FINAL

Multiple-Species Habitat Conservation Plan

Volume 2

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COYOTE SPRINGS INVESTMENT

PLANNED DEVELOPMENT PROJECT

Coyote Springs Investment Planned Development Project

Multiple-Species Habitat Conservation Plan

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ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ac	acre
ACECs	Areas of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
Aerojet	Aerojet-General Corporation
AESO	Arizona Ecological Services Office
afa	acre-foot per annum
AFB	Air Force Base
afy	acre-feet per year
AGFD	Arizona Game and Fish Department
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
AMP	Adaptive Management Plan
ANFO	ammonium nitrate and fuel oil
APE	Area of Potential Effect
APN	Assessor Parcel Number
ASTM	American Society for Testing and Materials
ATCAA	Air Traffic Control Assigned Airspace
ATV	all terrain vehicle
AUM	Animal Unit Months
BA	Biological Assessment
BAQP	Bureau of Air Quality Planning
BARCASS	Basin and Range Carbonate Aquifer System Studies
BAS	Biological Advisory Subcommittee
BBS	Breeding Bird Survey
BLM	Bureau of Land Management
BMP	Best Management Practices
BO	biological opinion
BRD	Biological Resources Division
BRRC	Biological Resources Research Center
CA	Conveyance Agreement
CAA	Clean Air Act
CBD	Center for Biological Diversity
CBOD	carbonaceous biochemical oxygen demand
CCMSHCP	Clark County Multiple-Species Habitat Conservation Plan
CCRFCD	Clark County Regional Flood Control District
CCRs	Covenants, conditions, and restrictions

CDFG	California Department of Fish and Game
CEC	Commission for Environmental Cooperation
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHAMP	Chemical Application Management Plan
CHU	Critical Habitat Unit
City	City of Mesquite
cm	centimeter
CO	carbon monoxide
COM	Construction, Operations and Maintenance
Corps	U.S. Army Corps of Engineers
CRF	Code of Federal Regulations
CS	Corrected Sign
CSCC	Coyote Springs Conservation Center
CS-H-1	Coyote Springs Resort Zone
CSI	Coyote Springs Investment LLC
CSLC	Coyote Springs Land Company, LLC
CS-M-U	Coyote Springs mixed use zones
CSPUD	Coyote Springs Planned Unit Development
CSPUDC	Coyote Springs Planned Unit Development Code
CSICL	Coyote Springs Investment Conservation Lands
CWA	Clean Water Act
DA	Development Agreement
dB	decibel
dBA	A-weighted decibel
DCP	Desert Conservation Plan
DFC	Desert Fishes Council
DFC	Desert Fishes Council
dm	decimeter
DNWR	Desert National Wildlife Range
DOE	Department of Energy
DPS	Distinct Population Segment
DTCC	Desert Tortoise Conservation Center
DTRPAC	Desert Tortoise Recovery Plan Assessment Committee
DTSAC	Desert Tortoise Science Advisory Committee
DTSAT	Desert Tortoise Science Advisory Team
DWMA	Desert Wildlife Management Areas

EA	Environmental Assessment
EC	Executive Committee
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ET	evapotranspiration
FAA	Federal Aviation Administration
FLMPA	Federal Land Policy and Management Act
FMV	fair market value
FPEMS GID	Fire Protection and Emergency Medical Service General Improvement District
fps	feet per second
FR	Federal Register
Framework Plan Amendment	Caliente Management Framework Plan Amendment and Record of Decision for the Management of Desert Tortoise Habitat (BLM 2000)
FY	fiscal year
g	grams
GID	General Improvement District
GIS	geographic information system
GPS	global positioning system
ha	hectare
HAPs	hazardous air pollutants
HCP	habitat conservation plan
HERS	Home Energy Rating System
Hwy	highway
Hz	Hertz
IA	Implementing Agreement
IMPLAN	IMpact analysis for PLANning
in	inch(es)
in/sec	inches per second
I-O	input-output
K&LA	Knight & Leavitt Associates, Inc.
km	kilometer
KOP	Key Observation Point
LCCRDA	Lincoln County Conservation, Recreation, and Development Act of 2004
LCLA EA	Environmental Assessment for the Lincoln County Land Act of 2000 Phase I Implementation

LCLA	Lincoln County Land Act of 2000
LCPD	Lincoln County Power District
LCR MCP	Lower Colorado River Multi-species Conservation Program (Jones & Stokes 2004)
LCR	Lower Colorado River
LCTS	Lincoln County Telephone System
LCWD	Lincoln County Water District
Ldn	day-night sound level
LLC	limited liability company
LOS	level of service
LVB	Las Vegas Buckwheat
LVFO	Las Vegas Field Office
LVVWD	Las Vegas Valley Water District
MAP	Management Action Plan
MBTA	Migratory Bird Treaty Act
MCP	Multiple-species Conservation Program
MDM	Mount Diablo Meridian
MGD	million gallons per day
mm	millimeters
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	miles per hour
MRRIP	Muddy River Recovery Implementation Program
MS4S	Municipal Separate Storm Sewer Systems
MSHCP	Multiple-Species Habitat Conservation Plan
msl	mean sea level
mtDNA	mitochondrial deoxyribonucleic acid
MVNWR	Moapa Valley National Wildlife Refuge
MVWD	Moapa Valley Water District
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NBAQP	Nevada Bureau of Air Quality Planning
NDEP	Nevada Department of Environmental Protection
NDF	Nevada Division of Forestry
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act of 1969

NESHAPs	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NNHP	Nevada Natural Heritage Program
NNPS	Nevada Native Plant Society
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NP	Nevada Power
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statue
NSPS	New Source Performance Standards
NSR	New Source Review
NSWA	Nevada State Water Authority
NTS	Nevada Test Site
NV-FL Act	The Nevada-Florida Land Exchange Authorization Act of 1988
NVR 100000	NDEP General Permit
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
OHV	off-highway vehicle
ORVs	off-road vehicles
PARC	Partners in Amphibian and Reptile Conservation
pc/h/ln	passenger cars per hour per lane
PM	particulate matter
PM_{10}	10 micron particulate matter
$PM_{2.5}$	2.5 micron particulate matter
PMRA	Pest Management Regulatory Agency
ppm	parts per million
PSD	Prevention of Significant Deterioration
PSP	Permanent Study Plots
PUD	planned unit development
RCI	Resource Concepts, Inc.
RCRA	Resource Conservation and Recovery Act
RESNET	Residential Energy Services Network
RFP	Requests for Proposals
RIP	Recovery Implementation Program

RLFWG	Relict Leopard Frog Working Group
RM	River Mile
RMP	Resource Management Plan
ROCs	reaction organic compounds
ROD	record of decision
ROW	right-of-way
SAT	Science Advisory Team
Services	USFWS and NMFS, collectively
Settlement Agreement	Agreement for Settlement of all Claims to Groundwater in the Coyote Spring Basin (2002)
SHPO	State Historic Preservation Office
SIPs	State Implementation Plans
SL	standard length
SLCHCP	Southeastern Lincoln County Habitat Conservation Plan
SMS4	Small Municipal Separate Storm Sewer Systems
SNHBA	Southern Nevada Home Builders Association
SNPLMA	Southern Nevada Public Lands Management Act
SNWA	Southern Nevada Water Authority
SO_2	sulfur dioxide
SPPC	Sierra Pacific Power Company
Stipulation	stipulation between LCWD/Vidler and USFWS regarding water rights
SU	Single Unit Truck
SUWA	Southern Utah Wilderness Alliance
SVL	snout to vent length
SWANCC	Solid Waste Agency of Northern Cook County
SWMP	Storm Water Management Plan
SWPPP	Stormwater Pollution Prevention Plan
SWReGAP	Southwestern Regional Gap Analysis Project
TAC	Technical Advisory Committee
TCF	The Conservation Fund
TESS	Threaten and Endangered Species System
TL	total length
TNC	The Nature Conservancy
Tribe	Moapa Band of Paiutes
TRP	Tuffy Ranch Properties, LLC
TSC	Technical Steering Committee
TSS	total suspended solids
TUP	Temporary Use Permit

UNR	University of Nevada at Reno
URTD	Upper Respiratory Tract Disease
USAF	U.S. Air Force
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USGS-BRD	U.S. Geological Survey Biological Resources Division
UST	underground storage tanks
VES	visual encounter survey
VOC	volatile organic compound
VRBRCA	Virgin River Basin Resource Conservation Assessment
VRCMA	Virgin River Conservation Management Assessment
VRHCP	Virgin River Habitat Conservation Plan
VRHCRP	Virgin River Habitat Conservation and Recovery Program
VRM	Visual Resource Management
VVWD	Virgin Valley Water District
WOUS	waters of the US

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CHAPTER 1

Introduction

Chapter 1: Introduction

1.1 OVERVIEW

Coyote Springs Investment LLC (CSI) proposes to develop a new town in southern Lincoln County, Nevada (CSI Development) that incorporates resource management features (Figure 1-1). This town, consisting of an environmentally sensitive, master planned community, will include residential, commercial, and industrial land uses. Environmental conservation features have been incorporated into the master plan to ensure the conservation of federal and state protected biological resources occurring on and in the vicinity of the CSI Development. These biological resources include, but are not limited to, the federally threatened desert tortoise (*Gopherus agassizii*), which is protected under the Endangered Species Act (ESA). As a result, the potential for incidental take of desert tortoise and other federally listed species exists. Incidental take is defined as the taking of a federally listed species that occurs as a result of conducting otherwise lawful activities that do not specifically target listed species. Therefore, CSI will need to obtain an incidental take permit from the U.S. Fish and Wildlife Service (USFWS), in accordance with ESA Section 10(a)(1)(B), prior to any development activities that result in take of federally listed species or their habitats occurring on the CSI property in Lincoln County. This Multiple-Species Habitat Conservation Plan (MSHCP) has been prepared as part of the application for an incidental take permit associated with the CSI Development in Lincoln County.

CSI owns approximately 21,454 acres of developable private land in Lincoln County. In addition, under the Nevada-Florida Land Exchange Authorization Act of 1988 (NV-FL Act), CSI holds a lease from the U.S. Bureau of Land Management (BLM) for approximately 7,548 acres of land in Lincoln County and 6,219 acres of land in Clark County. The land ownership surrounding the CSI lands is primarily public land managed by the BLM and the USFWS (Figure 1-1). A parcel of private property in Clark County adjoining the CSI property in Lincoln County is not included in this MSHCP.

