	C3	Lake	Upper Pahranagat Reservoir
926SW	C3	Lake	Lower Pahranagat Reservoir
927SW	C3	Lake/Marsh	Maynard Lake

[1] PA = Protected Area, SS = Sensitive Species, SW = Spring or Water body, TE = Federally Threatened or Endangered Species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N4150000m
N4125000m
N4100000m
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B
C
D
1
2
3
4
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93
375
760SS1
726TE1
778SS1
881SW
883SW
884SW
808SS1
885SW
725TE1
767SS1
781SS1
811SS1
809SS1
886SW
727TE1
887SW
807SS1
922SW
712PA2
713PA2
South Pahroc Range
Pahranagat Range
Alamo
888SW
777SS1
779SS1
925SW
Upper Pahranagat Lake
Pahranagat National Wildlife Refuge
926SW
Lower Pahranagat Lake
Maynard Lake
927SW
889SW
Desert National Wildlife Range
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 1KM OF POTENTIAL HEAVY HAUL ROUTES & ITS
UTAH
NEVADA
CALIFORNIA
ARIZONA
Plate 2
Caliente Route
Caliente - Chalk Mountain Route
Claiente - Las Vegas Route
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
HEAVY HAUL ROUTE
Potential Heavy Haul Route
Intermodal Transfer Station (ITS)
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-251.3

Plate 3

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

Map ID[1]	Quad	Resource Category	Description
712PA2	D4	Seasonal Game Habitat	Mule deer winter use area

[1] PA = Protected Area

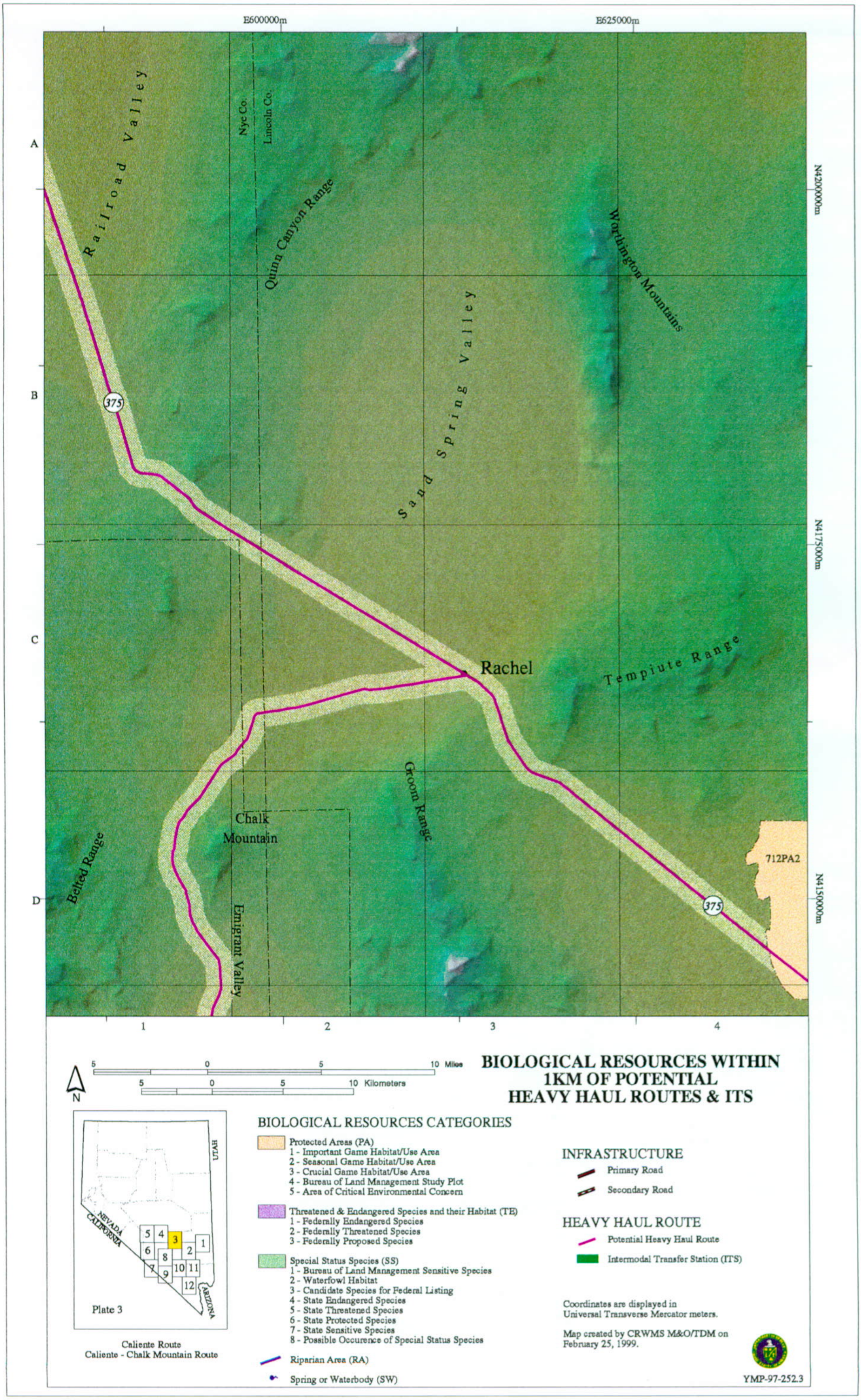
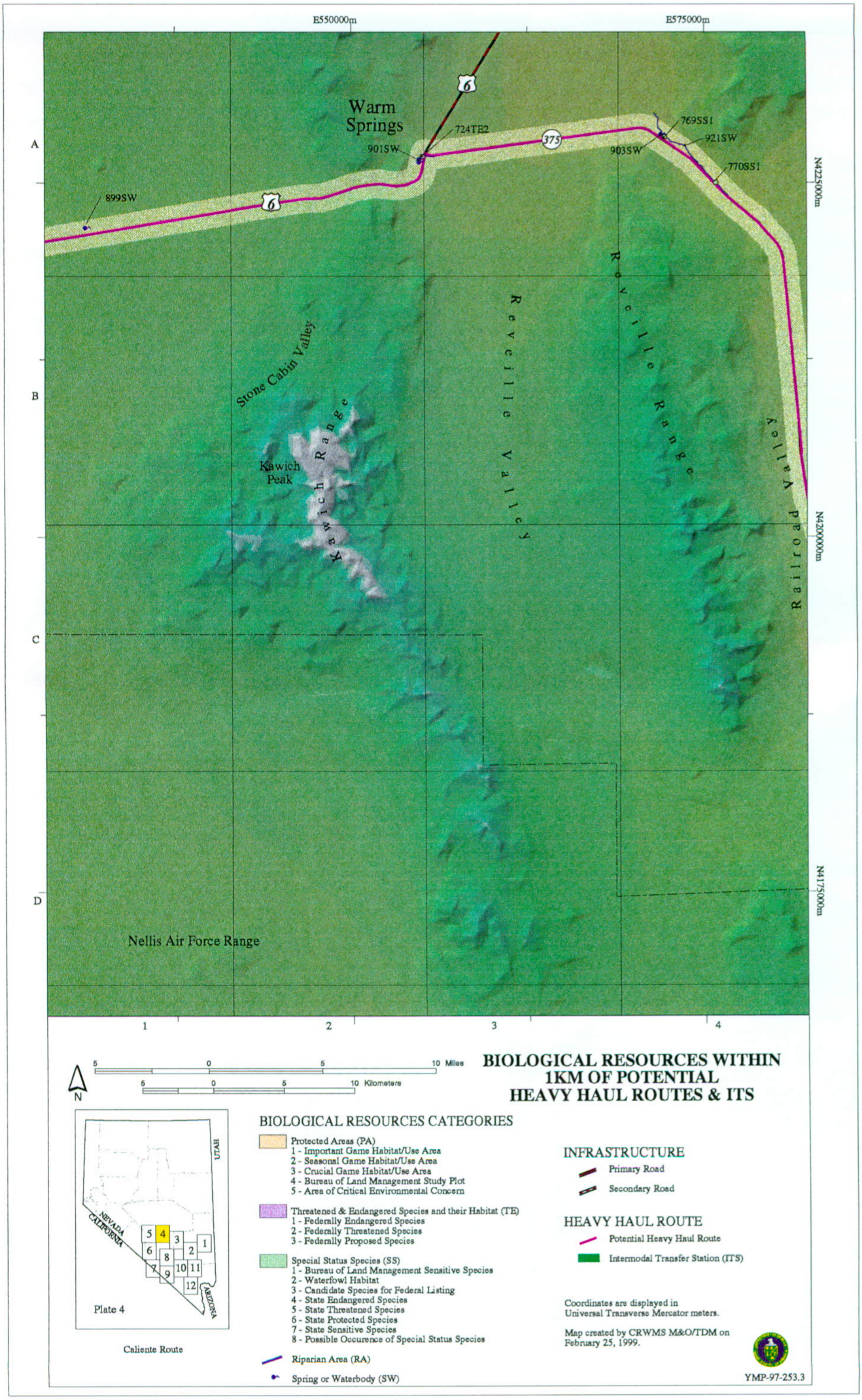

