7.0 THREATENED, ENDANGERED, CANDIDATE, AND SENSITIVE SPECIES

7.1 Affected Environment

Table 7-1 summarizes the special status species, updated for the cumulative assessment area, based on the BLM's list of special status species, dated December 1, 1999. Special status species are those species for which State or Federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are Federally listed species that are protected by the Endangered Species Act; species proposed for Federal listing and Federal candidate species, as identified by the USFWS; and species designated as state-sensitive by the BLM. In addition, there is a Nevada State Protected Animal List (NAC 501.100 - 503.104) that the BLM has incorporated, in part, into the BLM's sensitive species list. All of these special status species, if present, are afforded some level of protection on lands administered by the Elko BLM. Nevada BLM policy is to provide Nevada BLM-sensitive and State of Nevada-listed species with the same level of protection provided for candidate species (BLM Manual 6840.06C). Detailed discussions of sensitive wildlife species identified for the cumulative analysis can be reviewed in a number of sources including: BLM (1991c, 1993b, 1994b, 1996a); Fox (1993); JBR (1989, 1990b, 1992a,b,d, 1996a); Nevada Natural Heritage Program (NNHP) (1997); Ports (1995, 1996); and Ports and Bradley (1996).

7.1.1 Terrestrial Wildlife

7.1.1.1 Preble's Shrew

Few site-specific data are available for the Preble's shrew, although it has been reported in the northern portion of the Great Basin. Suitable habitat ranges among sagebrush, grasslands, openings in subalpine forest, and alpine tundra (Fitzgerald et al. 1994; BLM 1993b). This small mammal also is believed to occupy wetland or marshy habitats containing adequate emergent and woody plant species (BLM 1993b, 1996c). The Preble's shrew has been documented in both Washoe County (Hoffmann and Fisher 1978) and in northern Elko County (Ports and George 1990). Currently, it is unknown whether this species occurs in the cumulative assessment area; however, suitable habitat occurs along perennial drainages in the Little Boulder Basin and east of the Tuscarora Mountains (BLM 1996a). The Preble's shrew also may occur along the Humboldt River drainage, since suitable habitat may be present along the river corridor and associated floodplains.

7.1.1.2 Sensitive Bat Species

Six special status bat species potentially occur within the project region. Of these, four have been positively documented in the cumulative assessment area, including the small-footed myotis, long-eared myotis, long-legged myotis, and Townsend's big-eared bat (see Table 7-1) (BLM 1996a, 1993b, 2000a; NNHP 1997; Ports 1995, 1996; JBR 1995b). The myotis species were primarily recorded foraging over riparian and

Table 7-1
Special Status Species Identified for the Cumulative Assessment Area

Common Name	Scientific Name	Status[1]	Potential to Occur Within Cumulative Assessment Area[2]
MAMMALS			
Preble's shrew	*Sorex preblei*	S	U[3]
Long-eared myotis	*Myotis evotis*	S	R
Small-footed myotis	*M. ciliolabrum*	S	R
Long-legged myotis	*M. volans*	S	R
Fringed myotis	*M. thysanodes*	S	U
Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	S	R
Pacific Townsend's big-eared bat	*C. t. townsendii*	S	R
Spotted bat	*Euderma maculatum*	N[4]	U
BIRDS			
Bald eagle	*Haliaeetus leucocephalus*	T[5]	W, M
Golden eagle	*Aquila chrysaetos*	N	R
Northern goshawk	*Accipiter gentilis*	N	R
Swainson's hawk	*Buteo swainsoni*	N	R, M
Ferruginous hawk	*B. regalis*	N	R, M
Osprey	*Pandion haliaetus*	N	M
Burrowing owl	*Athene cunicularia*	N	R
Sage grouse	*Centrocercus urophasianus*	S	R
American white pelican	*Pelecanus erythrorhynchos*	N	M
White-faced ibis	*Plegadis chihi*	N	R, M
Black tern	*Chlidonias niger*	S	R, M
PLANTS			
Lewis buckwheat	*Eriogonum lewisii*	S	P
FISH			
Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	T	R
AMPHIBIANS			
Columbia spotted frog	*Rana luteiventris*	C	R
INVERTEBRATES			
Nevada viceroy	*Limenitus archippus lahontani*	S	R
California floater	*Anodonta californiensis*	S	R
Springsnails	*Pyrgulopsis* spp.	None[6]	R

[1]Status:

E: Endangered: Federally listed species in danger of extinction throughout all or a significant portion of its range.

T: Threatened: Federally listed species likely to become endangered within the foreseeable future through all or a significant portion of its range.

C: Candidate: Species identified as warranted for Federal listing, but precluded by other actions to revise the lists.

S: BLM-sensitive species.

N: Nevada-listed species.

[2]Including the Humboldt River corridor.

Table 7-1 (Continued)

[3]Potential Presence:
R = Resident yearlong.
P = Plant populations present.
W = Wintering.
M = Migratory.
U = Unknown whether this species occurs in the vicinity of the project; however, suitable habitat is present.

[4]Per wording for Table IIa, in BLM Instruction Memorandum No. NV-98-013 for Nevada State protected animals that meet BLM's 6840 Policy Definition: Species of animals occurring on BLM-managed lands in Nevada that are: (1) "protected under authority of Nevada Administrative Codes 501.100 – 503.104; (2) also have been determined to meet BLM's policy definition of "listing by a State in a category implying potential endangerment or extinction;" and (3) are not already included as BLM Special Status Species under federally listed, proposed, or candidate species. Nevada BLM policy is to provide these species with the same level of protection as is provided for candidate species in BLM Manual 6840.06C.

[5]Proposed to be delisted by the USFWS; final decision is pending.

[6]No designation but they are a concern due to their limited distribution.

Sources: BLM 1996a; NNHP 1997; Ports 1995, 1996; Ports and Bradley 1996.

open water habitats; a single Townsend's big-eared bat was observed roosting in an abandoned mine site in Boulder Valley (Ports 1995 and 1996). Two male Townsend's big-eared bats were observed in the upper Lynn Creek drainage (BLM 1993b, 1996a, 2000a). Big-eared bats also have been recorded along the North Fork of the Humboldt River and in the northern Tuscarora Mountains (JBR 1995b). Although the current species' distribution of the Townsend's big-eared bat suggests that only the Pacific subspecies occurs in northeastern Nevada, the pale subspecies also has been documented (Bradley 2000). It is unknown which subspecies has been reported for the cumulative assessment area. The remaining two bat species identified as sensitive by the BLM (i.e., spotted bat and fringed myotis) could occur within the cumulative assessment area, based on habitat associations and previous field studies (Ports 1995; Ports and Bradley 1996). Habitat associations for all six of these species range among the upland shrub communities, woodland habitats (e.g., piñon-juniper), riparian areas, rock outcrops, cliff sites, and higher elevational woodland and wetland areas. Detailed information on habitat associations, breeding habits, foraging activities, and roost preferences are available in a number of publications, including: BLM (1996b, 2000a), Ports and Bradley (1996), JBR (1995b), Kunz (1990), Kunz and Martin (1982), Warner and Czaplewski (1984), Manning and Jones (1989), Colorado Division of Wildlife (1984), Arizona Game and Fish Department (1993), Zeveloff (1988), Bats of Nevada (no date), and General History of Nevada Bats (no date).

Hibernacula, nursery colonies, and individual roost sites likely occur within the general region. However, little site-specific information on bat occurrences exist for the cumulative assessment area. Within eastern and northeastern Nevada, the small-footed myotis, long-eared myotis, and long-legged myotis have been reported as being the most common and widespread of resident bat species (Ports and Bradley 1996).

7.1.1.3 Bald Eagle

The Federally listed bald eagle winters and migrates throughout north-central Nevada (BLM 1994b). Individuals often concentrate in proximity to open water areas during the winter season, where prey species may be more abundant, although eagles also utilize carrion and upland birds and mammals, in addition to organisms (e.g., fish, waterfowl) associated with these open water areas. Since 1989, NDOW has conducted winter surveys for birds of prey within the subbasins of Rock Creek, Boulder Creek, and Maggie Creek. Wintering bald eagles have been recorded during one or more of these surveys in all of these subbasins, with two to six eagles using each area (Bradley 1999). Limited open water areas are present during the winter period along Hot Creek (a thermal spring tributary to Rock Creek) and portions of Willow Creek Reservoir (Bradley 1999). No communal roost sites or nests have been reported in the project region (i.e., the Little Boulder Basin, Tuscarora Mountains, Independence Mountains, Sheep Creek Range, Adobe Range, or Humboldt River drainage) (BLM 1993b, 1994b, 1996a; JBR 1995b; Bradley 1999).

Wintering eagle use along the Humboldt River would be considered incidental (Neel 1999). Use would be associated with forage and roost availability. The bald eagle also has been documented in the vicinity of the Humboldt Sink (Seiler et al. 1993; Seiler and Tuttle 1997; Neel 1999), which provides some foraging opportunities for wintering birds. However, the majority of the Humboldt Sink is frozen during the winter season (Neel 1999), which limits the number of eagles and extent of their use.

7.1.1.4 Golden Eagle

The golden eagle occurs in nearly all habitat types of the western states, from desert grasslands to above timberline (Johnsgard 1990). In Nevada, the majority of eagles nest on suitable cliffs that overlook sagebrush flats, piñon -juniper forests, salt desert shrub or other habitats that support a suitable prey base (Herron et al. 1985). The golden eagle is a year-round resident within the cumulative assessment area. An active golden eagle nest site was documented along Boulder Creek in 1990 (JBR 1992a). A large number of roosting and foraging eagles also have been reported throughout the region, including along the mountains and drainages associated with the Tuscarora Range (JBR 1992a,f; EIP 1994; Fox 1993). Consequently, it is assumed that golden eagles could nest or forage within the cumulative assessment area (including along the Humboldt River), based on potentially suitable habitat, regional historical records, and these recent sightings.