CSI considered both leased and privately owned land in this MSHCP. The types of land uses and associated acreages proposed in this MSHCP include the 21,454 acres of CSI private lands (Development Area), and the 13,767 acres of lands leased from BLM, which will be conserved as part of the Coyote Springs Investment Conservation Lands (CSICL). An additional area outside of the CSI lands, including, but not limited to, the Muddy Springs Area of the Muddy River and various tributaries of the Muddy River, may be affected indirectly by the activities addressed by this MSHCP (Figure 1-1).

1.1.1 Purpose and Need for CSI Development

1.1.1.1 Purpose

The purpose of the CSI Development is to construct a new town in Lincoln County under separate jurisdiction comprised of a planned community (residential housing, mixed-use urban villages, public buildings, and other public facilities, commercial and light industrial development, and hotels, resorts, and casinos) within approximately one hour's drive from the Las Vegas area.

1.1.1.2 Need

CSI proposes to develop a new town in southern Lincoln County to address the need for increased economic opportunities and housing in Lincoln County. The development would provide up to 111,000 residential dwellings to meet housing needs of the growing Southern Nevada area. Economic growth in Lincoln County would result from commercial development components of the planned community, as well as an increased tax base for Lincoln County's increasing public needs from the future residents. This growth would benefit the current limited economy of Lincoln County, provide increased employment opportunities and economic diversification, and create an environment that would encourage the 20 to 24 and 25 to 34 age groups to stay remain within the county.

Lincoln County covers approximately 6.8 million acres in Nevada, and in 2005 had a population of approximately 3,886 people. Based on these figures, Lincoln County was the third least-populated county in the State of Nevada (Nevada State Demographer 2006). The current population in Lincoln County has decreased by about 6.7 percent since 2000 when the population stood at 4,165 and was only slightly higher than 1990 levels.

With 98 percent of the county's lands in federal ownership, little private land has historically been available for development and the county's population and economy has been constrained as a result. Concerns have been raised by Lincoln County residents that their population is aging and younger people are forced to leave because of lack of economic opportunity (Lincoln County 1991, 2006; Gibbons 2004). U.S. Census data indicate that these concerns are valid. In the decade in between the 1990 and 2000 censuses, the population in Lincoln County within the 20 to 24 and 25 to 34 age groups decreased by 16.67 percent (U.S. Census Bureau 2000). Rural counties often see declines in the population sizes of these age groups, because these age groups often leave rural areas to seek better opportunities (Harris et al. 2004). Harris et al. (2004) suggest encouraging these age groups to stay should always be a goal for rural economic development.

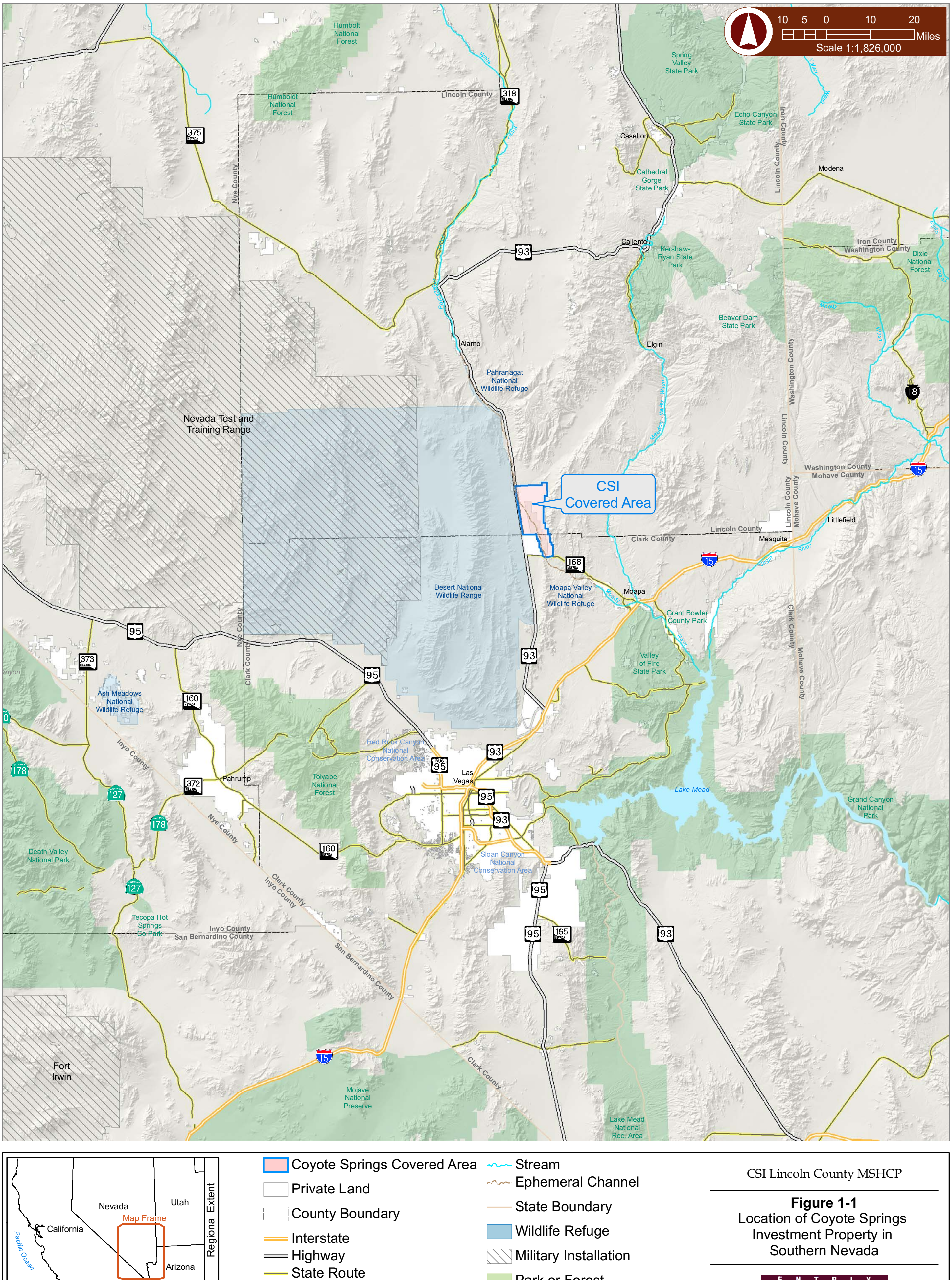
Agriculture, mining, and local government have traditionally been dominant sectors of the economy in Lincoln County (Borden et al. 1996); however, agriculture and mining's roles in the county's economy have declined in recent years (Harris et al. 1994). Thus, unemployment rates in natural resource-based economies often do not reflect downturns in agriculture or mining economies. Instead, the size of the labor force can decrease, as people leave rural areas in search of other opportunities. Harris et al. (2004) measured indicators of employment for Lincoln County, such as residents employed. When residents employed in Lincoln County are analyzed, a decrease from 1998 (1,133 residents employed) to 2003 (960 residents employed) is noticeable. During the same time frame, resident employment in the State of Nevada steadily increased from 943,600 in 1998 to 1,081,900 in 2003 (Harris et al. 2004). Therefore, between 1998 and 2003, employment opportunities in Lincoln County declined by 14.66 percent while the state of Nevada and the United States as a whole realized a steady increase in their labor forces (Harris et al. 2004).

Based on information from 1970 through 2003, Lincoln County has the fourth most unstable economy of Nevada's 19 counties. This indicates a dependency on a single economic sector, such as mining. Economic diversification would stabilize the county's economy (Harris et al. 2004). This instability index encapsulates a time frame when mining employment and real earned income declined by 95 percent (between 1980 and 1994) from the closure of several mining operations (Borden et al. 1996).

Agriculture has also declined in terms of income contributing to the Lincoln County economy. Real earnings per job declined 52 percent between 1975 and 1994, even though 19 new jobs were added during the same time period (Borden et al. 1996). In terms of dollars, total net income of farms in Lincoln County also decreased from 2,390 in 1970 to 1,612 in 2005 (Headwater Economics 2006). This is likely a result in a county-wide decrease in the number of livestock raised per year (18,000 animals in 1974 was reduced to 12,000 in 2006) and an increase in crop-based agriculture during the same time period (National Agricultural Statistical Service 2006). Livestock is more lucrative than crops, but labor is needed for both.

Census data also show that the housing stock in Lincoln County is relatively old. Approximately 22 percent of homes in the county were built before 1940, which is the second highest value of pre-1940 homes across all Nevada counties and substantially higher than the 1.7 percent value for the State of Nevada as a whole. Further, only about 17 percent of housing units in the county were built in 1990 or later, compared to 42 percent in the State of Nevada (U.S. Census Bureau 2000).

In contrast to the economy and population of Lincoln County, the nearby Las Vegas metropolitan area has seen a dramatic increase in economic opportunities and population in the last few decades. Between 1990 and 2005, the population in neighboring Clark County, Nevada, has steadily increased by 1,020,100 people, a 236 percent increase in population during that time period (Center for Business and Economic Research at UNLV 2006). The number of jobs also increased in the same time period from 452,733 to 788,025. It is anticipated that as developable land in Clark County becomes scarcer, the population will need to spread into adjacent Lincoln County.



Coyote Springs Covered Area
Private Land
County Boundary
Interstate
Highway
State Route
Stream
Ephemeral Channel
State Boundary
Wildlife Refuge
Military Installation
Park or Forest

CSI Lincoln County MSHCP

Figure 1-1
Location of Coyote Springs Investment Property in Southern Nevada

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1.1.2 Purpose and Need for Federal Action

The purpose of preparing this CSI MSHCP and the need for the federal action of issuing an incidental take permit are:

- To evaluate the impacts of implementing the Coyote Springs Investment LLC's MSHCP by the Executive Committee (i.e., USFWS, CSI, and Bureau of Land Management);
- To address the issuance of a Section 10(a)(1)(B) incidental take permit (incidental take permit) by the USFWS based upon this plan;
- To protect and conserve the Covered Species and their habitat for the continuing benefit of the people of the United States;
- To address the issuance of a permit pursuant to Section 404 of the Clean Water Act (CWA; 33 U.S.C. 1344), to authorize the discharge of dredged or fill material into waters of the United States (WOUS); and
- To ensure compliance with the ESA, CWA, National Environmental Policy Act (NEPA), and other applicable federal laws and regulations.