E600000m
E625000m
N4200000m
N4175000m
N4150000m
A
B
C
D
1
2
3
4
Railroad Valley
Nye Co.
Lincoln Co.
Quinn Canyon Range
Sand Spring Valley
Worthington Mountains
375
Rachel
Tempiute Range
Groom Range
Chalk
Mountain
Belted Range
Emigrant Valley
712PA2
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN
1KM OF POTENTIAL
HEAVY HAUL ROUTES & ITS
UTAH
NEVADA
CALIFORNIA
ARIZONA
Plate 3
Caliente Route
Caliente - Chalk Mountain Route
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
HEAVY HAUL ROUTE
Potential Heavy Haul Route
Intermodal Transfer Station (ITS)
Coordinates are displayed in
Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on
February 25, 1999.
YMP-97-252.3

Plate 4

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

Map ID[1]	Quad	Resource Category	Description
724TE2	A2	Federally Threatened Species	Railroad Valley springfish
769SS1	A4	BLM Sensitive Species	Hot Creek Valley tui chub
770SS1	A4	BLM Sensitive Species	Railroad Valley tui chub
899SW	A1	Springs	Fivemile Spring
901SW	A2	Spring and outflow	Warm Springs
903SW	A4	Spring	Twin Springs
921RA	A4	Riparian area	Twin Spring Slough and Echo Canyon Reservoir

[1]RA = Riparian Area, SS = Sensitive Species, SW = Spring or Water body, TE = Federally Threatened or Endangered Species



BIOLOGICAL RESOURCES WITHIN 1KM OF POTENTIAL HEAVY HAUL ROUTES & ITS

BIOLOGICAL RESOURCES CATEGORIES

Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern

Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species

Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species

Riparian Area (RA)

Spring or Waterbody (SW)

INFRASTRUCTURE

Primary Road

Secondary Road

HEAVY HAUL ROUTE

Potential Heavy Haul Route

Intermodal Transfer Station (ITS)

Coordinates are displayed in Universal Transverse Mercator meters.

Map created by CRWMS M&O/TDM on February 25, 1999.

YMP-97-253.3

Plate 5

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

Map ID[1]	Quad	Resource Category	Description
890SW	D1	Spring	Rabbit Spring

[1] SW = Spring or Water body

E475000m E500000m E525000m

N4225000m N4200000m N4175000m

A B C D

1 2 3 4

San Antonio Mtns.

376

Thunder Mountain

McKinney Mountains

Monitor Range

McKinney Mountains

95

6

Tonopah

Ralston Valley

Esmeralda Co.

Nye Co.