7.1.1.5 Northern Goshawk

The northern goshawk is an uncommon forest species that is a year-round resident in northern Nevada, breeding in the higher elevations and wintering in the lower foothills and valleys (Herron et al. 1985). The northern goshawk primarily nests in the higher elevational woodland areas, particularly in aspen and conifer stands (Herrron et al. 1985). Potential goshawk habitat within the cumulative assessment area is limited to forest and mountain shrub communities (BLM 1993b), which would be found predominantly in the Tuscarora Mountains, Independence Mountains, Sheep Creek Range, and Adobe Range. Breeding goshawks have been documented in the Independence Mountains (BLM 1993b).

7.1.1.6 Swainson's Hawk

The Swainson's hawk is a summer resident of Nevada. Historically, this species was a common breeder in northern Nevada; however, current records indicate that this neotropical migrant is one of the least abundant raptors in the region. In Nevada, the majority of documented nesting territories occurred in agricultural valleys at elevations ranging from 4,000 to 6,500 feet. Nests have been found in buffaloberry, serviceberry, sagebrush, willow trees, and aspen; however, most of the documented nest sites occur in cottonwood or elm trees in agricultural valleys (Herron et al. 1985). In the cumulative assessment area, one pair of breeding Swainson's hawks was recorded on the Humboldt River floodplain in Lander County in 1987 (Bradley 1992), two Swainson's breeding territories were reported along the river southeast of Boulder Valley in 1992 (JBR 1992b), and territorial behavior was reported along the Humboldt River in the vicinity of Lone Tree Mine's discharge point in 1994 (BLM 1995b). Consequently, additional Swainson's hawk nests could potentially occur within the valleys and riparian zones associated with the cumulative assessment area.

7.1.1.7 Ferruginous Hawk

This buteo often nests on trees, promontory points, rocky outcrops, cut banks, and infrequently on the ground (Terres 1991; Herron et al. 1985). In Nevada, its preferred breeding habitat is scattered piñon-juniper trees along the interface between the conifer woodland community and the lower desert shrub communities that generally overlook broad valleys used for foraging (Herron et al. 1985). One record of a nesting ferruginous hawk has been documented by NDOW on the Carlin Trend, and individuals have been recorded in Boulder Valley during spring migration (JBR 1992a). Ferruginous hawks nest in the Tuscarora Mountains (JBR 1996a) and reportedly concentrate in late summer and early fall near the wet meadows associated with the upper reaches of Maggie Creek. This area appears to be a staging area used by the hawks prior to migrating (BLM 1993b). Suitable nesting habitat is limited in the Little Boulder Basin, but individual hawks likely forage within the basin and surrounding areas (JBR 1996a, 1995b). This raptor species also occurs along the Humboldt River drainage. Active nesting along the river would depend on suitable nest substrates, adequate prey base, and minimal human activities in proximity to the nest. In 1994, an active ferruginous hawk nest was recorded in a buffaloberry shrub in the vicinity of a water discharge ditch for the Lone Tree Mine (BLM 1995b), upstream of the Comus Gage.

7.1.1.8 Osprey

The osprey is primarily a spring and fall migrant in Nevada. Ospreys typically nest in dead snags or in trees within a mile or more from water, but have been known to nest on cliffs, on the ground, and on man-made structures (i.e., power poles, chimneys, windmills, channel buoys, and duck blinds) (Herron et al. 1985). In Nevada, only one nesting pair of osprey was recorded at Lake Tahoe in the 1970s. Since then, failed attempts have been made to attract breeding pairs to Marlette Lake, located 2 miles east of Lake Tahoe, by constructing nesting platforms (Reyser 1985). The diet of this raptor species consists primarily of fish that is usually captured near the water surface, but other sources of food include small mammals, birds, reptiles, and amphibians. Although breeding would be considered unlikely within the region, migrating osprey may occasionally roost and forage within the cumulative assessment area. One osprey was recorded along the

Humboldt River in 1988 near the Herrin Slough in Humboldt County. This bird was thought to be a migrant nonbreeder (Neel 1994).

7.1.1.9 Burrowing Owl

The burrowing owl is a confirmed nesting species in lower Boulder Valley (JBR 1996a) within the cumulative assessment area. In Nevada, burrowing owls have been observed primarily in disturbed sites such as recently burned areas or new troughs, corrals, or mineral licks where livestock concentrates. Nesting habitat for this owl species consists of abandoned mammal burrows on flat, dry, and relatively open terrain. This small owl typically forages in open grassland and sagebrush communities and feeds on insects, small rodents, small birds, reptiles, and amphibians (Terres 1991). Since the burrowing owl generally depends on mammal burrows for nesting, along the Humboldt River it would be restricted to more upland communities.

7.1.1.10 Sage Grouse

The sage grouse is becoming a focus of western U.S. land managers and regulatory agencies. A widespread reduction in available sagebrush habitat from wildfire events, livestock management, increased residential and urban development, and resource development activities has resulted in an incremental loss of breeding, nesting, and wintering areas for this species. In addition, the ongoing reduction in riparian and associated mesic communities in the arid portions of the West continues to reduce optimal brooding habitat for this grouse species. The western sage grouse may be petitioned for Federal listing in 2000; however, it is currently unknown when and if this will occur. In the interim, the sage grouse is classified as a BLM-sensitive species and is afforded the same level of protection on BLM lands as Federal candidate species.

Within the cumulative assessment area, sage grouse use the upland sagebrush habitat in rolling hills and benches along drainages for breeding and wintering. Mesic and riparian habitats are especially important during brooding and molting periods. Active sage grouse breeding sites, called leks, historically occurred throughout the cumulative assessment area. Since the quality of suitable breeding habitat typically improves with higher elevations, a greater number of grouse leks occur along the foothill regions and in the higher meadows (e.g., upper Rock Creek, northern Tuscaroras, Squaw Valley Ranch) (Lamp 1999). However, previous range fires and subsequent seeding of perennial grasses have reduced the overall habitat value for sage grouse in the Little Boulder Basin west of the Tuscarora Range (JBR 1989). In addition to their wildlife value, sage grouse are also important to the Western Shoshone Culture (see Section 10.2.2).

Available data on historical sage grouse leks within the cumulative assessment area are patchy and scattered. The most comprehensive record of historic lek sites recorded for the cumulative assessment area was obtained from the NDOW's state-wide database (NDOW 1998c) and supplemented with active leks recorded by JBR (1992g) for the cumulative assessment area. Overall surveys conducted within the Little Boulder Basin infer a general population decline, based on lek counts and reduced use of satellite leks by males in 1989 and 1990 (JBR 1992a). Several of the historic leks were recorded in the 1980s and early 1990s. Because of the recent wildfire events and ongoing mining operations along the Carlin Trend, it is unknown whether the majority of these sites are currently active.

Although a review of the available data indicated a few concentration areas in and near the cumulative assessment area, it is assumed that sage grouse could occur within potentially suitable habitats (i.e., upland, mesic, and riparian) within the entire region, including along the Humboldt River corridor. Exact lek locations are not shown, due to the sensitivity of these breeding sites; however, a summary of the historic lek locations is presented in an effort to characterize past and present use of the cumulative assessment area by breeding, nesting, and brooding sage grouse.

A large lek and several small satellite leks have been documented in Little Boulder Basin on the terrace south of Bell Creek (BLM 1994a). Approximately 10 to 15 leks have been documented on benches north of the Willow Creek drainage, and 3 historic leks were located north of Antelope Creek (NDOW 1998c). Ten to 15 leks have been recorded in the upper Maggie Creek drainage, in the northern Independence Range, and 5 leks were associated with the southern Independence Range (NDOW 1998c; JBR 1992g). Three leks were documented along the eastern flanks of the Tuscarora Range, 4 leks in the Adobe Range, and up to 7 leks were associated with drainages located west of the Adobe Range, including along Susie Creek and Sixteenmile Creek (NDOW 1998c; JBR 1992g). Few breeding or nesting grouse were recorded along the Humboldt River during the 1988 surveys (Nell 1994); however, it is assumed that they occur in suitable areas.

As stated above, a number of these leks may not be currently active. The lek summary provided for the cumulative assessment area was developed as a basic reference for the impact analysis presented in Section 7.2.1.10.

7.1.1.11 American White Pelican

The American white pelican breeds only at a few locations in the western and north-central United States. In Nevada, white pelicans breed at Pyramid Lake in Washoe County. Nesting habitat consists of inaccessible islands that provide protection from coyotes and other marauding predators, and productive, shallow-water fishing grounds. This species feeds primarily on fish species including the tui chub that occurs in Pyramid Lake and surrounding water bodies. Foraging by the Pyramid Lake colony has been documented 100 miles south of the breeding grounds to Washoe Lake, and as far as 60 miles south and east to Lahontan Reservoir, Humboldt Sink, and the Stillwater marshes (Ryser 1985). During spring migration, white pelicans begin to arrive on their breeding grounds from mid- to late March. Post-breeding and migratory movement studies indicate that while adult pelicans generally move northeast and northwest from Pyramid Lake into Utah, Idaho, and Oregon, most of the young pelicans move westward into central California (Ryser 1985). Consequently, based on this species' current distribution and common habitat associations, presence within the cumulative assessment area would be limited to potential migrating and foraging pelicans.

7.1.1.12 White-Face Ibis and Black Tern

Wet meadows and both perennial and intermittent wetlands provide habitat for resident and migratory shorebirds, including the white-faced ibis and black tern (Terres 1991). Within the arid habitats of northern Nevada, potential nesting or foraging habitat for these bird species typically fluctuates with available water.

The white-faced ibis has been documented using the Boulder Valley springs, TS Ranch Reservoir, and associated diversion canals within the Little Boulder Basin (ENSR 1995; JBR 1996a). Additional habitats located in the cumulative assessment area for these two water bird species include the wet meadows located along the perennial portions of the drainages occurring in Boulder Valley; along Maggie, Coyote, and Little Jack creeks; and in the Tuscarora Mountains, Independence Mountains, Sheep Creek Range, and Adobe Range (BLM 1993b, 2000a). These species also may use irrigated agricultural lands.