1.1.3 History of Land Ownership of CSI Land in Coyote Spring Valley

Prior to 1988, the lands currently owned by CSI were federal lands administered by the Bureau of Land Management (BLM). In 1988, Congress enacted Public Law 100-275 or The Nevada-Florida Land Exchange Authorization Act of 1988 (NV-FL Act) (see below). This act authorized the exchange of approximately 29,055 acres of BLM-administered lands in Coyote Spring Valley, in Clark and Lincoln counties, Nevada, (together with approximately 10,040 acres in Mineral County, Nevada, which lands are not part of CSI's lands) without any use restrictions, for approximately 4,600 acres of private wetlands in the Florida Everglades owned by Aerojet-General Corporation (Aerojet). The purpose of the land trade was to provide habitat protection for environmentally sensitive areas needed for recovery of ESA-protected species in Florida. The NV-FL Act also entitled Aerojet to lease approximately 13,767 acres of BLM-administered land in Coyote Spring Valley for 99 years, with an automatic 99-year lease renewal term unless terminated by the lessee (land lease agreement is included in Appendix G). Aerojet initially intended to use approximately 2,760 acres of the conveyed (fee) lands for the construction of rocket manufacturing, assembly, and testing facilities. The remaining leased lands were to remain substantially undeveloped and serve as a conservation area and buffer for the rocket facilities. Under the original configuration, the leased land was an island surrounded by CSI private land (Figure 1-2). This configuration was designed to meet the needs of the Aerojet facilities. Aerojet never built the facilities intended for this land, and in 1998 the fee lands changed ownership. In accordance with the NV-FL Act, the Secretary of the Interior approved the assignment of the lease and all its rights from Aerojet to Harrich Investment LLC in 1996, and then again to CSI in 1998. Prior to the lease assignment, CSI informed the Secretary of Interior of the plan to build a community at the site.

Included in the NV-FL Act was a provision for a federally reserved electrical transmission line right-of-way corridor (Corridor) on 10,735 acres of fee lands in southern Lincoln and northern Clark counties. The Lincoln County Conservation, Recreation, and Development Act of 2004 (Public Law 108-424) (LCCRDA) authorized and directed BLM to relinquish the reserved Corridor upon CSI's payment of the fair market value (FMV), and to relocate the Corridor to an area adjacent to and west of U.S. Highway 93. Relinquishment of the Corridor in Clark County has been completed; however, relinquishment of that portion of the Corridor encompassing CSI's Lincoln County lands is pending. This action expanded development opportunities on CSI existing fee lands.

In 2005, CSI and BLM, in consultation with the USFWS, reconfigured the private and leased lands in Clark County (ENTRIX et al. 2005). The purpose of this reconfiguration was to: 1) allow for the establishment of the CSICL in Clark County and 2) maintain connectivity between the leased lands and the adjacent BLM lands to the east, which have been designated as desert tortoise critical habitat and Areas of Critical Environmental Concern (ACECs)[1] (Figure 1-3). These actions were consistent with the reasonable and prudent measures

[1] ACECs are designations that highlight areas where special management attention is needed to protect and prevent irreparable damage to unique natural values. However, ACECs are also considered multi-use areas and BLM may allow human use appropriate with the

stipulated in the Biological Opinion (File No. 1-5-05-FW-536-Tier 01) for issuance of an Army Corp of Engineers (Corps) 404 permit issued to CSI in conjunction with development activities on private land in Clark County.

Additionally, CSI has conveyed approximately 720 acres of property in Lincoln County to The Conservation Fund (TCF), a Maryland non-profit corporation. The transfer of 720 acres leaves approximately 21,454 acres of CSI private land available for development in Lincoln County. Final land patents and lease amendment (and therefore finalization of the reconfiguration of private and leased lands) for CSI private and leased lands in Lincoln County will be issued following finalization of the CSI MSHCP, a CSI Environmental Impact Statement (EIS), and upon completion of all necessary cadastral survey work. Upon reconfiguration and creation of the CSICL, CSI reserves the right to relinquish portions of the lease hold on the lease lands from time to time subject to the provisions of the CSICL and subject to the terms of the land lease agreement (Appendix G).

1.2 WATER SUPPLY DEMAND

The CSI Development is anticipated to occur over a 40-year period. The Project development schedule and the extent of building will be limited by the water supply that is available to the general improvement district for serving the customers within its service territory (the Development Area). Development will occur over time and the water supply will be obtained in phases during the course of development. This is the normal process for developing a community and its associated water right entitlement. At present, the only groundwater supply approved by the State Engineer (Ruling #5712) and designated for use within the Project is 1,000 acre-feet appropriated within the Kane Spring Valley. Potential sources for the future water supply have been identified in the CSI MSHCP and the EIS.

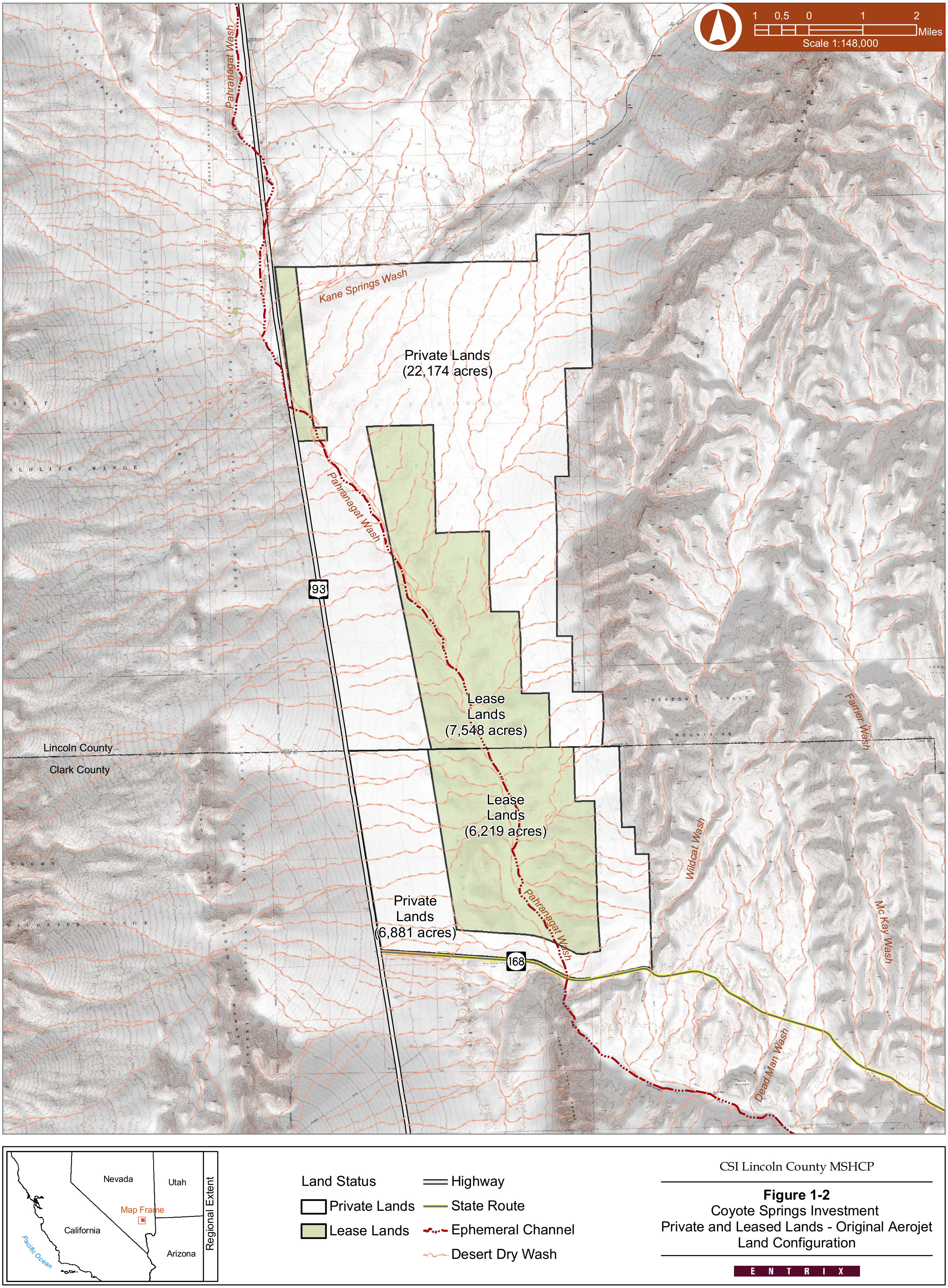
Nevada Water Law establishes a specific process for the approval of applications for new appropriations and changes in the point of diversion, manner or place of use of existing appropriations. CSI and its affiliates will comply with all legal requirements under Nevada Water Law and regulations as specific projects are identified. While an affiliate of CSI has change applications pending before the State Engineer that seek to change the manner and place of use of approximately 20,000 acre-feet of certificated groundwater rights it is unknown to what extent the requested transfer will be allowed by the State Engineer.

Cumulative impacts associated with using 1,000 af appropriated within Kane Spring Valley and up to 20,000 af of certificated alluvial groundwater appropriated within the Lake Valley Basin are addressed in the CSI MSHCP and EIS.

Because the land owned by CSI's affiliate in Lincoln County and the Development all abut and are surrounded by federal land, no water can be brought into the Development from outside the Development without obtaining one or more right-of-way grants from the Bureau of Land Management. All water that is ultimately delivered to the Project will be subject to full NEPA compliance and Section 7 consultations under ESA.

CSI proposes to utilize existing local and regional water rights and future local or regional water rights for the new planned community including the resource management features. Drinking water will be supplied to the development from groundwater produced within or transported to the Development Area, and water service will be provided by a water purveyor. These additional water rights and associated groundwater development will not be included as Covered Activities in this MSHCP. Instead, separate ESA consultation will occur for any new water developments associated with the CSI Development in Lincoln County. Potential effects of these activities on Covered Species will be addressed as interrelated/interdependent or cumulative effects in Chapter 10, Cumulative Effects. It is anticipated that additional out-of-basin water transfers will be necessary to develop and sustain the community in the Development Area.

designation of the ACEC. (Note: when BLM designates the ACEC it also then prescribes what can be done on the land). BLM establishes special management measures for these areas through land use planning.