Mud Lake

Cactus Flat

Nellis Air Force Range

95

890SW

Goldfield

5 0 5 10 Miles

5 0 5 10 Kilometers

N

BIOLOGICAL RESOURCES WITHIN 1KM OF POTENTIAL HEAVY HAUL ROUTES & ITS

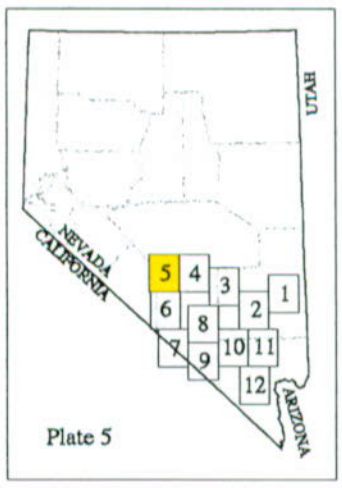


Plate 5

Caliente Route

BIOLOGICAL RESOURCES CATEGORIES

Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern

Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species

Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species

Riparian Area (RA)

Spring or Waterbody (SW)

INFRASTRUCTURE

Primary Road

Secondary Road

HEAVY HAUL ROUTE

Potential Heavy Haul Route

Intermodal Transfer Station (ITS)

Coordinates are displayed in Universal Transverse Mercator meters.

Map created by CRWMS M&O/TDM on February 25, 1999.

YMP-97-254.3

Plate 6

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

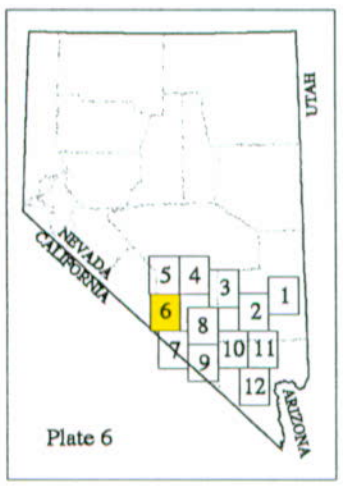
Map ID[1]	Quad	Resource Category	Description
711PA5	D4	ACEC	Amargosa-Oasis ACEC
752SS1	D4	BLM Sensitive Species	Amargosa toad
756SS1	D4	BLM Sensitive Species	Amargosa toad
782SS1	D3	BLM Sensitive Species	Nevada sanddune beardtongue
799SS1	D4	BLM Sensitive Species	Oasis Valley springsnail
804SS1	D4	BLM Sensitive Species	Oasis Valley speckled dace
805SS1	D4	BLM Sensitive Species	Oasis Valley speckled dace
891SW	D4	Spring	Unnamed spring
892SW	D4	Spring	Unnamed spring
893SW	D4	Spring	Unnamed spring
894SW	D4	Spring	Unnamed spring
895SW	D4	Spring	Unnamed spring
897SW	D4	Spring	Fleur-de-lis Spring
920SW	D4	River	Amargosa River

[1] PA = Protected Area, SS = Sensitive Species, SW = Spring or Water body

E500000m
E525000m
N415000m
N412500m
N410000m
A
B
C
D
1
2
3
4
Goldfield Hills
Stonewall Flat
95
Lida Junction
266
Nellis Air Force Range
Esmeralda Co.
Nye Co.
Scotty's Junction
267
Sarcobatus Flat
95
Nellis Air Force Range
782SS1
892SW
752SS1
804SS1
711PA5
894SW
799SS1
Oasis Valley
891SW
893SW
920SW
756SS1
805SS1
897SW
895SW

5 0 5 10 Miles
5 0 5 10 Kilometers
N

BIOLOGICAL RESOURCES WITHIN 1KM OF POTENTIAL HEAVY HAUL ROUTES & ITS



Caliente Route

BIOLOGICAL RESOURCES CATEGORIES

Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern

Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species

Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species

Riparian Area (RA)

Spring or Waterbody (SW)

INFRASTRUCTURE

Primary Road

Secondary Road

HEAVY HAUL ROUTE

Potential Heavy Haul Route

Intermodal Transfer Station (ITS)

Coordinates are displayed in Universal Transverse Mercator meters.

Map created by CRWMS M&O/TDM on February 25, 1999.