As discussed for general shorebird species in Chapter 5.0, shorebird occurrences in the Little Boulder Basin have been closely associated with surface water availability. Shorebird numbers were high during the early 1990s, because of the high water levels in the TS Ranch Reservoir, at the associated springs (i.e., Knob, Green, and Sand Dune), and along the irrigation ditch located south of these springs. As the area of surface water diminished during periods when no water was discharged to the reservoir, the amount of suitable habitat within the basin also declined. Therefore, shorebird numbers have fluctuated according to these changing water levels.

Both the ibis and tern have been observed along the Humboldt River (Alcorn 1988; Neel 1994, 1998; Bradley 1992; Bradley and Neel 1990), and terns are occasionally reported in northeastern Nevada, particularly the Ruby Marshes (Alcorn 1988). Historically, white-faced ibis foraged in the sloughs and flooded meadows along the Humboldt River and nested in the emergent vegetation. Currently, the majority of the habitat types that supported nesting ibis have been removed from the Humboldt system (Neel 1994), and ibis populations are declining in the western United States. The majority of white-faced ibis breed within the Great Basin area (Neel 1994). Therefore, the ibis is considered a BLM-sensitive species because of the declining population trends and the reduction in wetland habitats currently occurring within the Great Basin, and specifically Nevada.

In 1986, a nesting colony of 10 white-faced ibis pairs was recorded downstream of Battle Mountain (Bradley and Neel 1990). In 1987, white-faced ibis were documented by the NDOW during the breeding season upstream of Battle Mountain (Bradley 1992), and ibis were reported along the river in 1992 upstream of the mines' discharge points (JBR 1992b). Prominent ibis nesting areas occur at the Herrin Slough (Neel 1994), along the northern portion of Rye Patch Reservoir, at the Humboldt Sink (Humboldt WMA), and south at Carson Lake (Stillwater WMA) (Saake 1998; Neel 1998; Seiler et al. 1993). Typically, white-faced ibis range along the Humboldt River, following the patterns of flood irrigation (Neel 1994).

The black tern is an uncommon nesting species in the Great Basin. Black terns have been recorded along the Humboldt River near Golconda (Neel 1994), downstream of the Comus Gage. This species also could occur in other locations that provide the necessary habitat for breeding or foraging.

7.1.1.13 Nevada Viceroy

This butterfly species is typically associated with willow (*Salix exigua*) habitat, which is used by the larval stage as a host plant (Herlan 1971). Its known distribution is limited to riparian habitat in valley floors below approximately 6,000 feet in elevation. The Nevada viceroy is not abundant in its present distributional range.

The use of herbicides and burning of willow species along canals and streambanks have affected the species' distribution (Herlan 1971).

The Nevada viceroy occurs in riparian areas along the Humboldt River and its tributaries (Austin 1998). This butterfly has been reported from Dunphy, Beowawe, and Elko (JBR 1992e) and was observed along the Humboldt River and Maggie Creek in 1990 (BLM 1996a). Approximately 446 acres of potential habitat for the Nevada viceroy was identified and mapped along Little Jack, lower Susie, and Maggie creeks (BLM 1993b). Potentially suitable habitat also occurs along Coyote, Boulder, and Bell creeks; however, no Nevada viceroys have been documented (BLM 1993b, 1996a).

7.1.1.14 Lewis Buckwheat

Lewis buckwheat is a mounded or matted perennial forb that is restricted to dry, open, relatively barren and undisturbed convex ridge-line knolls and crests underlain by siliceous carbonate and limestone rock types on all aspects (Morefield 1996). Known habitat is characterized by sparse to moderately dense vegetation, typically including low sagebrush (*Artemisia arbuscula*), green rabbitbrush (*Chrysothamnus viscidiflorus*), Indian ricegrass (*Oryzopsis hymenoides*), and squirreltail (*Elymus elymoides*). This species is endemic to north-central Elko County and northern Eureka County, Nevada; in the Bull Run, Independence, and Tuscarora Mountains; and in the Jarbidge Mountains complex (Morefield 1996). A total of 33 populations, including approximately 665,000 plants, are known to occur in 10 general areas. These populations cover approximately 118 acres on National Forest, private, BLM, and Elko County lands between 6,470 and 9,720 feet in elevation. The majority of these populations have been affected by road-building activities, livestock trampling, fire suppression activities, and mineral exploration. Three of the 33 known populations occur in the central portion of the cumulative assessment area, more specifically, north of Emigrant Pass and adjacent to Marys Mountain at approximately 6,960 to 8,337 feet (Morefield 1996).

7.1.2 Aquatic Species

Three aquatic Federally threatened, candidate, or BLM-sensitive species potentially occur within the cumulative assessment area. Of these species, LCT (*Oncorhynchus clarki henshawi*) is the only Federally listed species (threatened). The California floater (*Anodonta californiensis*) is a BLM-sensitive species. The Columbia spotted frog (*Rana luteiventris*) is a Federal candidate species. Springsnails currently have no BLM designation; however, they are important because of limited occurrence and potential for future listing or identification as a candidate or sensitive species. The following discussion summarizes the distribution, abundance, and habitat used by these species or group of species (i.e., springsnails). Habitat characteristics of streams located within the Maggie and Rock Creek subbasins are described in Sections 6.1.2 and 6.1.3, respectively.

7.1.2.1 Lahontan Cutthroat Trout

The LCT was initially listed as Federally endangered in 1970, but its status was changed to threatened in 1975 to legalize angling and provide for improved management of the species. Historically, LCT occupied streams throughout the Humboldt River drainage. Presently, this species occurs in 83 to 93 streams in the

Humboldt River Basin, or approximately 318 stream miles (Coffin and Cowan 1995). This constitutes approximately 14 percent of their historic habitat range. Most existing populations are found in eight subbasins that include Marys River, Maggie Creek, Rock Creek, North Fork Humboldt River, East Fork Humboldt River, South Fork Humboldt River, Little Humboldt River, and Reese River.

Maggie Creek Subbasin

The present distribution of LCT within the Maggie Creek subbasin is limited to the following streams: Little Jack Creek, Jack Creek, Coyote Creek, Beaver Creek, Little Beaver Creek, Toro Canyon, Williams Canyon, and mainstem Maggie Creek (Figure 7-1). The estimated miles of occupied habitat in these subbasin streams is listed in Table 7-2. The length of occupied habitat may vary annually depending upon stream flows and water temperatures. Of these seven streams, Beaver, Coyote, and Little Jack creeks contain the highest quantity of presently occupied habitat. The present distribution of LCT in the mainstem portion of Maggie Creek is limited to a few scattered locations within an 8-mile segment (Figure 7-1) (AATA International 1998a, 1997; Aronson 1998; Coffin and Cowan 1995; Evans 1998; JBR 1992f; NDOW 1998b, 1996b, 1978; Valdez et al. 1994). Presently, LCT numbers in Maggie Creek are reduced in comparison to historic numbers. The entire 8-mile mainstem segment is considered potential habitat because LCT occur in Maggie Creek and the Maggie Creek Watershed Restoration Project is improving aquatic habitat. A summary of this restoration project is provided in Section 6.1.2, Maggie Creek Subbasin.

Previous LCT population surveys in the Maggie Creek subbasin have been conducted by JBR (1992f), BLM (1994b), Valdez et al. (1994), NDOW (1998b, 1996) and AATA International, Inc. (1998a, 1997). These surveys followed similar electrofishing techniques, except that the survey distance varied in some studies. Overall, LCT densities ranged from approximately 15/mile in Beaver Creek to 2,592/mile in Coyote Creek. Based on studies conducted by Valdez et al. (1994), LCT were collected in Beaver, Little Beaver, Williams Canyon, and Toro Canyon creeks, and three tributaries to Toro Canyon (Table 7-3). Little Beaver Creek supported the highest densities in this study, with 704 LCT/mile. Recent surveys conducted in 1997 found LCT in Beaver, Little Jack, and Coyote creeks, with densities ranging from 1 to 52 fish/328-foot sampling segment (AATA International 1997). Total LCT catches and densities/mile for these three streams are shown in Table 7-4. Recent sampling also was conducted by NDOW (1999, 1996b) in Little Jack and Coyote creeks, where average LCT densities per mile were 647 and 634, respectively. Three trout (likely LCT) also were observed in Maggie Creek just downstream of the confluence with Coyote Creek in 1997 (NDOW 1998b). The most productive areas for LCT exist in upper Coyote Creek, Little Beaver Creek, and Toro Canyon and its tributaries. The mainstem portions of Beaver Creek and Maggie Creek support relatively low LCT densities. The LCT Recovery Plan identified the entire Maggie Creek drainage as a metapopulation. Recovery sites for LCT, expressed in linear miles, include the following streams: Little Jack Creek (1 mile), Maggie Creek (4 miles), Beaver Creek (2.8 miles), and Coyote Creek (4.8 miles) (Coffin and Cowan 1995). These distances were based on information available as of 1995 and were not intended to limit recovery activities to a specific stream length.