CSI Lincoln County MSHCP

Figure 1-2
Coyote Springs Investment
Private and Leased Lands - Original Aerojet
Land Configuration

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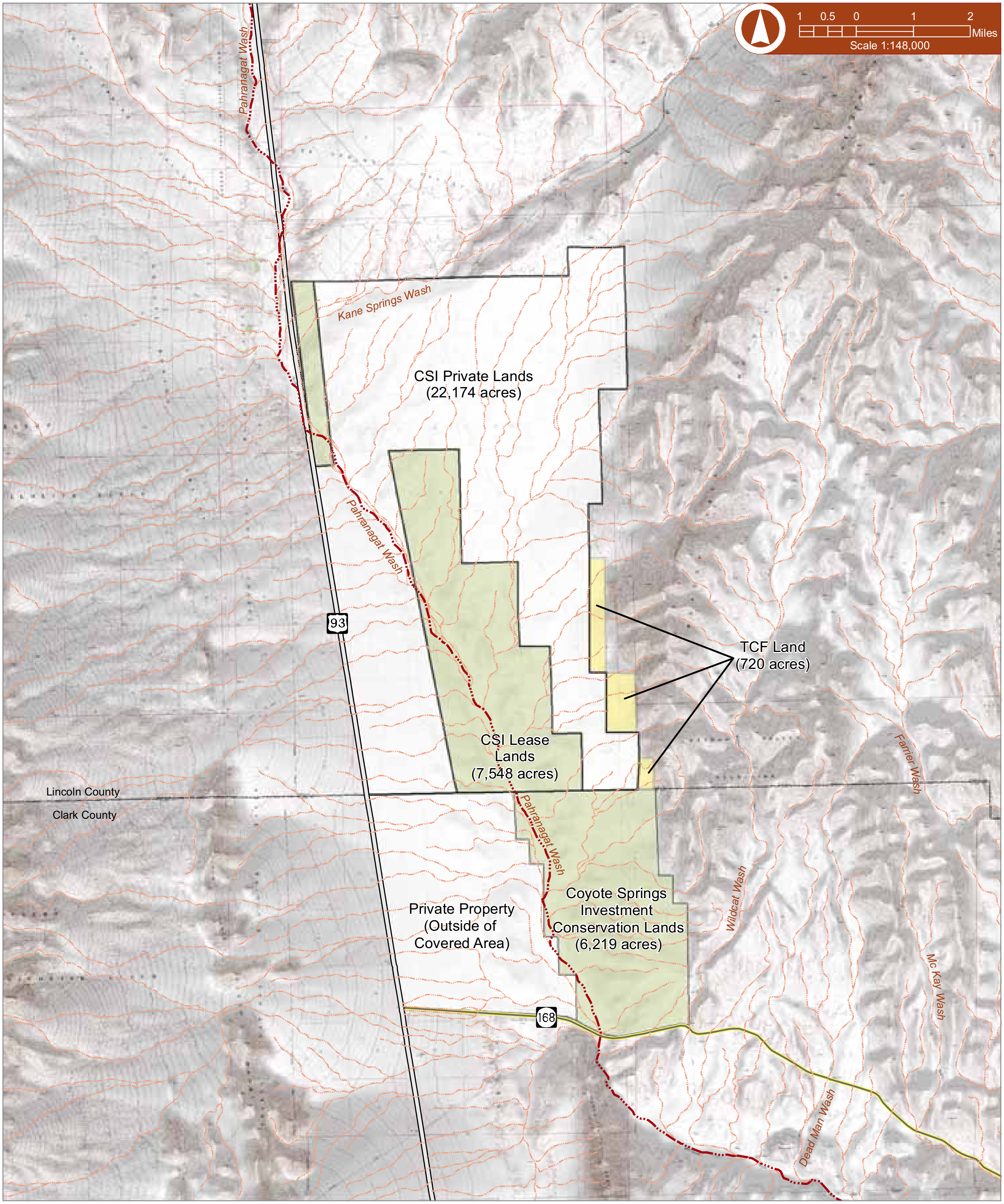

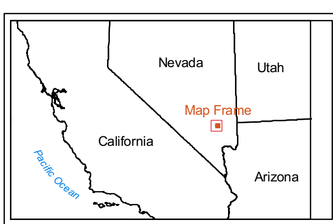

Land Status

Private Lands

Conservation Lands or Lease Lands

The Conservation Fund Parcels

Highway

State Route

Ephemeral Channel

Desert Dry Wash

CSI Lincoln County MSHCP

Figure 1-3
Coyote Springs Investment Covered Area
Exsting Land Configuration

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Water may be provided to the Development Area by means of the Southern Nevada Water Authority (SNWA) Groundwater Project at some future date. Lincoln County Water District (LCWD) entered into an agreement with SNWA under which LCWD reserved capacity in the Groundwater Project in anticipation of future deliveries of groundwater from various areas within Lincoln County to the Development Area (including the Coyote Springs-Clark County Development). LCWD has assigned its rights and delegated its obligations associated with the Groundwater Project to the Coyote Springs – Lincoln County General Improvement District (GID). An EIS is currently being prepared in connection with the SNWA Groundwater Project right-of-way application. At the present time, no specific water resources have been identified for potential transport via the SNWA Groundwater Project, and therefore, are not being addressed in the Clark, Lincoln, and White Pine County Groundwater Development Project EIS. If and when specific water rights are identified for transport via this project, environmental issues and NEPA compliance will occur in connection with processing applications for rights-of-ways or other federal permits required for the project.

Water may be provided to the Development Area by means of a LCWD/Vidler Water Company pipeline that would be constructed within congressionally designated Lincoln County utility corridors. At the present time LCWD/Vidler do not have a specific regional pipeline project identified nor have any specific water rights been identified for potential transport via a Vidler regional pipeline to the Development Area. If and when specific water rights are identified for transport via this project, environmental issues and NEPA compliance will occur in connection with processing applications for rights-of-ways or other federal permits required for the project.

Water may be provided to the Development Area by means of a CSI pipeline that would be constructed within congressionally or BLM designated utility corridors or rights-of-way. At the present time, CSI does not have a specific pipeline project identified nor have any specific water rights been identified for potential transport via a CSI pipeline to the Development Area. If and when specific water rights are identified for transport via this project, environmental issues and NEPA compliance will occur in connection with processing applications for rights-of-ways or other federal permits required for the project.

1.3 REGULATORY COMPLIANCE FRAMEWORK FOR THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED

The ESA (16 U.S.C. 1531 et seq.) was passed by Congress in 1973 and amended multiple times between 1976 and 2004. The stated purpose of the ESA is "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and to act on specified relevant treaties and conventions"(16 U.S.C. 1531 (b)).

USFWS, acting on behalf of the Secretary of Interior, oversees administration of the ESA. However, the Secretary of Commerce, acting through National Marine Fisheries Service (NMFS), is the listing authority for marine mammals and most anadromous fish species. With several exceptions, Section 9 of the ESA (16 U.S.C. 1538(a)(1)(B)) prohibits the take of any endangered species and defines take as follows: "[t]he term 'take' means to harass, harm, pursue, hunt, shoot, kill, trap, capture, collect, or to attempt to engage in any such conduct" (16 U.S.C. 1532(19)). USFWS has further defined "harm" to mean "an act which actually kills or injures wildlife. Such acts may include significant habitat modification or degradation, where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering" (50 Code of Federal Regulations [CFR] 17.3). The term "harm" is defined by NMFS administrative rule to include "significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering" (64 FR 215).

1.3.1.1 Section 10 and Habitat Conservation Plans

Amendments to Section 10 of the ESA in 1982 allowed non-federal parties that engage in otherwise lawful activities that are likely to result in the "take" of ESA-listed species to obtain incidental take permits. This would be necessary if their actions are not otherwise covered by an incidental take statement under Section 7 of the ESA. Under Section 10(a)(2)(A) of the ESA, applicants for an incidental take permit are required to develop and submit a habitat conservation plan (HCP). HCPs are developed by project applicants and state and local government entities with advice and guidance from USFWS. The HCP defines the activities to be addressed, characterizes the extent to which activities may affect ESA-listed species and their habitat, and then specifies measures to minimize and mitigate for impacts to the ESA-listed species.

In 1982, Congress amended the ESA to allow for take of ESA-listed species "if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" (16 U.S.C. 1539(a)(1)(B)). In approving the 1982 amendments to the ESA, created under Section 10, Congress also expressed that HCPs be long-term, multi-species plans that cover not only ESA-listed species, but also unlisted species, as long as those species are treated as if they were ESA-listed (H.R. Rep. No. 835, 97th Cong., 2d Sess. 29 [1982]). Congress also recognized that HCPs should provide non-federal property owners seeking incidental take permits under Section 10, economic and regulatory certainty regarding the overall cost of species mitigation over the life of the permit, but that HCPs should also make provisions for circumstances and information that could change over time and that might require revisions to an HCP (H.R. Rep. No. 835, 97th Cong., 2d Sess. 29 [1982]). This regulatory certainty has often been referred to as "no surprises."

The *Habitat Conservation Planning Handbook* (HCP Handbook) (USFWS and NMFS 1996) indicates an HCP submitted in support of an incidental take permit application must include the following information:

- Impacts likely to result from the proposed taking of the species for which the permit coverage is requested;
- Measures the applicant will undertake to monitor, minimize, and mitigate such impacts, the funding that will be made available to undertake such measures, and the procedures to deal with unforeseen circumstances;
- Alternative actions the applicant considered that would not result in take, and the reasons why such alternatives are not being utilized; and
- Additional measures USFWS or NMFS (collectively referred to as the Services) may require necessary or appropriate for purposes of the plan.

On March 9, 1999, the Services published a Notice of Availability for a "Draft Addendum to the Final Handbook for Habitat Conservation Planning and Incidental Take Permitting Process" (64 FR 11485-11490), which provides additional guidance for HCPs and incidental take permits. The draft addendum emphasizes five points for the preparation of HCPs, including the need for:

- Adequate monitoring based on measurable biological goals;
- Incorporation of adaptive management to allow for changes in mitigation strategies;
- Development of biological goals (based on habitat or species);
- Appropriate terms for the duration of HCPs; and
- Increased public participation.