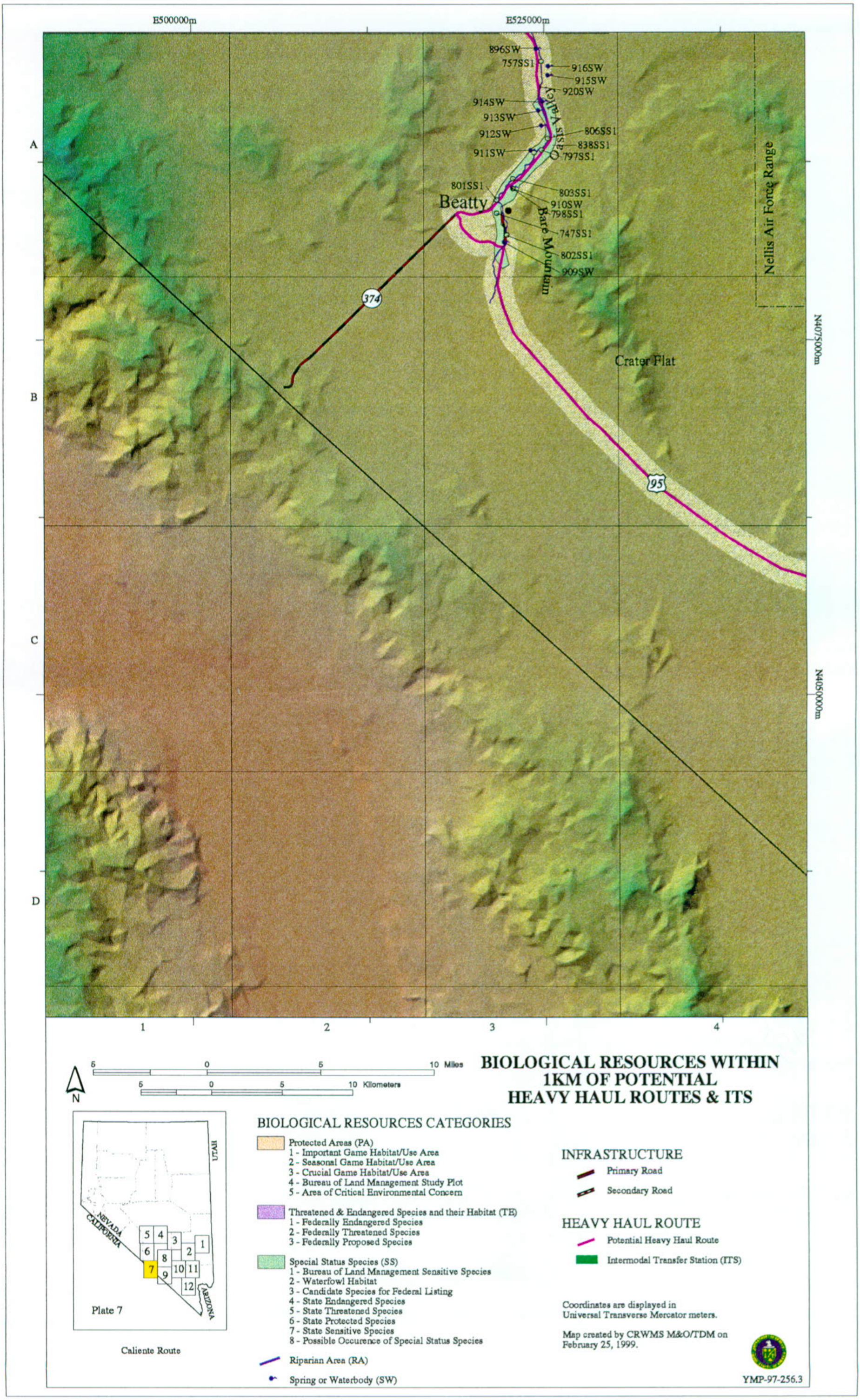
YMP-97-255.3

Plate 7

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

Map ID[1]	Quad	Resource Category	Description
747SS1	A3	BLM Sensitive Species	Funeral Mountain milkvetch
757SS1	A3	BLM Sensitive Species	Amargosa toad
797SS1	A3	BLM Sensitive Species	Townsend's big-eared bat
798SS1	A3	BLM Sensitive Species	Oasis Valley springsnail
801SS1	A3	BLM Sensitive Species	Oasis Valley speckled dace
802SS1	A3	BLM Sensitive Species	Oasis Valley speckled dace
803SS1	A3	BLM Sensitive Species	Oasis Valley speckled dace
806SS1	A3	BLM Sensitive Species	Oasis Valley speckled dace
838SS1	A3	BLM Sensitive Species	Amargosa toad
896SW	A3	Spring	Unnamed spring
909SW	A3	Spring	Unnamed spring
910SW	A3	Spring	Revert Spring
911SW	A3	Spring	Unnamed spring
912SW	A3	Spring	Ute Spring
913SW	A3	Spring	Well Spring
914SW	A3	Spring	Unnamed thermal springs
915SW	A3	Spring	Goss Spring
916SW	A3	Spring	Unnamed spring
920SW	A3	River	Amargosa River

[1] SS = Sensitive Species, SW = Spring or Water body


E500000m
E525000m
N4075000m
N4050000m
A
B
C
D
1
2
3
4
896SW
757SS1
916SW
915SW
920SW
914SW
913SW
912SW
911SW
806SS1
838SS1
797SS1
Oasis Valley
801SS1
Beatty
803SS1
910SW
798SS1
747SS1
802SS1
909SW
Bare Mountain
Nellis Air Force Range
Crater Flat
374
95
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 1KM OF POTENTIAL HEAVY HAUL ROUTES & ITS
UTAH
NEVADA
CALIFORNIA
ARIZONA
5 4 3 1 6 2 8 7 9 10 11 12
Plate 7
Caliente Route
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
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3 - Federally Proposed Species
Special Status Species (SS)
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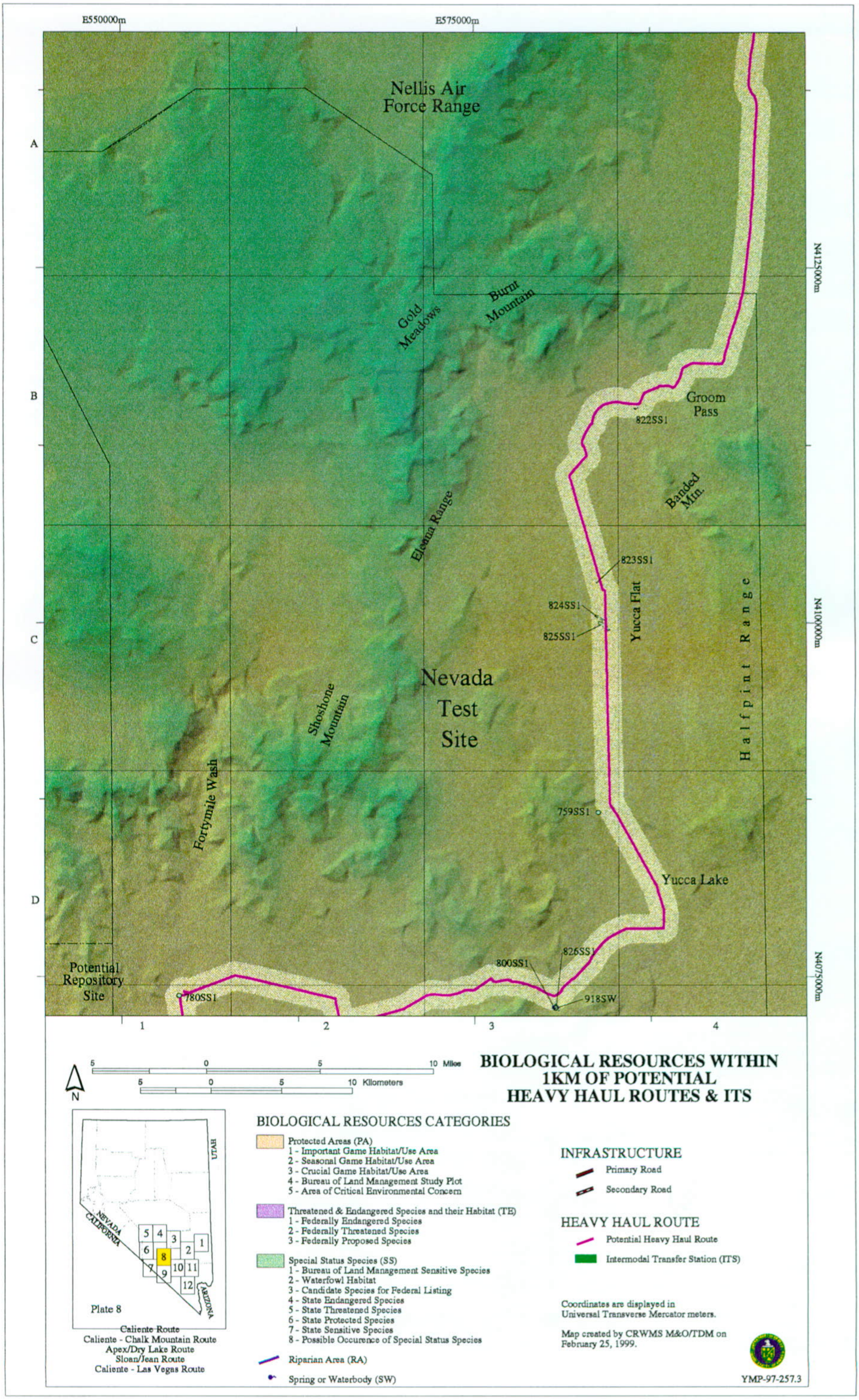
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
HEAVY HAUL ROUTE
Potential Heavy Haul Route
Intermodal Transfer Station (ITS)
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-256.3