LCT populations inhabiting the upper canyons of Little Jack, Coyote, Toro Canyon, and Beaver creeks in 1997 showed evidence of reproduction, since young-of-the-year were abundant (AATA International 1998a, 1997). Below the canyon mouths of these streams, only one reproductive population of LCT was found in a

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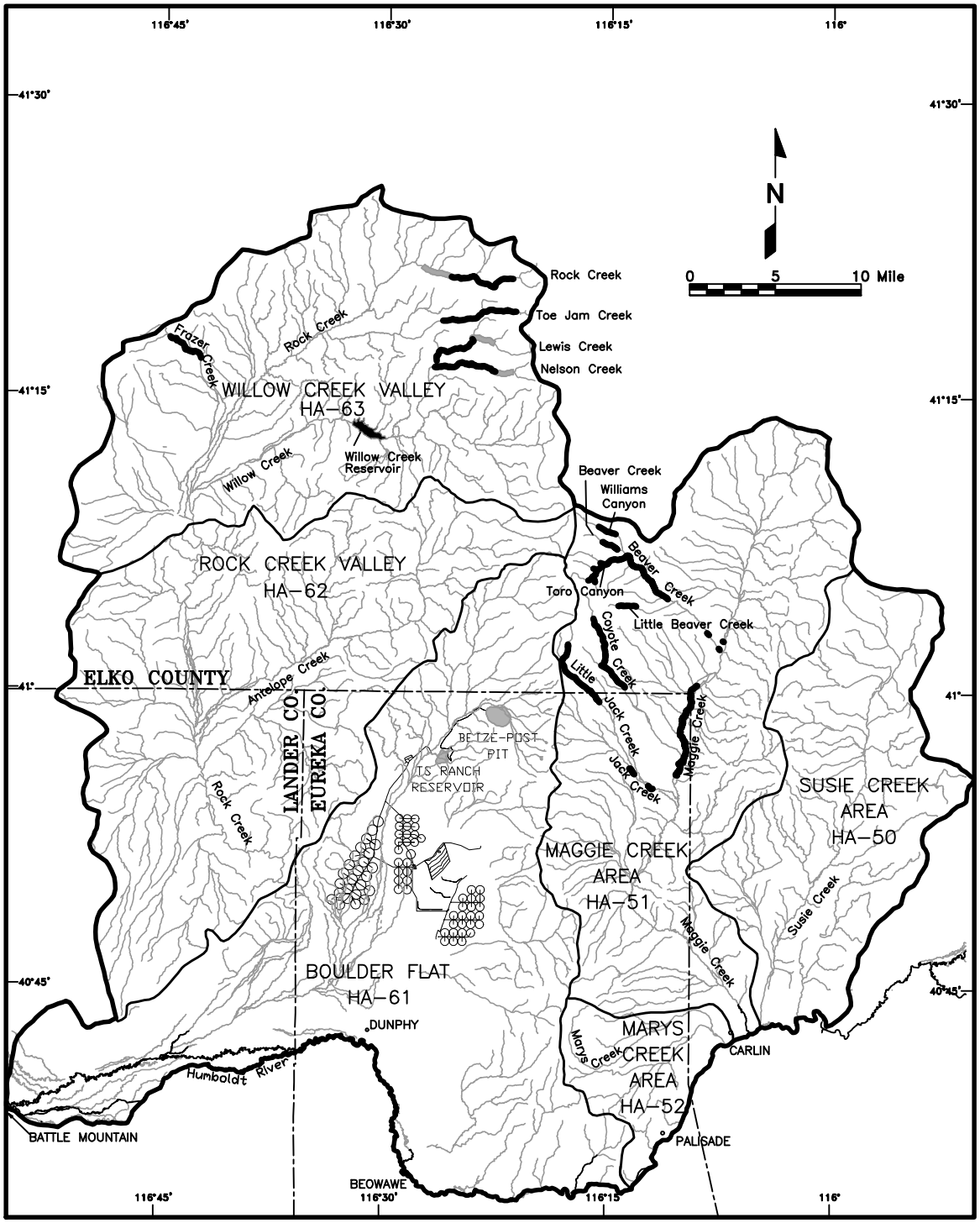

Legend

- Ground Water Basin Boundary
- Stream
- County
- Lahontan Cutthroat Trout Habitat
- Potential Seasonal Habitat
- Center Pivot Irrigation

Figure 7-1

Areas of Lahontan Cutthroat Trout Habitat

Table 7-2
Estimated Miles of Occupied LCT Habitat in the Maggie Creek and Rock Creek Subbasins

Maggie Creek Subbasin	Occupied[1]
Maggie Creek Mainstem	8.0
Little Jack Creek	4.6
Coyote Creek	5.2
Beaver Creek	7.1
Little Beaver Creek	1.1
Toro Canyon Creek	2.3
Williams Canyon	1.1
Rock Creek Subbasin	**Occupied[1]**
Frazer Creek	2.6
Toe Jam Creek	4.5
Lewis Creek	3.1
Nelson Creek	4.1
Rock Creek	4.2
Willow Creek Reservoir	2.2

[1]Occupied habitat may vary annually based on stream flow, temperature, and habitat conditions.

spring-fed reach of lower Jack Creek. Limited LCT reproduction has been detected in the mainstem portion of Maggie Creek below beaver dams (JBR 1992e). However, adult LCT in Maggie Creek have been observed entering (or attempting to access) tributary streams for possible spawning (Evans 1999a). LCT that have been found in the lower reaches of the subbasin streams were considered to be "outwash victims" that have been removed from the reproducing populations. Winter habitat conditions are adequate to maintain existing LCT populations, but the number of deeper pools are limited (AATA International 1998c).

Rock Creek Subbasin

An estimated 25 miles of potential LCT habitat exists within the Rock Creek subbasin (BLM 1994b). LCT have been documented in Willow Creek Reservoir and six streams within the Rock Creek subbasin: Frazer, Willow, Toe Jam, Lewis, Nelson, and Rock creeks (Figure 7-1). Previous NDOW surveys in 1959 and 1986 collected LCT in Willow Creek above the reservoir during spawning (Elliott 1999). Based on Aronson (1998), potential seasonal habitat also is present in Rock, Lewis, and Nelson creeks. In terms of linear miles, Toe Jam Creek and upper Rock Creek contain the highest quantity of occupied habitat. Based on surveys conducted by NDOW in 1977 and 1996 in Toe Jam, upper Rock, upper Willow, and Frazer creeks (as summarized in BLM 1998c), LCT densities ranged from 211 to 581/mile in 1977 and from 70 to 854 in 1996 (Table 7-5). Previous surveys conducted between 1955 and 1986 reported densities ranging from 211 to 616 LCT/mile in these streams (BLM 1994b). Recent and historic surveys showed that Frazer Creek is the

Table 7-3
Mean LCT Abundance[1] (number/mile) in the Beaver Creek Drainage, 1994

Stream	Location	Life Stage	
		Juvenile	Adult
Beaver Creek	1	0	10
	2	0	0
	3	0	0
	4	44	0
	5	0	0
	6	28	28
	7	15	15
	8	43	43
	9	128	0
	10	15	0
	11	0	0
Williams Canyon	1	0	0
	2	81	0
	3	132	0
Toro Canyon	1	0	0
	2	170	34
	3	270	0
	4	114	0
	5	103	26
Toro Tributary A	1	128	64
Toro Tributary B	1	313	0
Toro Tributary C	1	328	0
Little Beaver Creek	1	0	0
	2	634	70

[1]Number of fish/sampling segment (in feet) was extrapolated to number/mile.
Source: Valdez et al. (1994).

Table 7-4
Summary of LCT Densities in Maggie Creek Tributaries, 1997

Stream	Total Catch	No. of 328-foot Segments	Density/Mile
Little Jack Creek	80	13	99
Beaver Creek	2	4	8
Coyote Creek	45	5	145

Source: AATA International, Inc. (1997).

Table 7-5
LCT Densities for Rock Creek Subbasin Tributaries

Stream	1977			1996		
	LCT/Mile	No. of Age Classes	Occupied Habitat (Miles)	LCT/Mile	No. of Age Classes	Occupied Habitat (Miles)
Toe Jam Creek	581	3	4.7	106	2	4.5
Upper Rock Creek	282	4	5.0	70	2	5.0
Upper Willow Creek[1]	211	2	1.0	290[2]	2	1.0
Frazer Creek	320	5	1.0	854	5	2.0

[1]Survey reach extended from above Willow Creek Reservoir to the confluence with Lewis Creek.
[2]The same area was surveyed in 1977 and 1996; however, this portion of upper Willow Creek was reported by NDOW (1996c) as being part of Lewis Creek.
Source: BLM (1998c).

most productive stream for LCT in the Rock Creek subbasin. NDOW (1996c) reported moderate LCT densities in 1996 (853/mile), while 2,600 LCT/mile were estimated in 1971 (BLM 1994b). Recovery habitat has been identified in the following six streams: Frazer Creek (1.5 miles), Lewis Creek (3.8 miles), Nelson Creek (2.6 miles), upper Rock Creek (10.0 miles), Toe Jam Creek (6.0 miles), and upper Willow Creek (1.0 mile) (Coffin and Cowan 1995). As previously mentioned, these approximate distances were based on information available as of 1995 (Coffin and Cowan 1995).

Ecology and Life History

In general, riverine populations of LCT inhabit small streams with cool water; pools in proximity to cover and velocity breaks; well vegetated and stable stream banks; and relatively silt-free, rocky substrate in riffle-run areas (Coffin and Cowan 1995). Within the Humboldt River Basin, LCT can tolerate temperatures exceeding 80°F for short periods of time and daily fluctuations of 25° to 35°F (Coffin 1983; French and Curran 1991). Habitat characteristics of collection sites in Little Jack Creek included pools with overhanging vegetation and gravel substrates (JBR 1992e). Ideal overwintering habitat consists of deep pools (depths to 3 feet) with abundant cover such as large woody debris and undercut banks (AATA International 1998d). Beaver ponds, which provide this type of overwintering habitat, are increasing in Maggie, Beaver, Susie, and Rock creeks due to increased availability of willows.

LCT spawning typically occurs from April through July, depending on stream conditions such as flow, water temperature, and elevation. Spawning behavior is similar to other stream-spawning trout, which involves eggs being laid in redds dug in riffle areas over gravel substrates (Coffin and Cowan 1995). Adult maturity is 3 to 4 years for females and 2 to 3 years for males. Generally, spawning occurs every 1 to 2 years rather than consecutive-year spawning. LCT spawning migrations usually occur at temperatures ranging from 41° to 61°F (Lea 1968 and USFWS 1977, as cited in Coffin and Cowan 1995). Eggs usually hatch in approximately 4 to 6 weeks, with fry emergence occurring 13 to 23 days later. In the Maggie Creek and Rock Creek subbasins, fry always are present by July (AATA International 1998c,d; Dunham and Vinyard

1996). Fry usually move out of the tributary streams during increasing flows in the fall and winter. However, some juveniles may remain in the nursery stream for 1 to 2 years before migrating in the spring.