In summary, an HCP is a plan authorized under Section 10 of the ESA (16 U.S.C. 1539) to conserve the habitat of species listed as threatened and endangered under the ESA or unlisted species also covered by the plan. Section 10 authorizes a non-federal applicant to negotiate a conservation plan with USFWS to minimize and mitigate any impact to threatened and endangered species, while conducting otherwise lawful activities for the general welfare of the public. Section 10 authorizes incidental take of individuals of species' populations covered by an incidental take permit, including those caused by disturbance of the habitat of such species, provided that an incidental take permit has been issued. Through recent rulings and guidance, the Services have stated that an HCP is intended not only to provide regulatory certainty to applicants, but also to include provisions that will work in the manner intended and meet the conservation goals of the plan through incorporation of clear goals, monitoring, and adaptive management strategy.

According to the HCP Handbook, completion of the HCP process requires:

> "(1) an HCP; (2) an application form and fee ($25); (3) an Implementing Agreement (optional, depending on Regional Director discretion); (4) the NEPA analysis, either an EA or EIS; (5) publication in the Federal Register of a Notice of Receipt of a Permit Application and Notice(s) of Availability of the NEPA analysis; (6) Solicitor's Office review of the application package; (7) formal section 7 consultation; and (8) a Set of Findings, which

evaluates a section 10(a)(1)(B) permit application in the context of permit issuance criteria found at section 10(a)(2)(B) of the ESA and 50 CFR Part 17. Note: For NMFS, the National Oceanic and Atmospheric Administration (NOAA) General Counsel's Office (either in the Region or Headquarters) reviews all documents relating to all HCPs" (NMFS and USFWS 1996).

1.3.1.2 Section 7 Consultation

As noted above, ESA Section 7 consultation on issuance of an incidental take permit is required. The ESA Section 7 consultation process determines whether the Proposed Action is likely to jeopardize the continued existence of an ESA-listed species or destroy or adversely modify critical habitat. A conclusion of "likely to adversely affect" will be reached if any individual of an ESA-listed species could be harmed by the Proposed Action, even if the risk of an adverse effect to the overall population is low. Such a conclusion would mean that one or more individuals might be harmed by the Proposed Action. Incidental "take" may be authorized by USFWS through issuance of an incidental take permit.

In addition to assessing effects of the Proposed Action on federally listed species, Section 7 consultation on the issuance of an incidental take permit requires that the following be addressed in the HCP process:

- Indirect effects of the Proposed Action;
- Potential for jeopardy to listed plants; and
- Effects on critical habitat.

Although non-federal entities obtain an incidental take permit under Section 10 of the ESA, intra-service Section 7 consultation on the federal action of issuing the incidental take permit is still required, which results in the issuance of an incidental take statement on the federal action. In the intra-service consultation, USFWS or NMFS evaluates the potential effects relative to baseline conditions to determine whether the Proposed Action is likely to jeopardize the continued existence of the species under consultation. USFWS or NMFS then prepares a biological opinion (BO). The BO contains an assessment of the effects of issuance of the incidental take permit under the MSHCP on listed species and their habitat. If federal agencies other than the USFWS or NMFS are involved in the HCP process, a single biological opinion issued by USFWS or NMFS would include an incidental take statement that authorizes any incidental take by the federal agency and an incidental take permit that authorizes any incidental take by the section 10 permittee. The BO would include take limits, reasonable and prudent measures, and other terms and conditions.

1.4 CONSULTATION AND REGULATORY COMPLIANCE HISTORY

1.4.1 Informal Consultation of CSI MSHCP

CSI, USFWS, and BLM signed a Memorandum of Agreement (MOA) on March 31, 2001, to establish a MSHCP under Section 10(a)(1)(B) of the ESA (Appendix A). The CSI MOA explains the ownership history of the CSI lands and provides guidance for development of a mutually agreeable MSHCP and land adjustments as appropriate to benefit the desert tortoise (*Gopherus agassizii*), with the subsequent issuance of an incidental take permit. In signing the MOA, CSI agreed to develop a MSHCP for the desert tortoise and other Covered Species for activities occurring on Lincoln County lands. From the outset, CSI, USFWS, and BLM have been engaged in an iterative, cooperative process to develop a MSHCP, EIS, and biological assessment (BA) pursuant to Section 7 of the ESA.

The CSI MSHCP has been prepared in accordance with Section 10(a)(2)(A) of the ESA as part of the application for the incidental take permit of Covered Species on CSI private lands in Lincoln County. Under the CSI MOA, it was agreed that CSI development on private land in Clark County would be covered by a 1995 and 2000 incidental take permit issued by the USFWS to Clark County, thus not subject to the CSI MSHCP.

The CSI MOA outlined the establishment of an Executive Committee (EC), a Technical Steering Committee (TSC) and a Biological Advisory Subcommittee (BAS). The Executive Committee is comprised of one representative each from the USFWS, the BLM, and CSI. The TSC included representatives from the USFWS, NDOW, Nevada Department of Transportation (NDOT), BLM, the Board of Lincoln County Commissioners, the Clark County Department of Comprehensive Planning, SNWA, U.S. Geological Survey (USGS) Water and Biological Resources Divisions, the Moapa Town Advisory board, the Sierra Club, and the Audubon Society. The BAS was initiated by the USFWS and CSI to address research concerns and issues related to the desert tortoise and other species listed as threatened or endangered under the federal ESA or identified as species of concern by BLM. These committees provided significant guidance during the early development phase of the CSI MSHCP.

In 2002, the Nevada State Engineer issued Order No. 1169 (Appendix B), which held in abeyance carbonate-rock aquifer system groundwater applications pending or to be filed in Coyote Spring Valley and other specified hydrographic basins, and required further study of the effects of groundwater production from the Coyote Spring Valley Basin. CSI is currently working with SNWA, LVVWD, MVWD, and Nevada Power Company, under the direction of the State Engineer, to conduct pump testing and monitoring activity within the basin and surrounding basins in accordance with State Engineer Order No. 1169.

CSI also agreed to develop a Water Monitoring Plan under the CSI MOA. The Regional Water Monitoring Plan was approved by the Nevada State Engineer on March 14, 2005, and is being implemented under the direction of the Nevada State Engineer.

In May 2005, based upon a series of meetings between USFWS and CSI, an informal consultation letter was issued by USFWS outlining the framework for development of the CSI MSHCP (Appendix C). Continuing consultations with USFWS during development of the CSI MSHCP resulted in modifications to some of the concepts set forth in 2005. Those modifications are reflected in this document.

1.4.2 Muddy River Memorandum of Agreement and Moapa Dace Biological Opinion

On April 20, 2006, the SNWA, USFWS, CSI, the Moapa Band of Paiutes (Tribe) and the MVWD signed the Muddy River MOA (Appendix D). The Muddy River MOA established conservation measures and monitoring and management criteria to be implemented concurrently with development of water projects within certain groundwater basins, including the Coyote Spring Valley and the California Wash hydrographic basins. The Muddy River MOA outlines specific conservation actions that each party would complete to minimize potential impacts to the Moapa dace (*Moapa coriacea*) if water levels decline in the Muddy River system as a result of cumulative withdrawal of 16,100 acre-feet per year (afy) from the Regional Carbonate Aquifer in Coyote Spring Valley and California Wash basins. The parties agreed to establish a Recovery Implementation Program (RIP) as a conservation measure for the protection and recovery of Moapa dace and its habitat. CSI agreed to dedicate a portion of its current and future water rights for the survival and recovery of the Moapa dace and agreed to provide funding for the restoration of Moapa dace habitat. The parties to the MOA have started developing the RIP and anticipate completion of the RIP in 2007.

The USFWS developed an intra-service, programmatic BO for the Muddy River MOA regarding the groundwater withdrawal and associated conservation measures for the Moapa dace (USFWS 2006) (Appendix D). ESA consultation for project-specific activities included in the MOA is tiered off of the 2006 programmatic BO.

Based on CSI's commitments to the survival and recovery of the Moapa dace and overall conservation of the Muddy River as outlined in the Muddy River MOA (Appendix D), CSI has agreed to dedicate 460 afy for the Moapa dace, an amount equal to 10 percent of CSI's allotted water rights within the Coyote Spring Valley Basin. In addition, CSI agreed to dedicate five (5) percent of all water rights above 4,600 afy that CSI appropriates within the basin or imports into and uses the Coyote Spring Valley Basin. This dedication of water rights to Moapa dace recovery and Muddy River conservation was established under the Muddy River MOA and will be implemented through the Muddy River RIP for water rights used for development in Clark County, an action separate from the CSI MSHCP and the Lincoln County development.

Additional development of water in excess of 16,100 afa analyzed in the intra-service, programmatic BO would require reinitiation of Section 7 consultation.