Plate 8

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

Map ID[1]	Quad	Resource Category	Description
759SS1	D3	BLM Sensitive Species	Largeflower suncup
780SS1	D1	BLM Sensitive Species	Fringed myotis
800SS1	D3	BLM Sensitive Species	Oasis Valley springsnail
822SS1	B4	BLM Sensitive Species	Ripley's springparsley
823SS1	C3	BLM Sensitive Species	Ripley's springparsley
824SS1	C3	BLM Sensitive Species	Ripley's springparsley
825SS1	C3	BLM Sensitive Species	Ripley's springparsley
826SS1	D3	BLM Sensitive Species	Largeflower suncup
918SW	D3	Spring	Cane Spring

[1] SS = Sensitive Species, SW = Spring or Water body


E550000m
E575000m
N4125000m
N4100000m
N4075000m
A
B
C
D
1
2
3
4
Nellis Air Force Range
Gold Meadows
Burnt Mountain
Groom Pass
822SS1
Eleana Range
Banded Mtn.
823SS1
824SS1
825SS1
Yucca Flat
Halfpint Range
Nevada Test Site
Shoshone Mountain
Fortymile Wash
759SS1
Yucca Lake
826SS1
800SS1
918SW
780SS1
Potential Repository Site
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 1KM OF POTENTIAL HEAVY HAUL ROUTES & ITS
UTAH
NEVADA
CALIFORNIA
ARIZONA
Plate 8
Caliente Route
Caliente - Chalk Mountain Route
Apex/Dry Lake Route
Sloan/Jean Route
Caliente - Las Vegas Route
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
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3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
HEAVY HAUL ROUTE
Potential Heavy Haul Route
Intermodal Transfer Station (ITS)
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-257.3

Plate 9

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

Map ID[1]	Quad	Resource Category	Description
827SS1	A2	BLM Sensitive Species	Beatley's scorpionweed
828SS1	A2	BLM Sensitive Species	Beatley's scorpionweed
829SS1	A2	BLM Sensitive Species	Parish's scorpionweed
830SS1	A2	BLM Sensitive Species	Parish's scorpionweed
831SS1	A2	BLM Sensitive Species	Parish's scorpionweed
832SS1	A2	BLM Sensitive Species	Parish's scorpionweed
833SS1	A3	BLM Sensitive Species	Ripley's springparsley
834SS1	A3	BLM Sensitive Species	Parish's scorpionweed
835SS1	A3	BLM Sensitive Species	Ripley's springparsley
836SS1	A3	BLM Sensitive Species	Ripley's springparsley

[1] SS = Sensitive Species

E550000m
E575000m
N4050000m
N4025000m
A
B
C
D
1
2
3
4
827SS1
828SS1
830SS1
829SS1
831SS1
832SS1
833SS1
834SS1
836SS1
835SS1
Skull Mountain
NTS
Mercury
95
Amargosa Valley
Specter Range
373
160
Devil's Hole
(Death Valley
National Park)
Amargosa Desert
Ash Meadows
Nevada
California
Mt.
Schader
Mount Stirling
Spring Mountains
Johnnie
Pahrump
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 1KM OF POTENTIAL HEAVY HAUL ROUTES & ITS
UTAH
NEVADA
CALIFORNIA
ARIZONA
5 4 3 1 2 6 8 7 9 10 11 12
Plate 9
Caliente Route
Apex/Dry Lake Route
Sloan/Jean Route
Caliente - Las Vegas Route
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
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2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
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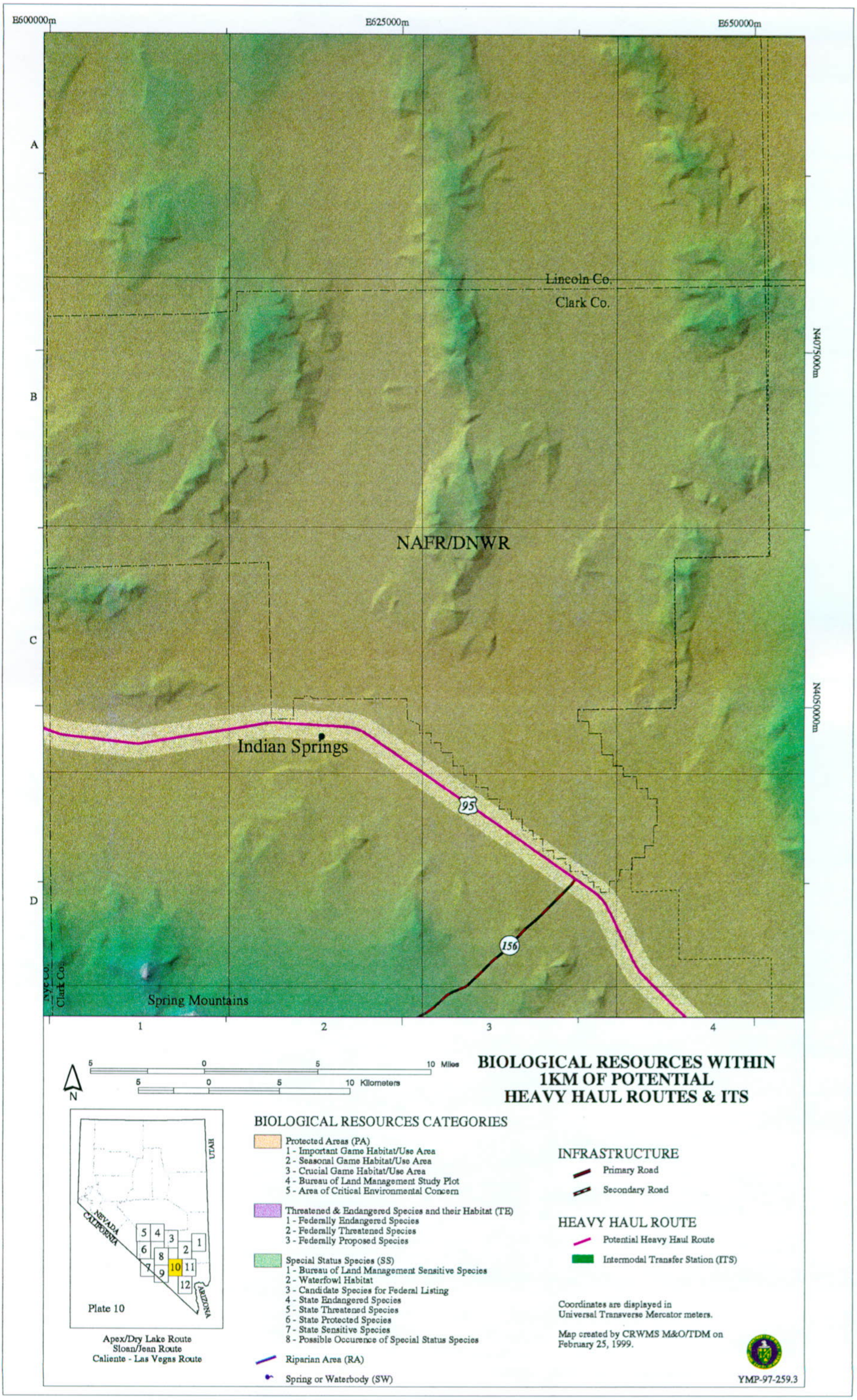
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
HEAVY HAUL ROUTE
Potential Heavy Haul Route
Intermodal Transfer Station (ITS)
Coordinates are displayed in
Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on
February 25, 1999.
YMP-97-258.3