Numerous factors such as fires, floods, droughts, extreme temperatures, nonnative species, destructive land use practices, and habitat fragmentation have affected LCT populations within the Lahontan Basin (Dunham et al. 1997). In general, fragmentation, which results from a loss of connectivity among streams, is a concern because it reduces the recolonization potential, life history development, and habitat diversity (Dunham and Vinyard 1996). Habitat fragmentation exists in the Maggie Creek and Rock Creek subbasins. Impassable culverts beneath the county road on tributary streams are the primary cause of habitat fragmentation in the Maggie Creek subbasin.

7.1.2.2 California Floater

Potential habitat for the California floater, a freshwater mussel, occurs within the Maggie Creek and Rock Creek subbasins. Two live specimens were found in Maggie Creek in 1993 at the following locations: 1) immediately north of the confluence between Maggie and East Fork Cottonwood creeks, and 2) approximately mid-distance between the confluences of Cottonwood/Maggie and Jack/Little Jack creeks (Worley 1993, as cited in BLM 1993b). No live specimens were observed in surveys of the Humboldt River from Tonka downstream to Beowawe, or in Maggie, Simon, Marys, or Susie creeks (McGuire 1993). Three live California floaters also were found in a 5-mile section of lower Rock Creek Canyon in 1995 (McGuire 1995). No live floaters or shell fragments were observed during surveys in Antelope and Boulder creeks.

Collections in Nevada have indicated that California floaters occur primarily in small, permanent streams with pool or run habitats and substrates consisting of silt, sand, and gravel (McGuire 1995). In Rock Creek, California floaters were observed in pool habitats with silt/sand substrates, depths of 18 to 30 inches, and velocities of 0.5 feet/second. One specimen also was located in a narrow run, with gravel/sand substrates, a depth of 14 inches, and velocity of 1 foot/second.

7.1.2.3 Springsnails

Springsnails, a group of mollusks that are found in perennial springs and seeps, are considered important organisms due to their restricted distribution and native origin. Although the taxonomic classification of springsnails below the family level is difficult, Hershler (1998) has reviewed the taxonomy of *Pyrgulopsis* species. Springsnails have been collected at a limited number of springs and seeps within the cumulative assessment area (see Figure 7-2) (McGuire 1992, 1996; JBR 1992e).

Based on surveys conducted in 65 springs and seeps in 1992, springsnails were collected at 3 sites (McGuire 1992). *Pyrgulopsis* was collected in Warm Billy Spring (unnamed tributary flowing into Buck Rake Jack Creek) and Rattlesnake Spring (unnamed tributary flowing into the Humboldt River). *Pyrgulopsis bryantwalheri* was present in Warm Spring, which is located near the Humboldt River about 3 miles south of Carlin. Estimated densities at these collection sites were 200/m^2 at the spring source and 10/m^2 below the source at Warm Billy Spring, 500 to 1,000/m^2 at Rattlesnake Spring, and 1,000/m^2 at Warm Spring.

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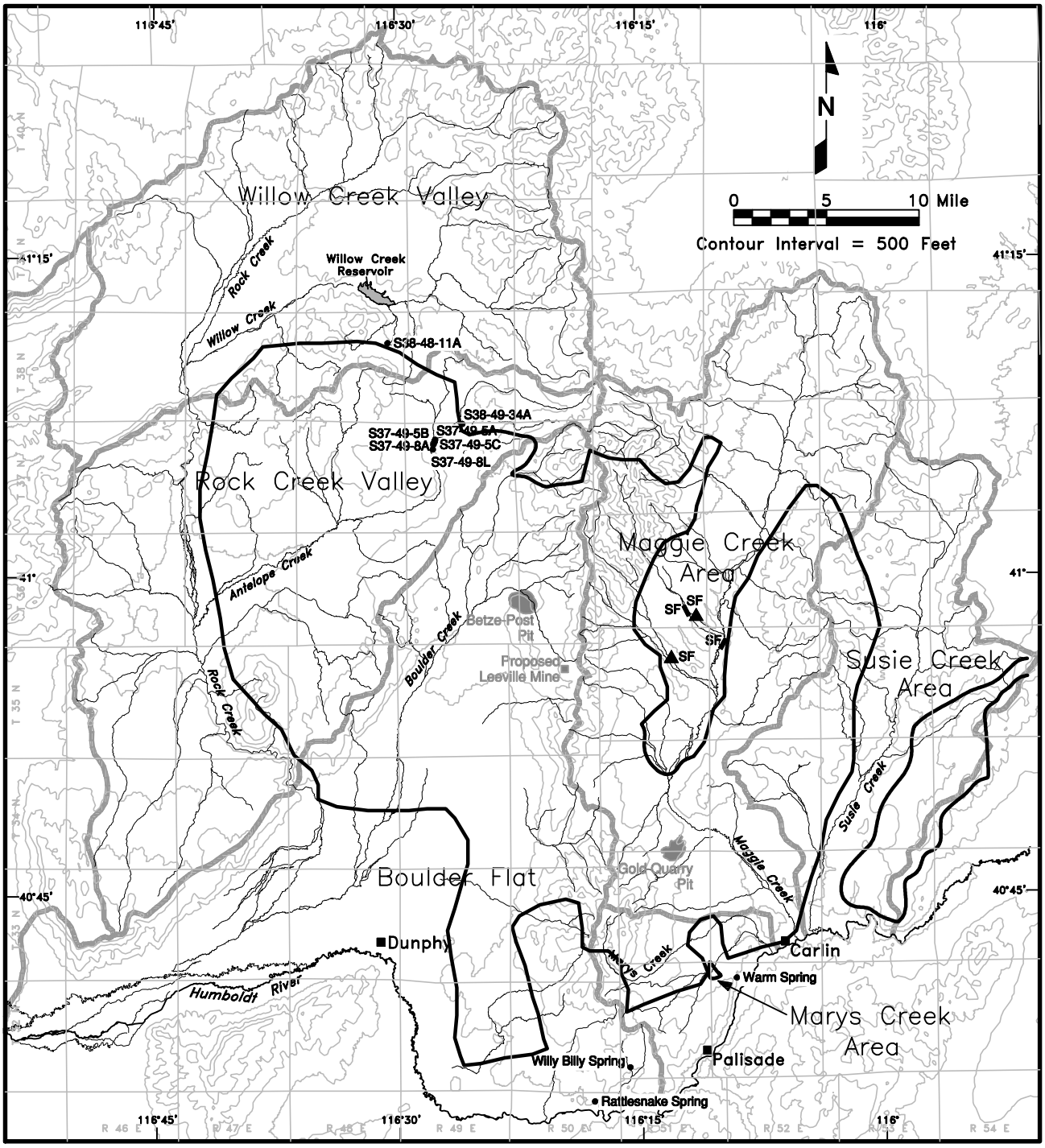

Legend

- Ground Water Basin Boundary
- Stream
- Cumulative Drawdown Area (≥10 Feet of Drawdown)
- S37-49-8A Springsnail Location
- SF▲ Spotted Frog Collection Sites
- SF▬ Spotted Frog Potential Habitat

Figure 7-2

Known Locations for Springsnail Populations and Spotted Frog Habitat

Subsequent surveys were conducted in 1995 and 1996 to include seeps and springs found within or near the Betze Project hydrologic baseline study area (McGuire 1995, 1996). Springsnails were collected in 7 of 41 springs that were surveyed (labeled in Figure 7-2). Collection sites included springs along Antelope Creek (T37N, R49E, Sections 5 and 8), an unnamed spring perched above Squaw Creek (T38N, 49E, Section 34), and the spring source for Hot Creek (T38N, R48E, Section 11). Hershler (1995) also reported that springsnails were common in two additional springs located within the Squaw Creek drainage (T38N, R48E, Section 33 and T40N, R47E, Section 32).

Habitat conditions in springs supporting springsnails showed the following characteristics. Springsnails usually were confined to the spring source and a wetted area immediately downstream from the spring. The springs also exhibited low to moderately high discharges (5 to greater than 30 gpm), stable substrates consisting of gravel, cobble, or boulder; and dense growth of aquatic vegetation such as *Ranunculus aquaticus* or *Nasturtium* (McGuire 1996, 1992). Springsnails often decline in density downstream of stream sources, presumably reflecting their requirement for stable temperature, chemistry, and flow regime (Deacon and Minckley 1974, as cited in Hershler 1998).

7.1.2.4 Columbia Spotted Frog

The Columbia spotted frog occurs in wetland habitats ranging from subalpine forests to low elevation shrublands and grasslands. During the breeding season, they are found near permanent water bodies such as ponds, pools in streams, and springs (BLM 1993b). The water bodies also usually contain emergent vegetation. After the breeding season is completed, frogs can move considerable distances to habitats such as mixed conifer forests, subalpine forests, grasslands, and brushlands that contain sage and rabbitbrush. This species hibernates during the winter in holes near springs or other areas where water is unfrozen and constantly renewed (U.S. Forest Service 1991). The entire upper Humboldt River watershed is considered historic and potential spotted frog habitat.

The spotted frog was observed in Newmont's South Operations study area in 1992. The collection sites for this species consisted of sloughs or springs with pools that were located adjacent to Coyote and Little Jack creeks (JBR 1992e) (see Figure 7-2). The spotted frog was not observed during surveys at Antelope, Rock, or Boulder creeks in 1995 (McGuire 1996). However, a 1-mile section of Antelope Creek (T38N, R49E, Section 25) appeared to represent suitable habitat for this species. Spotted frogs were observed on the east side of the Tuscarora Mountains in Maggie Creek upstream of the Coyote Creek confluence and in old beaver ponds along Coyote Spring Creek (McGuire 1992).