1.4.3 Biological Opinion for CSI 404 Permit in Clark County

A record of decision (ROD) for issuance of a Section 404 permit associated with development of private CSI lands in Clark County (see Figure 1-1) was issued on May 22, 2006. The issuance of this ROD was based on compliance with NEPA and ESA, including a BO from the USFWS. The primary findings and directives of the BO issued by the USFWS included the following:

1.4.3.1.1 Findings

- The effects of the proposed action and the cumulative effects, as proposed and analyzed, is not likely to jeopardize the continued existence of the desert tortoise and not likely to adversely modify its critical habitat based on the action area falling within the coverage and acreage calculation of the Clark County MSHCP and the Corps intends to minimize the effects of the proposed action on the desert tortoise by requiring the applicant to comply with the terms and conditions of the section 10(a)(1)(B) incidental take permit under the ESA for the Clark County MSHCP and implementation of additional minimization and conservation measures described below.
- The effects associated with the cumulative groundwater withdrawal by multiple parties analyzed in the Muddy River MOA BO, the project-specific effects associated with CSI's proposed action, and the cumulative effects are not likely to jeopardize the continued existence of the endangered Moapa dace based on implementation of the project's conservation actions described below.
- The USFWS concurred with the Corp's determination that the project may affect, but is not likely to adversely affect southwestern willow flycatcher, Yuma clapper rail, and the yellow-billed cuckoo (a candidate species which does not require consultation under section 7 of the ESA)

1.4.3.1.2 Conservation Measures

- Coyote Springs Investment Conservation Lands: setting aside 6,219 acres in Clark County that permanently protects the Pahranagat Wash incised ephemeral channel (WOUS) and all adjacent WOUS associated with the uplands to the east of Pahranagat Wash, within the project area, from development activities (except for conservation purposes)
- Conservation Measures Specific to the Desert Tortoise
  - A $550 per acre development fee, as required under the Clark County MSHCP.
  - CSI has agreed to pay $750,000 to fund research and activities that will further conservation efforts for the desert tortoise in Coyote Spring Valley and Mormon Mesa CHU.
  - All lands surveyed and cleared of desert tortoise prior to ground disturbing activities.
  - Permanent tortoise exclusion fencing provided on the northern and eastern perimeter of the developed area (the western perimeter of the Development Area follows U.S. Highway 93 and the southern perimeter follows State Route 168; NDOT will fence these roadways). The fence on the eastern side of the Development Area is on the western side of Pahranagat Wash and will also assist in minimizing impacts to the wash.
  - Research studies will be conducted as directed by a Scientific Advisory Team, and may include surveys to evaluate the status of the tortoise within the Mormon Mesa Critical Habitat Unit; assessment of weed control and habitat restoration measures; and establishment of a juvenile tortoise "head-start program."
- Conservation Measures Specific to the Moapa Dace
  - Participation by CSI in the establishment of a RIP, and employ the principles of adaptive management, to outline and carry out conservation measures necessary to protect and recover the Moapa dace and allow for development and operation of regional water facilities.
  - Dedication of an amount equal to 10% (460 afy) of the CSI water rights within the Coyote Spring Valley Basin to the survival and recovery of the Moapa dace and its habitat.

- Dedication of an additional 5% of any water rights above 4,600 afy that CSI may be entitled to withdraw in the future from Coyote Spring Valley or import into the basin.
- CSI has agreed to provide $50,000 annually for four (4) years to be used for habitat restoration to promote the recovery of the Moapa dace.

1.4.4 Federally Listed and Candidate Species with the Potential to be Affected by the CSI Development

A summary of federally listed and candidate species with the potential to be affected by the CSI Development was requested from the USFWS on October 14, 2004 on behalf of CSI. A letter from the USFWS dated January 7, 2005 (File No. 1-5-05-SP-410) listed the following species:

- Desert tortoise (*Gopherus agassizii*), Mojave population, threatened
- Moapa dace (*Moapa coriacea*), endangered
- Yuma clapper rail (*Rallus longirostris*), endangered
- Southwestern willow flycatcher (*Empidonax traillii extimus*), endangered
- Yellow-billed cuckoo (*Coccyzus americanus*), candidate

1.5 OVERVIEW OF THE PROPOSED CSI MSHCP

The Proposed Action is issuance of a 40-year incidental take permit pursuant to Section 10(a)(1)(B) of the ESA for the incidental take of Covered Species in connection with the development of CSI's private land within Lincoln County.

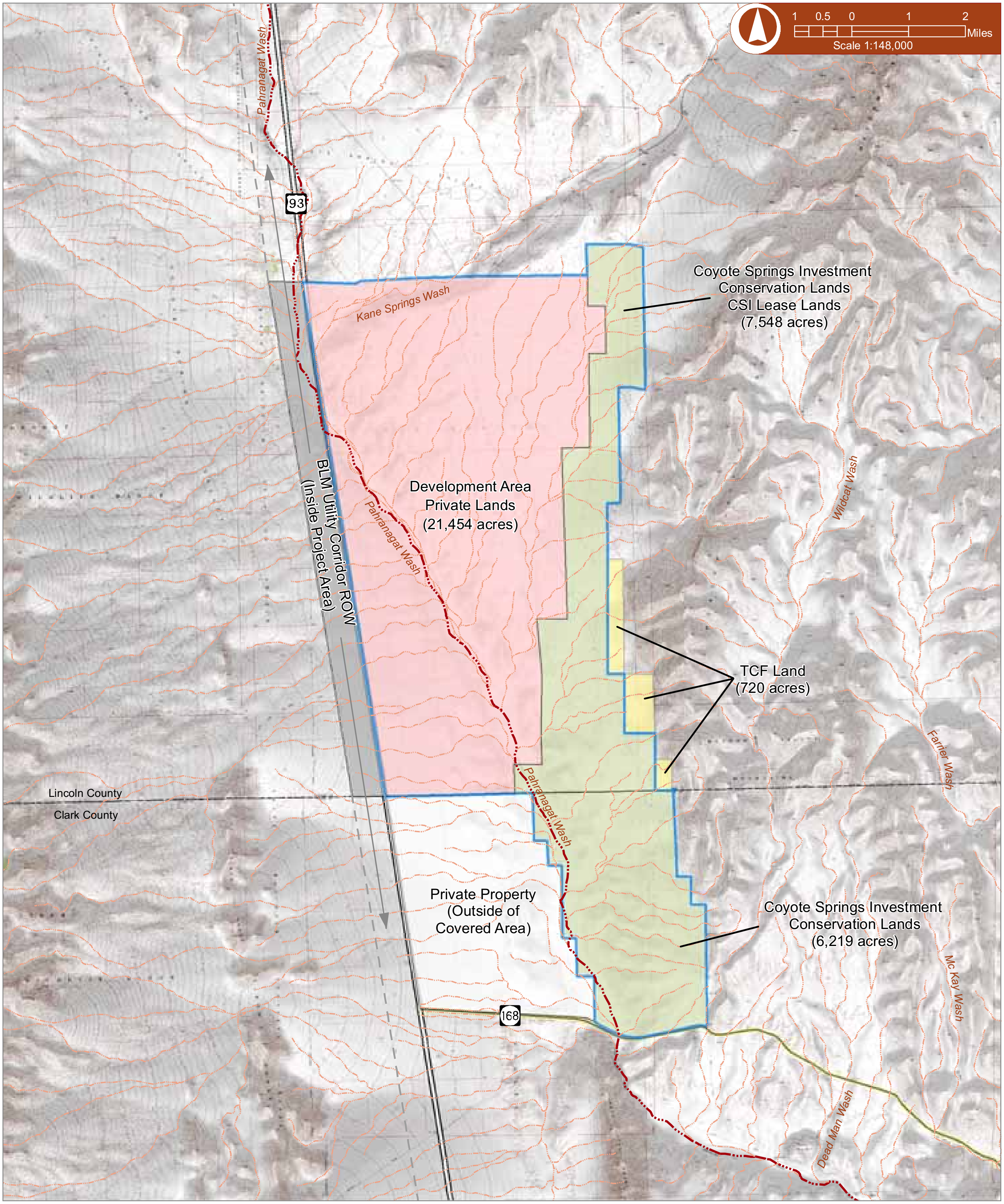
1.5.1 Permit Duration

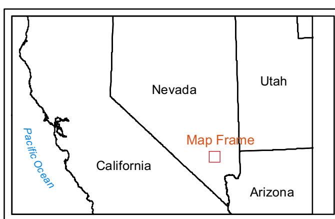
CSI is requesting a 40-year incidental take permit to accommodate the length of time anticipated to reach the full build-out of the CSI private lands. A shorter permit term would likely not fulfill the project need, and a longer permit term would likely be unnecessary. Ultimately, the level of build-out will be contingent upon the amount of water resources available for the planned community and the final development configuration. This MSHCP is based on the assumption that all of CSI's private lands within the Development Area will be disturbed.

1.5.2 Covered Area

The CSI lands are located approximately 56 miles northeast of Las Vegas in Lincoln County. They occupy most of the eastern portion of Coyote Spring Valley straddling the Pahranagat Wash and the Kane Springs Wash in Lincoln County (Figure 1-4). The CSI lands extend 9 miles north of the Lincoln County-Clark County line. They are bordered by the Delamar Mountains to the north, U.S. Highway 93 to the west, and the Meadow Valley Mountains to the east. The Development Area is bordered by the Lincoln County-Clark County line to the south and is adjacent to the CSI development in Clark County. The land ownership surrounding CSI lands is primarily public land managed by BLM and USFWS.

For ESA purposes, the Covered Area includes the Development Area in Lincoln County and the CSICL in Lincoln and Clark counties (Figure 1-4, Table 1-1). The CSICL consists of approximately 13,767 acres of land (approximately 7,548 acres in Lincoln County and 6,219 acres in Clark County). Approximately 21,454 acres of private land are available for development within Lincoln County, which have been considered as the Development Area (Figure 1-4, Table 1-1). Creation of the CSICL and a land reconfiguration will be considered as mitigation for development in Lincoln County, by conserving habitat for the Covered Species and WOUS. Further details on the Covered Area are included briefly in Chapter 2, Covered Area, of this document and in greater detail in Volume I: CSI Planned Development Project EIS.





Land Status

- CSI Covered Area
- CSI Development Area
- Conservation Lands
- The Conservation Fund Parcels
- BLM Utility Corridor
- Private Property (in Clark County)
- Highway
- State Route
- Ephemeral Channel
- Desert Dry Wash

CSI Lincoln County MSHCP

Figure 1-4
Coyote Springs Investment
Lincoln County Multi-species HCP
Covered Area and Proposed Land Configuration

ENTRIX

Table 1-1 Lands Comprising the Covered Area in the CSI MSHCP

Description of Lands	Acreage
Development Area	21,454 acres
Coyote Springs Investment Conservation Lands (CSICL)	13,767 acres, including: 7,548 acres in Lincoln County 6,219 acres in Clark County
Total Covered Area	35,221 acres

1.5.3 Species Selected for the CSI MSHCP

Covered Species are those species for which coverage under an incidental take permit (ESA Section 10(a)(1)(B) permit) is requested. CSI, in cooperation with the USFWS and BLM, considered 40 species for coverage (Appendix S). In addition to Covered Species, two additional categories of species are proposed for the CSI MSHCP: Evaluation Species and Watch List Species. Evaluation Species are those for which additional biological information is required to adequately assess the potential effect of Covered Activities and the benefits of conservation measures. Watch List Species are those for which adequate information is not available to assess population range, current status, or conservation potential or those that are not considered to be at risk during the planning horizon of the MSHCP, which is the length of the incidental take permit requested. Watch List Species are not anticipated to need coverage under the incidental take permit during the 40-year permit length. Of the 40 species assessed, five (5) are designated as Covered Species, eight (8) as Evaluation Species, and twenty-seven (27) as Watch List Species. Covered Species and Evaluation Species are listed in Table 1-2 and further described in Chapter 3, Covered Species and Habitat.