Plate 10

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

Map ID[1]	Quad	Resource Category	Description
No important biological resources were identified within 1 km of the route in the area within this plate			


E600000m
E625000m
E650000m
A
B
C
D
N4075000m
N4050000m
Lincoln Co.
Clark Co.
NAFR/DNWR
Indian Springs
95
156
Nye Co.
Clark Co.
Spring Mountains
1
2
3
4
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN
1KM OF POTENTIAL
HEAVY HAUL ROUTES & ITS
UTAH
NEVADA
CALIFORNIA
ARIZONA
Plate 10
Apex/Dry Lake Route
Sloan/Jean Route
Caliente - Las Vegas Route
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
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3 - Federally Proposed Species
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3 - Candidate Species for Federal Listing
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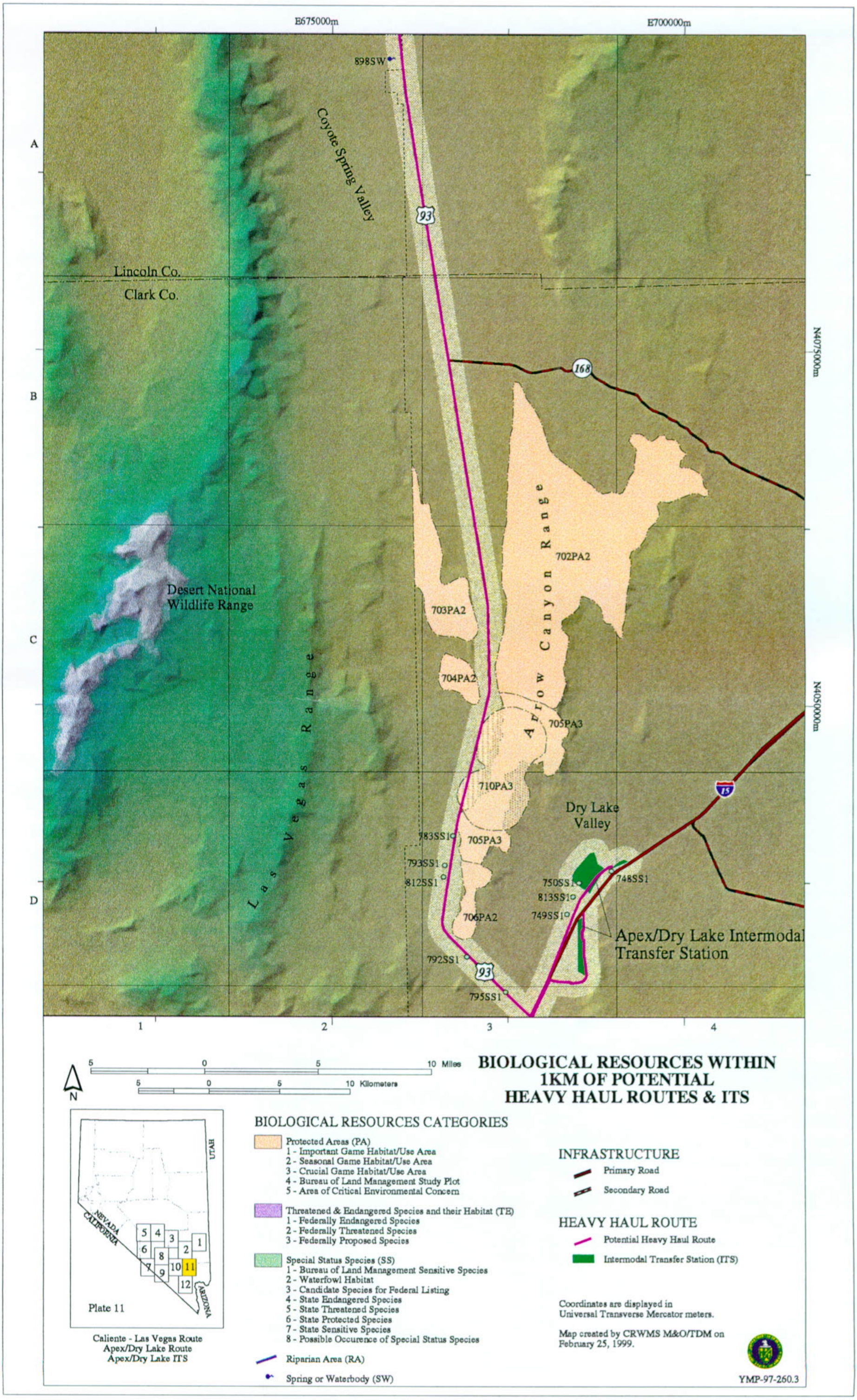
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
HEAVY HAUL ROUTE
Potential Heavy Haul Route
Intermodal Transfer Station (ITS)
Coordinates are displayed in
Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on
February 25, 1999.
YMP-97-259.3