7.2 Impacts from Mine Dewatering and Discharges to the Humboldt River

7.2.1 Terrestrial Wildlife

Federal agencies, in consultation with the USFWS, are required to ensure that any action that they authorize, fund, or carry out will not adversely affect a Federally listed species or species proposed for

Federal listing. The BLM, as the Federal lead agency, is currently working with the USFWS under the informal Section 7 process for both Barrick's and Newmont's water management operations.

The cumulative impact analysis pertaining to special status species focuses on only those project components or areas (e.g., regional hydrologic study area, Humboldt River, Humboldt Sink) that apply to special status species identified for the project. Potential short- and long-term impacts to wildlife species that may occur at the Humboldt Sink from possible exposure to constituents of concern are discussed for representative wildlife in Section 5.3.2. These same project assumptions and impact determinations have been applied to special status species that may use the Humboldt Sink for breeding, foraging, or resting.

7.2.1.1 Preble's Shrew (BLM-Sensitive Species)

Little is known about the potential occurrence of the Preble's shrew in the cumulative assessment areas (see Section 7.1.1.1). The potential long-term loss of some seeps, springs, and stream reaches within the areas of potential impact to perennial surface waters (i.e., shaded areas on Figure 3-15) could reduce the amount of potentially suitable habitat for this shrew species.

As discussed for general wildlife resources in Section 5.3.1, it is anticipated that increased flows in the Humboldt River and Humboldt Sink would provide additional water to support existing riparian and wetland communities during the mines' discharge period. Although increased mine water discharges into the Humboldt River also would result in an increase in water withdrawals for irrigation by existing water right holders (see Section 3.3.7), a net increase in flows would be expected. Therefore, a short-term increase in available water for wildlife resources would be anticipated. Inundation of some wetland areas near the river may occur from greater water depths, particularly downstream of Comus (see Section 3.3.3). It is assumed that slightly greater inundation of some backwater areas from increased flows would occur. Inundation of terrestrial areas along the river would result in an incremental loss of habitat; however, it would be offset by the creation of other habitats along natural sloughs within existing meanders and oxbows that do not currently receive water during normal flows (see Section 5.3.1). The anticipated reduction in baseflow, as discussed in Section 3.3.2, could result in an incremental reduction in suitable foraging habitat in the long term along the river corridor, although Newmont's mitigation plan to augment low flows should minimize potential long-term effects from reduced baseflow in the river (see Sections 5.3.1 and 3.3.2). Potential impacts to species at the Humboldt Sink from chemical constituents of concern have been examined for representative wildlife species, as discussed in Section 5.3.

7.2.1.2 Sensitive Bat Species (BLM-Sensitive Species)

The impact analysis of the six special status bat species (including the two subspecies of the Townsend's big-eared bat) that may occur within the cumulative assessment area and along the Humboldt River focused on the changes to available foraging areas from modifying water depths and riparian vegetation. The potential reduction or loss of perennial surface water resources and surrounding riparian vegetation could affect bats, incrementally reducing the amount of suitable foraging habitat for a number of these bat species listed in Section 7.1.1.2. However, the vegetation density relative to the amount of open water combined with the proximity of possible foraging areas to occupied bat roosts would determine overall habitat values

for bats and the extent of anticipated habitat losses or reduction in foraging opportunities. No impacts to bat hibernacula or other communal roosts would be expected, since it is assumed that these larger roost sites occur in caves, buildings, or large rock outcrops.

As discussed for other terrestrial wildlife resources, increased flows along the Humboldt River and Humboldt Sink would create additional foraging areas for bats, in the form of increased surface water area and improved riparian habitats. Over the life of the dewatering discharges, it is expected that a net gain of backwater habitats would occur along the river corridor. The projected reduction in baseflow after discharges cease, discussed in Section 3.3.2, could result in an incremental reduction in open water and riparian habitats for wildlife use in the long term, which should be mitigated by Newmont's mitigation plan (see Sections 5.3.1 and 3.3.2).

7.2.1.3 Bald Eagle (Federally Listed Threatened; Delisting Pending)

No bald eagle nests or communal roost sites have been documented within the cumulative assessment area. Bald eagles migrate through the region and are fairly common during the winter. Although wintering eagles are often attracted to open water to feed on fish and waterfowl, they also occur in the upland habitats, foraging on carrion, rabbits, and sage grouse.

The reduction in perennial surface water within the regional hydrologic study area would incrementally reduce the potential amount of available foraging habitat for wintering and migrating eagles. However, potential habitat effects would be minimized, based on: 1) the low number of wintering eagles that typically occur within the regional hydrologic study area (i.e., two to six eagles within each of the subbasins, Rock Creek, Boulder Creek, and Maggie Creek); 2) the fact that wintering and migrating birds use both open water areas and the upland habitats for foraging; 3) no drawdown impacts are anticipated for the Willow Creek Reservoir, a prominent site for eagles; and 4) no known communal or historic roost sites occur within this study area.

Potential effects to bald eagles that occur along the Humboldt River and Humboldt Sink during the mines' water discharges would parallel the effects discussed for general wildlife resources. Increased water levels would be most apparent during the low-flow periods (October through February), resulting in more open water (less freezing) during the late fall and winter and a greater prey abundance. The anticipated reduction in baseflow in the Humboldt River could result in an incremental reduction of potential foraging habitat in the long term. However, Newmont's existing Humboldt River mitigation plan (BLM 1993d) should reduce or eliminate potential effects associated with predicted baseflow reductions (see Sections 5.3.1 and 3.3.2). As discussed above, the potential for adverse impacts to species using the Humboldt Sink from possible bioconcentration of chemical constituents of concern is discussed in Section 5.3.2.

7.2.1.4 Golden Eagle (Nevada-Listed Species)

Potential impacts to the golden eagle that could occur from the reduction or loss of riparian or wet meadow habitat types would be limited to an incremental reduction in potential foraging areas, if available surface water and associated riparian vegetation were affected by long-term ground water drawdown. However, this

raptor predominantly nests and forages in drier, upland areas, and use of riparian drainages and wet meadow areas would be incidental. The potential effects to golden eagles from increased water levels in the Humboldt River and in the Humboldt Sink would parallel those discussed for general wildlife resources in Section 5.3. An overall increase in water availability and maintenance or enhancement of riparian vegetation would result in an associated increase in small mammal populations. Therefore, an incremental increase in the quality of foraging habitat and opportunities along the river and in the Humboldt WMA could be anticipated, even with an increase in water use for irrigation purposes. As discussed above, the potential long-term reduction in baseflow in the Humboldt River may result in an incremental reduction of potential foraging habitats and associated prey species.

7.2.1.5 Northern Goshawk (Nevada-Listed Species)

Potential long-term effects to goshawks could result from reduction or loss of riparian habitats associated with perennial water sources at the higher elevations of the Tuscarora Mountains and portions of the Independence Mountains. However, the majority of these high-elevational springs and streams would not be impacted. Possible impacts to nesting and foraging goshawks would be limited to perennial water sources that support suitable trees for goshawk nest sites and sufficient vegetation for this accipiter's primary prey species (smaller birds). The potential effects from changing flows in the Humboldt River and Humboldt Sink would only apply to wintering goshawks, since the Humboldt River Valley occurs at elevations that are lower than those typically occupied by nesting goshawks. The potential for impacts to individuals using the Humboldt Sink from possible bioconcentration of chemical constituents of concern is discussed in Section 5.3.2.

7.2.1.6 Swainson's Hawk (Nevada-Listed Species)

The likelihood of Swainson's hawks nesting and foraging within the cumulative assessment area is low, based on this species' current distribution in northern Nevada (see Section 7.1.1.6). If nesting and migrating birds were present, potential impacts to breeding or foraging birds would parallel the discussions for the other special status raptor species (i.e., ferruginous hawk, golden eagle, northern goshawk). Since this hawk species may occupy both upland and riparian areas for nesting and foraging, a potential reduction in available water and/or riparian vegetation could incrementally impact this species' nesting sites and foraging areas. A reduction in potential prey abundance (from invertebrates to small vertebrates) may affect this species' distribution and habitat use in northern Nevada, if present. Potential impacts to the Swainson's hawk from increased water flows into the Humboldt River and Humboldt Sink would be the same as those discussed for general wildlife and special status raptor species. Increased water levels and riparian habitats could result in a correlated increase in potential prey species for both breeding and migrating individuals. Inversely, the potential reduction in river baseflow in the long term could impact potentially suitable nesting and foraging habitat for this hawk species along the river. The potential effects to individual birds using the Humboldt Sink from possible bioaccumulation factors are discussed in Section 5.3.2.

7.2.1.7 Ferruginous Hawk (Nevada-Listed Species)

The long-term reduction or loss of riparian habitats may indirectly affect this raptor species. The success of nesting raptors is often closely associated with the available prey base and relative prey densities, and prey availability is particularly important for nesting ferruginous hawks. Also, since concentrations of ferruginous hawks may use wet meadows as staging areas prior to fall migration, prey abundance in these wet meadow habitat types may be important to both migrating and nesting birds. Reduction or loss of wet meadow or riparian habitats from the cumulative drawdown effects could remove habitats for suitable prey, thereby reducing prey abundance and possibly affecting subsequent ferruginous hawk nesting success.

As discussed for other sensitive species, increasing flows within the Humboldt River and Humboldt Sink may increase relative prey bases for area predators during the mines' discharges. For the ferruginous hawk, increasing prey species would be small mammals that may commonly occupy wet meadow or mesic habitats. A possible increase in these small mammal populations from increasing and expanding riparian habitats would likely be utilized by foraging raptors, including the ferruginous hawk. The anticipated reduction in baseflow in the Humboldt River in the long term could result in an incremental reduction of potential foraging habitat, which should be mitigated by Newmont's mitigation to augment low flows (see Sections 5.3.1 and 3.3.2). The potential for impacts to individual birds using the Humboldt Sink from possible bioconcentration of chemical constituents of concern is discussed in Section 5.3.2.