Although covered status is sought for five species in this MSHCP, the focus and primary target species is the desert tortoise, the only species federally protected under the ESA that occurs in the Covered Area. Diverse opinions exist regarding the status of the desert tortoise (Murphy, pers. comm.), at least in part because it is unclear whether current means of counting individuals of the species are sufficiently reliable to generate population estimates (Tracy et al. 2004). But almost all scientists and resource managers concerned about desert tortoises agree that they appear to be declining in many locations across the range of the species (Murphy pers. comm., Tracy et al. 2004). The species is declining not just where the desert habitats used by tortoises are being lost; but on protected lands, and on lands that have been dedicated specifically for the conservation of the species (Tracy et al. 2004). In many cases, activities such as agriculture, human collection, disease, drought, invasive plants, livestock grazing, ORV activities, and roads occurring on protected habitat are often threats to the species (Boarman 2002). It has been suggested that simply dedicating as open space those landscape areas with tortoise habitat attributes without management for desert tortoise populations is not in itself a sufficient and effective conservation strategy for the species, as surveyed populations are known to be declining on some protected habitat areas (Tracy et al. 2004).

Table 1-2 Covered Species and Evaluation Species in the CSI MSHCP

Common Name	Scientific Name	Federal Protection[a]	State Protection[b]
Covered Species:			
Potential to occur within the Covered Area			
Desert Tortoise	*Gopherus agassizii*	Threatened	Yes
Banded Gila monster	*Heloderma suspectum cinctum*	Former Species of Concern	Yes
Western burrowing owl	*Athene cunicularia hypugaea*	Former Species of Concern	Yes
Occur outside of the Covered Area and may be indirectly affected by Covered Activities			
Moapa dace	*Moapa coriacea*	Endangered	Yes
Virgin River chub (Muddy River population)	*Gila seminuda*	Virgin River population- Endangered Muddy River population - Former Species of Concern	Yes
Evaluation Species:			
Occur outside of the Covered Area and may be indirectly affected by Covered Activities			
Moapa White River springfish	*Crenichthys baileyi moapae*	-	Yes
Moapa speckled dace	*Rhinichthys osculus moapae*	-	Yes
Relict leopard frog	*Rana onca*	Federal Candidate	Yes
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered	Yes
Yuma clapper rail	*Rallus longirostris yumanensis*	Endangered	Yes
Plant species with the potential to occur within the Covered Area			
Las Vegas buckwheat	*Eriogonum corymbosum* var. *nilesii*	Federal Candidate	
Three-corner milkvetch	*Astragalus geyeri* var. *triquetrus*	Former Species of Concern	Critically Endangered
Sticky buckwheat	*Erigonum viscidulum*	Former Species of Concern	Critically Endangered

[a]The ESA listing status was obtained from the NNHP Rare Animal List (March 18, 2004) and the Rare Plant and Lichen List (April 1, 2005). The ESA status was then cross-referenced with the USFWS Threatened and Endangered Species System (http://ecos.fws.gov).

[b]The Nevada status was obtained from the NNHP Rare Animal List (March 18, 2004) and the Rare Plant and Lichen List (April 1, 2005). The Nevada status was then cross-referenced with a NatureServe (2006) species comprehensive report (available from http://www.natureserve.org/explorer/). Nevada faunal species either warrant protection or not under Nevada Revised Statute (NRS) 501. Flora species are designated as follows: [NRS ch. 527] CE = Critically Endangered; CY = Protected as cactus, yucca, or Christmas tree; P = Proposed for state listing.

1.5.4 Covered Activities

The CSI MSHCP addresses activities necessary for the proposed CSI Development (i.e., community features, recreational facilities and open space, utility and infrastructure, water supply infrastructure and management, and flood control structures development and maintenance) as well as activities related to the resource management features.

This section provides an overview of Covered Activities for the CSI MSHCP. Further information is provided in Chapter 4, Covered Activities, of this document and a complete description is provided as the Preferred Alternative in Volume I: CSI Planned Development Project EIS.

1.5.4.1 Community Features

The Development Area is located on the east side of U.S. Highway 93 and will straddle the Pahranagat Wash extending to the Lincoln County-Clark County line to the south. Resource management features will be implemented within the Covered Area, including natural wash buffer zones and conservation easements.

The proposed CSI Development will include residential housing, mixed-use urban villages and public buildings. Commercial and light industrial development will occur to support the local community. Hotels/resorts/casinos are planned. Roads and bridges will be constructed. The master planned community in the Development Area will include the following features:

- Residential areas including homes, residential villages, mixed-use urban villages, and various other types of residential villages
- Public buildings such as schools, library, and public services (e.g., government, fire, police)
- Hotels, resorts, casinos
- Commercial and light industrial development areas
- Agriculture (nursery operations – trees, plants and sod farm[s])
- Roads: (1) Existing roads will be maintained and improved (widening of U.S. Highway 93 and / or State Route 168); and (2) New roads will be constructed and maintained within the Development Area
- Heli-port(s)
- Up to four bridges spanning the Pahranagat Wash and additional bridges or crossings will likely be required

1.5.4.2 Recreational Facilities and Open Space

Recreational facilities and open space areas will serve residents and visitors. Golf courses and playfields will be sited to minimize impacts to WOUS. Recreational facilities may include the following features:

- Golf courses
- Parks and playfields
- Non-motorized trails for hiking, horseback riding, bicycling, etc.
- Open space areas
- Amusement parks

1.5.4.3 Utility and Infrastructure

Utilities and other infrastructure will be developed to serve the master planned community. The following utilities and infrastructure will be developed:

- Power, including electric power, power lines (distribution lines will be buried within the CSI Development), natural gas and renewable energy sources, including on-site direct generation
- Solar energy
- Natural gas transmission and distribution lines within the Development Area
- Propane distribution and storage within the Development Area
- Sanitary sewer and wastewater treatment plant (two located in Lincoln County) with corresponding reclaimed water storage, distribution and disposal facilities
- Effluent supply use and management
- Stormwater facilities and maintenance
- Solid waste disposal
- Telecommunications, including fiber optics lines and cellular towers, within the Development Area

1.5.4.4 Water Supply Infrastructure and Management

The water supply infrastructure and management activities to be covered under this MSHCP include construction and maintenance of the following:

- Water treatment – a minimum of two raw water treatment plants in Lincoln County located east of U.S. Highway 93

- Monitoring wells, including the construction, operation, maintenance, repair and replacement of such wells as authorized
- Production wells (including the construction, operation, maintenance, repair and replacement) for existing permitted rights within the Coyote Spring Valley Basin that may be installed in furtherance of the parties commitments under the Muddy River MOA and pursuant to other future Section 7 compliance and CSI's contractual obligations.
- Injection wells, as authorized
- Storage facilities – above or below ground reservoirs, on-site
- Local transmission and distribution facilities – construct, operate, maintain, repair, replace and reconstruct pipelines and all related appurtenances necessary or appropriate for the operation of such pipelines within the Development Area
- Water conservation – including treatment and reuse of effluent

1.5.4.5 Flood Control Structures Development and Maintenance (including Stormwater Management)

The existing desert dry washes within the Development Area do not have the capacity to adequately convey floodwaters through the Development Area and could endanger the health, safety, and welfare of residents during a flood event. Some of the desert dry washes will need to be relocated, enlarged and expanded to meet acceptable flood conditions and comply with EPA and State of Nevada regulations. The following activities will be included:

- Alteration of WOUS
- Stormwater conveyance (open ditch, pipe)
- Culvert replacement and construction
- Detention basins within the Development Area

1.5.4.6 Resource Management Features

The resource management features will include the following:

- Natural wash buffer zones
- Land ownership realignment and creation of the CSICL
- Collection and salvage of native plants and native plant seeds prior to ground disturbance

Natural wash buffer zones will be implemented along ephemeral washes within the Development Area, in accordance with the terms of the Section 404 permit.

Subsequent to completion of the land adjustments described herein, BLM would manage the BLM leased lands in accordance with the Land Lease Agreement (Appendix G), pursuant to the Nevada-Florida Land Exchange Act of 1988, and this CSI MSHCP, under the direction of the USFWS to protect and minimize any threat to federally listed endangered or threatened species. Approximately 7,548 acres of land in Lincoln County will be included in the CSICL and will be adjacent to approximately 6,219 acres of conserved land within Clark County; all 13,767 acres of land are to be included in this conservation measure. Any activities that occur within this area will be consistent with passive recreational use (e.g., passive or non-motorized recreation such as hiking, wildlife viewing, rock climbing, mountain biking, and horseback riding) or scientific research uses.

CSI nursery operations will also contribute to conservation measures. CSI has entered into a native plant seed collection agreement and a native plant collection agreement with the Springs Preserve, a department of the LVVWD (CSI and Springs Reserve 2005b, 2005a, respectively). In addition, CSI has entered into a Native Plant Salvage agreement with Native Resources Nevada for the purpose of salvaging native plants that will otherwise be lost as a result of surface disturbing activity (CSI and Native Resources Nevada 2006).

1.5.5 Conservation Measures that May Require Incidental Take

Implementation of certain types of conservation measures may require incidental take. These measures include the following:

- Measures affecting WOUS - Implementation of natural wash buffer zones, restoration of desert dry washes.
- Measures protecting wildlife - Clearance and translocation measures; Construction fencing and fencing for portions of conservation easements or along highways or project boundaries.
- Enhancement or restoration of disturbed or former habitats and/or physical processes.

1.5.6 Covered Activity Implementation Schedule

The proposed master planned community will be phased and built out over a period of up to 40 years. The resource management features of the CSI MSHCP will begin to be implemented before or concurrently with construction. Stewardship arrangements for the approximately 7,548 acres of land in Lincoln County to become part of the CSICL (e.g., funding/endowment, restoration projects, desert tortoise translocations, adaptive management) will be provided upon completion of the permitting process and issuance of all USFWS and Corps permits and will be addressed in the CSICL Management Plan.