Plate 11

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

Map ID[1]	Quad	Resource Category	Description
702PA2	C3	Seasonal Game Habitat	Bighorn sheep winter range
703PA2	C3	Seasonal Game Habitat	Bighorn sheep winter range
704PA2	C3	Seasonal Game Habitat	Bighorn sheep winter range
705PA3	C3, D3	Crucial Game Habitat	Bighorn sheep crucial habitat
706PA2	D3	Seasonal Game Habitat	Bighorn sheep winter range
710PA3	C3, D3	Crucial Game Habitat	Crucial Quail habitat
748SS1	D3	BLM Sensitive Species	Geyer's milkvetch
749SS1	D3	BLM Sensitive Species	Geyer's milkvetch
750SS1	D3	BLM Sensitive Species	Geyer's milkvetch
783SS1	D3	BLM Sensitive Species	Pinto (yellow) beardtongue
792SS1	D3	BLM Sensitive Species	Pinto (rosy) beardtongue
793SS1	D3	BLM Sensitive Species	Pinto (rosy) beardtongue
795SS1	D3	BLM Sensitive Species	Pinto (rosy) beardtongue
812SS1	D3	BLM Sensitive Species	Pinto (rosy) beardtongue
813SS1	D3	BLM Sensitive Species	Geyer's milkvetch
898SW	A2	Spring	Coyote Spring

[1] PA = Protected Area, SS = Sensitive Species, SW = Spring or Water body


E675000m
E700000m
N4075000m
N4050000m
A
B
C
D
1
2
3
4
898SW
Coyote Spring Valley
93
Lincoln Co.
Clark Co.
168
Desert National
Wildlife Range
Las Vegas Range
Arrow Canyon Range
702PA2
703PA2
704PA2
705PA3
710PA3
705PA3
706PA2
783SS1
793SS1
812SS1
792SS1
795SS1
Dry Lake
Valley
750SS1
813SS1
749SS1
748SS1
Apex/Dry Lake Intermodal
Transfer Station
15
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN
1KM OF POTENTIAL
HEAVY HAUL ROUTES & ITS
UTAH
NEVADA
CALIFORNIA
ARIZONA
Plate 11
Caliente - Las Vegas Route
Apex/Dry Lake Route
Apex/Dry Lake ITS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
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3 - Candidate Species for Federal Listing
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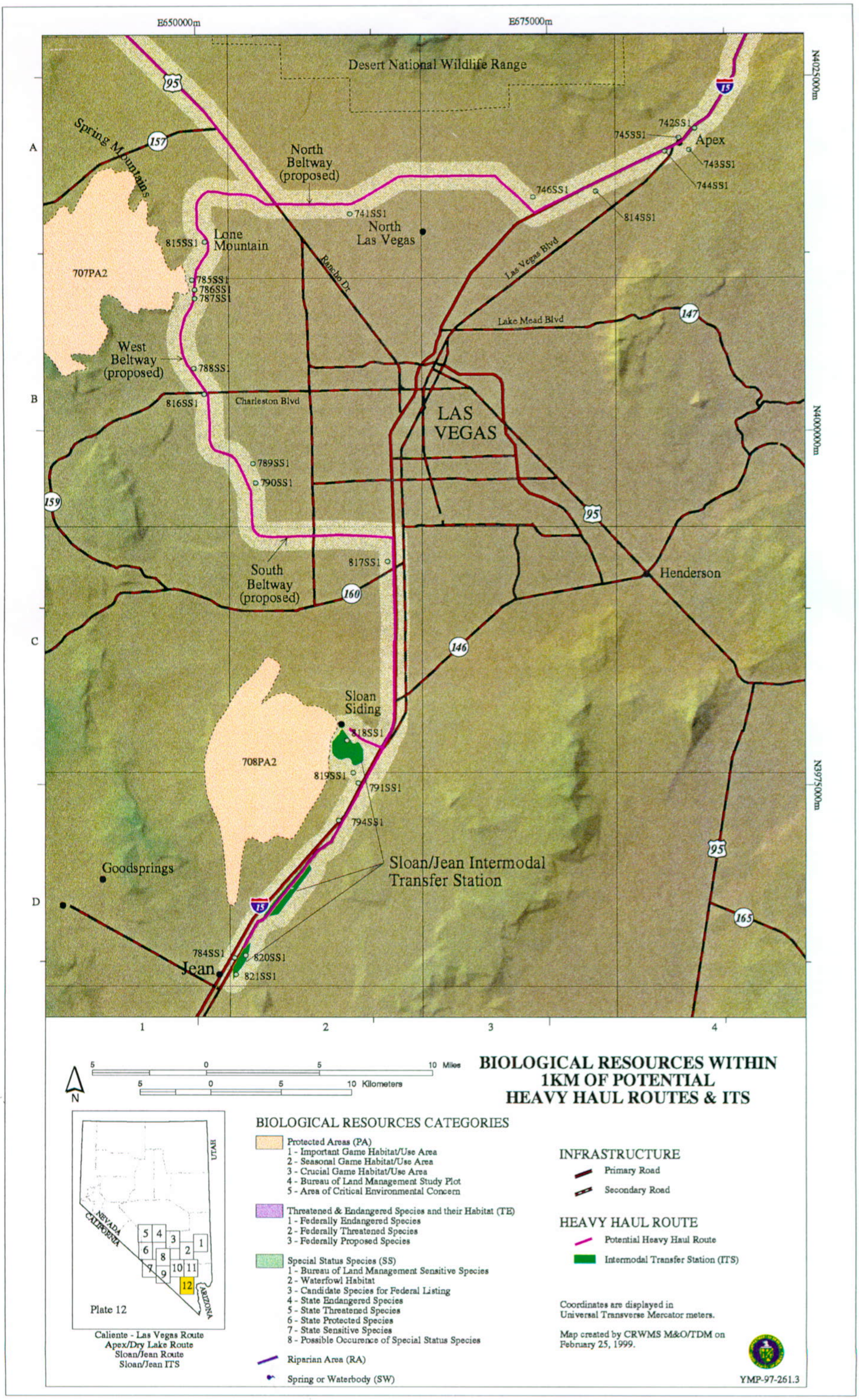
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
HEAVY HAUL ROUTE
Potential Heavy Haul Route
Intermodal Transfer Station (ITS)
Coordinates are displayed in
Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on
February 25, 1999.
YMP-97-260.3