7.2.1.8 Osprey (Nevada-Listed Species)

No impacts to the osprey would be anticipated from the potential long-term reduction in available surface water seeps, springs, or small streams throughout the cumulative assessment area, since this rare migrant generally is associated with large reservoirs, lakes, and rivers. As discussed for the bald eagle, no effects to Willow Creek Reservoir are expected, and the possibility of individual migrating osprey foraging along the smaller creeks or springs is low. The potential increase in available water in the Humboldt River during the mines' discharge period may result in increased foraging opportunities for migrating individuals. The potential long-term reduction in baseflow along the Humboldt River from ground water drawdown effects would result in a similar reduction in potential foraging areas for this primarily fish-eating raptor. The potential bioaccumulation effects discussed for species foraging within the Humboldt WMA in the long term are presented in Section 5.3.2.

7.2.1.9 Burrowing Owl (Nevada-Listed Species)

Based on this owl species' known habitat associations, it is assumed that breeding adults and young predominantly occupy dry, upland communities. However, it could not be determined, based on a preliminary literature review, whether burrowing owls depend on open (free) water or riparian/mesic habitats for foraging. Therefore, a conservative impact analysis for the burrowing owl would be limited to possible long-term loss of available water and possible foraging areas along riparian or wet meadow habitats. Since mesic and riparian habitats often provide a greater diversity and abundance of terrestrial invertebrates, it is feasible that adult owls would forage within these areas, particularly during the brood-rearing period. No impacts to this species' dry, upland nesting habitats would be anticipated. Potential impacts to the burrowing

owl from changing water levels in the Humboldt River would be expected to be limited to an incremental change in possible foraging habitat. However, based on this species' typical nest site selection, use of the river corridor likely would be sporadic and isolated.

7.2.1.10 Sage Grouse (BLM-Sensitive Species)

A potential reduction in naturally occurring seeps, springs, and perennial stream reaches and their associated riparian and mesic communities could ultimately affect the amount of potential brooding and foraging habitat for sage grouse. This incremental habitat loss would be long-term, and it is assumed that the birds that are closely associated with these habitat types would be displaced.

For perspective of potential long-term impacts to sage grouse, available data from the NDOW's statewide sage grouse lek database and the additional data collected by JBR (1992g) within the cumulative assessment area were compiled for both the cumulative drawdown area and within 2 miles of this drawdown area where the highest likelihood of nesting may occur away from the leks. General regions where perennial waters may be affected by the cumulative ground water drawdown are shaded in Figure 3-15.

A quantitative summary of historic lek sites in and near the cumulative assessment area was generated to characterize the overall use of the region by sage grouse. A total of 14 historic leks have been documented within the cumulative drawdown area, including 3 in the Little Boulder Basin, 2 in the western Adobe Range, 3 in the vicinity of the Independence Mountains, 3 in the Tuscarora Mountains, and 3 north of Antelope Creek. Of these 14 leks within the cumulative drawdown area, 11 are located in areas where perennial surface waters potentially could be affected by cumulative ground water drawdown. An additional 3 leks have been documented within 2 miles of perennial waters that could be impacted and another 5 leks within 2 miles of the cumulative drawdown area boundary (NDOW 1998c; JBR 1992g).

In the event that perennial flows were reduced, the riparian vegetation would likely decrease, reducing the vegetative structure, composition, and diversity. No direct impacts to active or potential lek sites would be anticipated, since leks generally occur in more upland communities (although they are often adjacent to intermittent or perennial drainages). However, there is a potential that nesting and brood-rearing areas could be affected in riparian, wetland, and mesic habitats that could be impacted by ground water drawdown, particularly in the mid- to late summer, as the upland forbs desiccate and the broods depend more on the mesic and riparian habitats. Because these brood-rearing areas could be located several miles from leks and nesting areas within the drawdown area, it is difficult to quantify the amount of habitat that could be affected. However, it can be stated that the loss of riparian, wetland, or mesic habitats due to drawdown in these areas would reduce the amount of possible nesting and brood-rearing habitat available, altering sage grouse distribution during summer and autumn and possibly reducing the total sage grouse population.

As stated above, this summary has been generated to aid in characterizing the overall distribution and concentration of active lek sites for the cumulative assessment area. It is unknown whether specific lek sites and their associated nesting and brooding habitats may be affected in or near the drawdown area shown on Figure 3-15; however, it is feasible that the cumulative water drawdown may impact riparian, wetland, and

mesic habitats used by nesting and brooding hens. As discussed in Sections 4.2 and 5.2.1, the potential cumulative effects to riparian and wetland habitats total an estimated 618 acres within the area of potential impact (see Figure 3-15). Mesic habitats are not included in this acreage estimate. Given the variables discussed in Section 3.2.4, the dated and scattered available information on active lek sites, and the recent habitat loss from extensive wildfire events in northern Nevada, it is difficult, if not impossible, to estimate the percentage of these riparian or wetland areas that are actually used by nesting or brooding sage grouse and the amount of mesic habitat that could be affected. Therefore, the total number of acres of potentially suitable breeding, nesting, or brooding habitats that could be either directly or indirectly impacted in the long term cannot be quantified.

7.2.1.11 American White Pelican (Nevada-Listed Species)

As discussed for the osprey and bald eagle, no impacts to large bodies of water (e.g., Willow Creek Reservoir) are currently anticipated that could support pelican foraging. Since this species is closely associated with lakes or ponds, no impacts to migrating pelicans would be anticipated from future changes in water levels or riparian habitats in the mine areas or along the Humboldt River. The potential effects to fish-eating birds from possible bioaccumulation of constituents of concern in the Humboldt Sink area are presented in Section 5.3.2.

7.2.1.12 White-Faced Ibis (Nevada-Listed Species) and Black Tern (BLM-Sensitive Species)

The long-term impacts to these two shorebird species within the cumulative assessment area focused on potential long-term effects to naturally occurring perennial water sources and the ultimate reduction in available habitat associated with the artificially created wetlands within Boulder Valley. If present, individual birds would likely use the larger spring sites in the foothills region of the mountain ranges and the perennial portions of streams that support adequate riparian habitat and pools for foraging and cover. The reduction or loss of available surface water and associated emergent plants in these naturally occurring wetland areas would result in the displacement or loss of breeding or foraging individuals. As discussed for other wildlife species (see Section 5.2.1), it is assumed that the riparian communities potentially affected by the mines' dewatering activities are currently at their respective carrying capacities, given their limited availability in the cumulative assessment area. Therefore, loss of surface water and the associated riparian vegetation at historically occupied wetland areas would result in the displacement and/or loss of the individual birds that are dependent on these resources. This loss may affect the breeding potential of individuals; however, no population-level impacts would be anticipated. The estimated acreages of riparian and wetland habitats that could be affected in the long term are presented in Sections 5.2.1 and 4.2. Given the variables involved, it is not possible to quantify potential impacts to individual birds or breeding pairs.

As discussed for general water bird species in Section 5.2.4, as the mine discharges diminish in the future, the artificially created wetlands in Boulder Valley would be reduced, as well. The level of available surface water, in addition to the associated riparian and wetland vegetation, would slowly decline, with the drier, more upland communities becoming re-established. However, it presently appears that previously saturated soils have increased soil leaching of salts and minerals. This leaching process would ultimately result in a

transition of the present plant communities to a community that supports more salt-tolerant plants. This transition would result in both decreased plant and wildlife species diversity. At this time, the dry alkaline soils and vegetation would not be suitable for use by either the white-faced ibis or black tern.

As discussed for other terrestrial species, increased flows in the Humboldt River and in the Humboldt Sink during the mines' discharges would result in an increase in potentially suitable habitat for these two water birds. The anticipated reduction in baseflows in the Humboldt River in the long term could result in an incremental reduction of potential nesting and foraging habitat for these shorebird species, although this potential effect should be mitigated (see Sections 5.3.1 and 3.3.2). The potential for impacts to species breeding and foraging in the Humboldt Sink from possible exposure to chemical constituents of concern is discussed in Section 5.3.2.

7.2.1.13 Nevada Viceroy (BLM-Sensitive Species)

Because the Nevada viceroy is associated with willows below 6,000 feet elevation, surface water reductions that would affect the maintenance of willow communities would reduce the amount and quality of habitat for this species. Therefore, reduced flows may reduce willow development, which would affect Nevada viceroy habitat. Increased flows in the Humboldt River due to mine-water discharges could increase riparian habitat (and associated Nevada viceroy habitat) during mine discharge. The predicted long-term reduction in river flows could reduce riparian habitat and, in turn, habitat for the Nevada viceroy. These potential impacts from reduced baseflow in the river should be mitigated by Newmont's proposal to augment flows (see Sections 5.3.1 and 3.3.2).

7.2.1.14 Lewis Buckwheat (BLM-Sensitive Species)

Impacts to Lewis buckwheat are not anticipated as a result of ground water drawdown since this species is associated with upland habitats and is dependent on seasonal precipitation.

7.2.2 Aquatic Species

Three aquatic threatened, endangered, or BLM-sensitive species occur within the cumulative impact analysis area. Of these, LCT is the only Federally listed aquatic species. Although not formally listed, the Columbia spotted frog is considered a Federal candidate species, while the California floater is a BLM-sensitive species. Although springsnails have no special status, BLM continues to be concerned about impacts to this group of rare, endemic species. Refer to Section 7.1.2, Aquatic Species, for distribution, abundance, and habitats used by these species.

7.2.2.1 Lahontan Cutthroat Trout (Federally Listed Threatened)

Cumulative impacts predicted for LCT were based on the results of the cumulative hydrologic modeling analyses described in Section 3.2, Water Resources and Geochemistry. These analyses predicted the maximum extent of the 10-foot ground water drawdown contour (Figure 3-15). Further analysis was conducted to determine areas where perennial surface waters (both stream segments and springs) could

potentially be impacted by the ground water drawdown. The shaded areas in Figure 7-3 represent the areas where perennial surface flows could be reduced.