Plate 12

Important Biological Resources Identified within 1 km of the Heavy-Haul Route(s)

Map ID[1]	Quad	Resource Category	Description
707PA2	A1	Seasonal Game Habitat	Bighorn sheep winter range
708PA2	C2	Seasonal Game Habitat	Bighorn sheep winter range
741SS1	A2	BLM Sensitive Species	California bearpoppy
742SS1	A4	BLM Sensitive Species	California bearpoppy
743SS1	A4	BLM Sensitive Species	California bearpoppy
744SS1	A4	BLM Sensitive Species	California bearpoppy
745SS1	A4	BLM Sensitive Species	California bearpoppy
746SS1	A3	BLM Sensitive Species	California bearpoppy
784SS1	D2	BLM Sensitive Species	Pinto (yellow) beardtongue
785SS1	B1	BLM Sensitive Species	Pinto (yellow) beardtongue
786SS1	B1	BLM Sensitive Species	Pinto (yellow) beardtongue
787SS1	B1	BLM Sensitive Species	Pinto (yellow) beardtongue
788SS1	B1	BLM Sensitive Species	Pinto (yellow) beardtongue
789SS1	B2	BLM Sensitive Species	Pinto (yellow) beardtongue
790SS1	B2	BLM Sensitive Species	Pinto (yellow) beardtongue
791SS1	D2	BLM Sensitive Species	Pinto (rosy) beardtongue
794SS1	D2	BLM Sensitive Species	Pinto (rosy) beardtongue
814SS1	A3	BLM Sensitive Species	California bearpoppy
815SS1	A1	BLM Sensitive Species	Pinto (yellow) beardtongue
816SS1	B1	BLM Sensitive Species	Pinto (yellow) beardtongue
817SS1	C2	BLM Sensitive Species	California bearpoppy
818SS1	C2	BLM Sensitive Species	Pinto (rosy) beardtongue
819SS1	D2	BLM Sensitive Species	Pinto (rosy) beardtongue
820SS1	D2	BLM Sensitive Species	Pinto (rosy) beardtongue
821SS1	D2	BLM Sensitive Species	Pinto (yellow) beardtongue

[1] PA = Protected Area, SS = Sensitive Species


E650000m
E675000m
N4025000m
N4000000m
N3975000m
A
B
C
D
1
2
3
4
Desert National Wildlife Range
95
15
157
Spring Mountains
North Beltway (proposed)
742SS1
745SS1
Apex
743SS1
744SS1
746SS1
814SS1
741SS1
North Las Vegas
815SS1
Lone Mountain
707PA2
785SS1
786SS1
787SS1
Rancho Dr
Las Vegas Blvd
Lake Mead Blvd
147
West Beltway (proposed)
788SS1
816SS1
Charleston Blvd
LAS VEGAS
789SS1
790SS1
159
South Beltway (proposed)
817SS1
160
Henderson
146
Sloan Siding
818SS1
708PA2
819SS1
791SS1
794SS1
Sloan/Jean Intermodal Transfer Station
Goodsprings
784SS1
820SS1
821SS1
Jean
165
5 0 5 10 Miles
5 0 5 10 Kilometers
N
BIOLOGICAL RESOURCES WITHIN 1KM OF POTENTIAL HEAVY HAUL ROUTES & ITS
UTAH
NEVADA
CALIFORNIA
ARIZONA
1
2
3
4
5
6
7
8
9
10
11
12
Plate 12
Caliente - Las Vegas Route
Apex/Dry Lake Route
Sloan/Jean Route
Sloan/Jean ITS
BIOLOGICAL RESOURCES CATEGORIES
Protected Areas (PA)
1 - Important Game Habitat/Use Area
2 - Seasonal Game Habitat/Use Area
3 - Crucial Game Habitat/Use Area
4 - Bureau of Land Management Study Plot
5 - Area of Critical Environmental Concern
Threatened & Endangered Species and their Habitat (TE)
1 - Federally Endangered Species
2 - Federally Threatened Species
3 - Federally Proposed Species
Special Status Species (SS)
1 - Bureau of Land Management Sensitive Species
2 - Waterfowl Habitat
3 - Candidate Species for Federal Listing
4 - State Endangered Species
5 - State Threatened Species
6 - State Protected Species
7 - State Sensitive Species
8 - Possible Occurence of Special Status Species
Riparian Area (RA)
Spring or Waterbody (SW)
INFRASTRUCTURE
Primary Road
Secondary Road
HEAVY HAUL ROUTE
Potential Heavy Haul Route
Intermodal Transfer Station (ITS)
Coordinates are displayed in Universal Transverse Mercator meters.
Map created by CRWMS M&O/TDM on February 25, 1999.
YMP-97-261.3

EFS:AR-EBF.20295

WBS: 1.2.1.5
QA: N/A

Civilian Radioactive Waste Management System
Management & Operating Contractor

Environmental Baseline File for Biological Resources

Attachment 1: Maps of Biological Resources Along Transportation Corridors and Intermodal Transfer Stations

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