The modeled cumulative 10-foot ground water drawdown contour extends into two drainages that support LCT populations; the Maggie Creek and Rock Creek subbasins. However, surface water impacts are not predicted to extend into the drainages that contain LCT within the Rock Creek subbasin. Therefore, LCT and their habitats within the Rock Creek subbasin would not likely be affected. In addition, since LCT populations do not occur in lower Maggie Creek (below Maggie Creek Canyon) and the Humboldt River, flow changes in these drainages would not affect this species.

Hydrologic modeling predicted ground water drawdown areas where surface water flows (and associated LCT habitat) might be reduced including the lower sections of Little Jack, Coyote, and Beaver creeks (Figure 7-3). The analysis also indicated that there would likely be no surface water impacts to the majority of the identified LCT habitat in Little Jack, Coyote, and Beaver creeks, because their upper reaches are probably not connected to the regional aquifer.

In addition, the following LCT habitat segments also could potentially experience reduced flows because they are located downstream of areas where surface flows could be affected: two segments in lower Jack Creek where it is spring-fed, two segments in Beaver Creek, one segment in Coyote Creek, and the entire 8-mile segment in upper Maggie Creek (Table 7-6). The 8-mile segment of LCT habitat in upper Maggie Creek receives surface runoff from 34 feeder streams in the drainage subbasin, 9 of which are predicted to be potentially affected by ground water drawdown (Figure 7-3).

The effects of surface water reductions within occupied LCT habitat would be the reduction of aquatic habitat that supports LCT populations. A reduction of habitat (either in quality or areal extent) could result in decreased numbers for this species. The magnitude and duration of effect would depend on the changes in flow. However, only a small portion of the LCT-occupied habitat in each tributary (i.e., Little Jack, Coyote, and Beaver creeks) is located within or downstream of the potentially affected segments of these tributaries (Figure 7-3). The majority of the LCT-occupied habitat in these tributaries is located upstream of any predicted surface water impacted areas, as predicted by the models. Therefore, the viability of these isolated and self-sustaining LCT populations should be maintained. However, these populations could be subject to a higher extinction risk if habitat restrictions occur in the lower portions of the current LCT-occupied habitat. Continued monitoring would be used to determine this potential impact.

LCT habitat within the mainstem section of Maggie Creek could be affected by flow reductions. Available distribution data indicate that the 8-mile LCT segment in Maggie Creek, which supports individuals at scattered locations, is not a self-sustaining population (no reproduction) at this time. Therefore, any impacts to this reach would not likely affect the continued existence of LCT. However, any flow reductions within this portion of Maggie Creek could reduce the potential development of a genetic exchange system within the Maggie Creek subbasin, which is desirable to improve the likelihood of the recovery of this species. If the current stream restoration is successful, Maggie Creek could serve as a genetic exchange between the currently isolated populations in the Maggie Creek tributaries, and would be considered a "weakly-operating" metapopulation (Evans 1999b).

Table 7-6
Potentially Impacted LCT Habitat

Stream	Total Occupied Habitat (miles)	Linear Miles Located Within/Downstream[1] of Potential Surface Water Impact Area
Beaver Creek	7.1	0.7/0.4[1]
Coyote Creek	5.2	1.7
Little Jack Creek	4.6	0.7/0.3[1]
Jack Creek[1]	0.9	0/0.9
Maggie Creek[1]	8.0	0/8.0[1]
Total	**25.8**	

[1]LCT-occupied habitat that is located downstream of modeled potential impact areas. These areas also could potentially have surface water reductions.

Although Susie Creek is not currently inhabited by LCT, the LCT Recovery Plan has identified it as a potential LCT reintroduction stream (Coffin and Cowan 1995). Surface flows could be reduced during postmining in the lower portion of Susie Creek (Figure 7-3), which could affect future reintroduction activities. Eventually, flows are expected to return to baseline levels.

Drawdown is predicted to continue to expand and reach a maximum at approximately 100 years postmining. After this maximum, there would be a partial recovery of the aquifer and associated surface waters.

7.2.2.2 California Floater (BLM-Sensitive Species)

Mine dewatering may affect perennial surface water reaches in the Maggie Creek subbasin and lower Rock Creek, where California floaters have been found (i.e., confluence of Maggie Creek and East Fork Cottonwood Creek; mid-distance between the confluences of Cottonwood/Maggie and Jack/Little Jack creeks; and lower Rock Creek canyon). Impacts would depend on the amount of surface water reduction and could range from slight reduction to complete elimination of the California floater habitat in these streams.

7.2.2.3 Springsnails

Springsnail populations are known to occur at six springs in upper Antelope Creek, one spring in upper Willow Creek, Warm Spring in Marys Creek subbasin, and Warm Billy Spring and Rattlesnake Spring in Boulder Creek subbasin (Figure 7-2). No populations have been found in the Maggie Creek subbasin, or the remaining portions of the cumulative assessment area. Surface waters associated with the upper Willow Creek, Warm Billy Spring, and Rattlesnake Spring springsnail locations would not likely be affected; however, the upper Antelope Creek and Warm Spring populations are located within an area predicted to potentially have surface water impacts. If substantial water level reductions occur in these springs, springsnail populations would be affected. If the springs were permanently dewatered, the springsnail populations in these springs would be lost.

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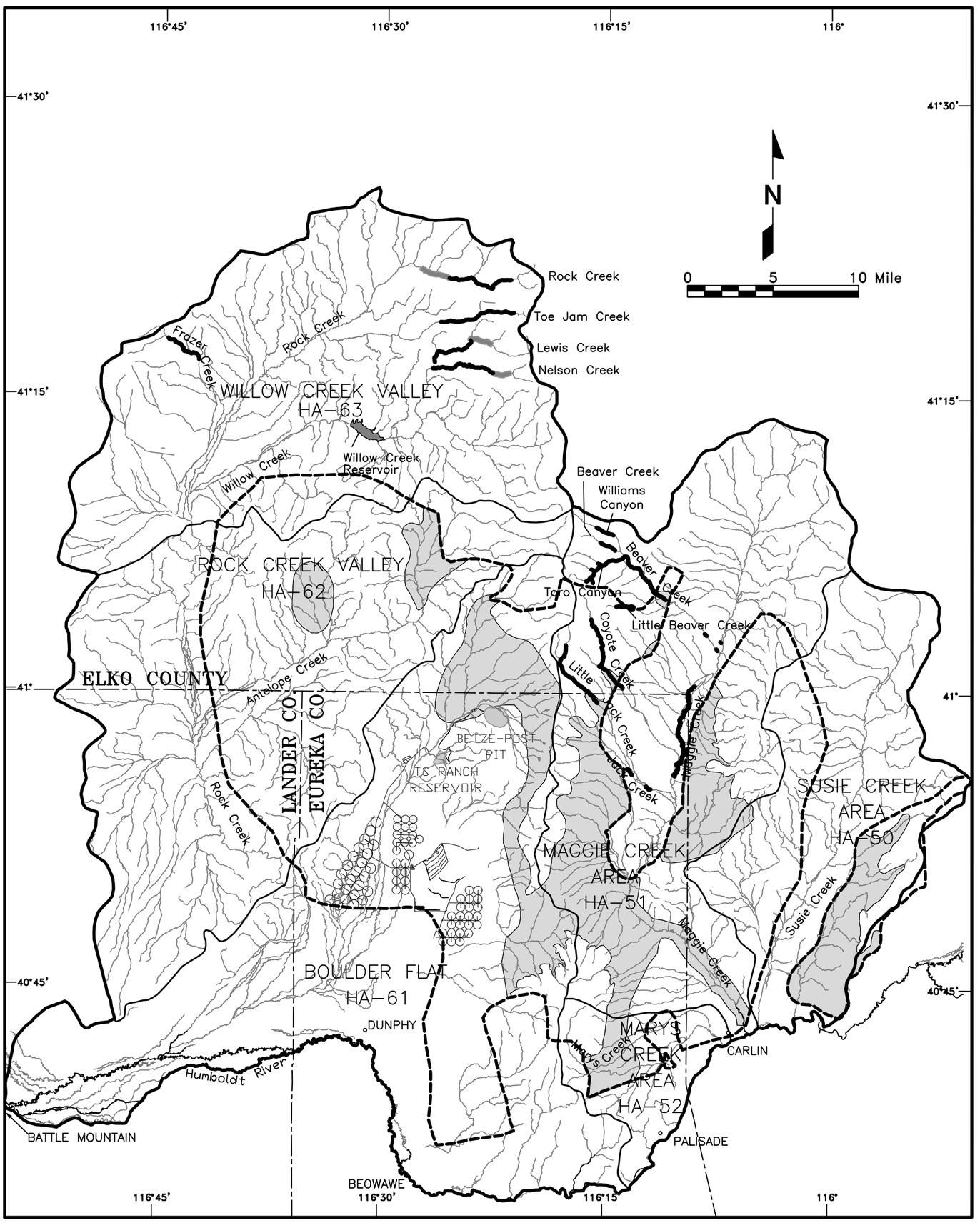

Legend

- Ground Water Basin Boundary
- Stream
- County
- Lahontan Cutthroat Trout Habitat
- Potential Seasonal Habitat
- Cumulative Drawdown Area (>10 Feet of Drawdown)
- Areas where Perennial Waters could Potentially be Impacted by Drawdown [1]
- Areas where Perennial Waters have a Low Probability of Being Impacted by Drawdown [1]
- Center Pivot Irrigation

[1] Does not include potential impacts to perennial waters located outside the cumulative 10-foot drawdown contour.

Figure 7-3

Lahontan Cutthroat Trout Habitat Potentially Affected by Drawdown

7.2.2.4 Columbia Spotted Frog (Federally Listed Candidate)

Mine dewatering may affect some of the perennial surface water reaches in the Maggie Creek subbasin, where spotted frog populations have been found (Maggie Creek upstream of the Coyote Creek confluence, Little Jack Creek, Spring Creek, and Coyote Creek). Furthermore, surface waters of the potential habitat in upper Antelope Creek potentially could be impacted. Surface water impacts could range from a slight reduction in habitat quality to elimination of the spotted frog habitat within the affected area. Potential reduction in spotted frog numbers could contribute to a proposal to list this species.