1.6 CONSERVATION MEASURES

Conservation measures are designed to avoid, minimize, and mitigate for effects of Covered Activities on Covered Species. An overview of proposed conservation measures is provided in this section. Detailed information is provided in Chapter 6: Conservation Measures of this document.

1.6.1 Moapa Dace and Virgin River Chub Conservation Commitments

1.6.1.1 Avoidance/Minimization Measures

Avoidance and minimization measures to protect habitat in WOUS for Moapa dace and Virgin River chub are identical to measures proposed for WOUS in the Mitigation Plan (Appendix J) and include the following:

- Avoidance of construction activities on upland buffers and protected WOUS protected in a Perpetual Conservation Easement Grant
- Avoidance of construction activities within the CSICL
- Temporary construction fencing around preserved desert dry washes
- Implementation of stormwater plan and erosion control measures
- Restore 59.8 acres of WOUS and avoid/protect 25.2 acres of existing WOUS
- Ensure establishment of a monitoring and maintenance period of 5 years for each restored WOUS. The Drainage and Maintenance Easement on each of these WOUS would include ongoing, annual monitoring of wash conditions.
- Develop Long-term Protection Plan and associated funding

1.6.2 Desert Tortoise, Banded Gila Monster and Western Burrowing Owl Conservation Commitments

Although incidental take coverage is sought for five species (see Table 1-2) under the CSI MSHCP, the focal species is the desert tortoise, the only species federally protected under the ESA that occurs within the Covered Area.

The desert tortoise persists in most of its historical, several-state distribution, where it remains a federally threatened species and is a target of substantial conservation planning. While typical recovery actions include dedicating areas with desert tortoise habitat attributes as open space, this may not in itself be a sufficient and effective conservation strategy for this species. Compounding threats, such as disease, can result in continued population declines on protected areas (Berry 1997, as cited in Boarman 2006). When multiple threats affect a population, removing one threat will not result in benefits to the population if other limiting factors remain (Boarman 2006).

Recognizing there are multiple threats to the recovery of desert tortoise, the CSI MSHCP takes a multi-faceted approach to conserving the desert tortoise and contributing to its recovery. Along with protection of more than 13,767 acres of Mojave Desert scrub, which likely includes some of the most densely populated tortoise habitat in the Coyote Spring Valley, the proposed CSI MSHCP provides a mechanism to provide funding for a full range of conservation measures targeting desert tortoise, co-occurring animals and plants, and the landscape areas that support them[2]. The 13,767 acres that would be conserved under the CSI MSHCP include 7,548 acres of lands in Lincoln County and 6,219 acres of lands in Clark County. The 6,219 acres of land in Clark County are being conserved for the protection of desert tortoise in this CSI MSHCP; in an earlier environmental assessment and Section 404 permit for development activities on CSI lands in Clark County, Nevada, these lands served as a component of the mitigation measures for effects to WOUS.

Under the Adaptive Management Plan (AMP) discussed in Chapter 9, Adaptive Management and Monitoring, a science-based monitoring program would be established to address key sources of environmental stressors that affect tortoises and co-occurring species in the Coyote Spring Valley and to target key uncertainties regarding the most pervasive threats to desert tortoise, other at-risk species, and the sensitive landscapes that support them. The completion of research efforts, including obtaining collection permits for the desert tortoise, would be the responsibility of researchers receiving funds generated by the CSI MSHCP. CSI's commitment under this MSHCP would be to engage in the selection of appropriate research and provide the funds. This effort would be in cooperation with BLM and USFWS.

The MSHCP initiates and sustains on-site a tortoise "head-starting" program, an on-site captive breeding and translocation effort that intends to supplement natural tortoise reproduction and recruitment on conserved and adjacent public lands; implements conservation actions, including fencing of highways and roads that have long contributed to local tortoise mortality; establishes a science-based monitoring program to address key sources of environmental stressors that affect tortoises and co-occurring species in the Coyote Spring Valley; and funds a research effort that targets key uncertainties regarding the most pervasive threats to desert tortoise, other at-risk species, and the sensitive landscapes that support them. This latter plan activity is explicitly designed to produce new knowledge locally that is anticipated to be of a nature that can be applied in recovery efforts throughout the range of the desert tortoise (Murphy, pers. comm.).

In concert, these MSHCP actions will contribute directly to better understanding and reducing the diverse known sources of threats to the desert tortoise and will address the most critical species needs that are identified in the Desert Tortoise Recovery Plan Advisory Committee report (Tracy et al. 2004). These actions are intended to contribute directly to tortoise recovery by targeting local populations, as well as populations surrounding the Mormon Mesa Critical Habitat Unit and ACEC; and contributing beyond, including to agency-led, range-wide tortoise planning efforts. The activities detailed below fulfill statutory intent in Section 10(a) of the Endangered Species Act, and the enhanced regulatory requirements in the USFWS's "five-points policy" conservation guidelines (USFWS and NOAA 2000). CSI intends for this CSI MSHCP to exceed in scope and breadth of conservation activities the contributions all of plans focusing on desert tortoises that have preceded it.

Conservation measures to benefit desert tortoise, as well as the banded Gila monster and western burrowing owl, include the following outlined below.

[2] This conclusion is based upon population estimates for desert tortoises at the Coyote Springs permanent study plot, just to the north of the CSRMA, which were higher than elsewhere in the Coyote Spring Valley (EnviroPlus Consulting 1995).

1.6.2.1 Avoidance/Minimization Measures

- Land Development Area Surveys, Clearance and Translocation
- Best Management Practices for Construction, Operations and Maintenance Activities
  - General Site Measures
  - Ground Disturbance Activities
  - Sediment and Erosion Control
  - Water Quality
  - Fire Conservation Measures
  - Trash Management
  - Conservation Education
  - Pet Management
- Temporary and Permanent Desert Tortoise Exclusion Fencing
- Weed Management Plan

1.6.2.2 Mitigation Measures

- Mitigation Fees
  - Research Efforts
- Conservation Easements and/or Resource Management Areas

1.7 EXPECTED OUTCOMES

The potential outcomes of implementing the Covered Activities and conservation measures for each of the Covered Species are summarized in Chapter 7, Expected Outcomes. Conclusions are drawn for each individual species considered, based on comparing the potential effects outlined in Chapter 5, Potential Effects, with the conservation measures identified in Chapter 6, Conservation Measures. Where avoidance and minimization measures do not reduce effects to low or undetectable levels, mitigation measures have been used to offset the effects to the Covered Species. Table 1-3 demonstrates the extent of acreage in which the Covered Activities and Conservation Measures would occur.

Evaluation species have not been included in the analysis in Chapter 7, Expected Outcomes, because conservation measures were not developed specifically for these species. However, three-corner milkvetch, the Evaluation Species with the potential to be directly affected by the Covered Activities, is expected to benefit from conservation measures developed for the desert tortoise, banded Gila monster, and western burrowing owl.

Table 1-3 Acreage to be Disturbed under the Covered Activities or Protected under the Conservation Measures for the Proposed CSI Development

Description of Lands	Acreage to be Disturbed under Covered Activities	Undisturbed Acreage to be Protected under Conservation Measures	Acres
Development Area	Private lands to be disturbed from Covered Activities		20,716 acres
		Protected Waters of the United States and Natural Perpetual Conservation Easement Grant	737.7 acres, including 25.2 acres of WOUS
Total Size of the Development Area			21,454 acres
Coyote Springs Investment Conservation Lands (CSICL)		Area Protected as a Resource Management Area	13,767 acres, including: ▪ 7,548 acres in Lincoln County, including 6.9 acres of WOUS ▪ 6,219 acres in Clark County
Total Size of the CSICL			13,767 acres
Total Size of the Covered Area (Development Area and CSICL)			35,221 acres
Desert Tortoise Habitat within the Covered Area	Habitat to be disturbed from Covered Activities		20,716 acres

1.7.1 Moapa Dace and Virgin River Chub

Activities related to community development and construction, recreational facilities and open space, utility infrastructure, water supply infrastructure and management, flood control and stormwater management, and construction of the resource management features are not anticipated to have a detectable impact on these species. No habitat occurs within the Covered Area; habitat for both of these aquatic species is located approximately 17 miles downstream of the Development Area. Implementation of the avoidance and minimization measures described in Chapter 6, Conservation Measures, will reduce any potential indirect effects (such as increased sedimentation in the Pahranagat Wash and downstream into the Muddy River) of the Covered Activities on Moapa dace and Virgin River chub habitat to undetectable levels.

Therefore, the combination of all activities and conservation measures should result in no detectable effect to the Moapa dace, Virgin River chub, and their habitats. Furthermore, the funds generated from the development fees collected to mitigate for impacts to desert tortoise and banded Gila monster habitat will be used to implement a variety of mitigation measures that could also benefit the Moapa dace and Virgin River chub.

1.7.2 Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

Approximately 20,716 acres of available desert tortoise critical habitat and banded Gila monster and western burrowing owl habitat within the Development Area have the potential to be affected by the Covered Activities. Community development and construction activities including utility infrastructure development, recreational facilities and open space activities, and water supply infrastructure and management activities have the largest impact, estimated at 20,716 acres (99 percent of the acres potentially affected) (refer to Table 1-3). The construction of resource management features is anticipated to have a minimal impact on these species due to the small footprint of the activities (e.g., less than 3 ft^2 for each monitoring well installed). Thus, implementation of all Covered Activities will have a limited potential for inadvertent take of individual desert tortoises, banded Gila monsters, and western burrowing owls after the prescribed avoidance and minimization measures are implemented (e.g., clearance surveys, translocation, desert tortoise-proof fencing, construction Best Management Practices [BMPs]). Avoidance measures associated with WOUS are likely to reduce the potential area to be disturbed within the Development Area to 20,716 acres (32.1 acres WOUS preserved and 737.7 acres upland buffer) (see Table 1-3). The total area of desert tortoise habitat likely to be disturbed is approximately 20,716 acres.

To offset the effect of disturbance on 20,716 acres of desert tortoise habitat, potential banded Gila monster, and western burrowing owl habitat, a combination of a one-time per-acre mitigation fee ($800) will be paid by the developers and/or CSI for disturbing that habitat as well as the permanent protection of approximately 13,767 acres of habitat as part of the CSICL. CSI would manage the collection of the fees as part of issuance of the appropriate permitting process in conjunction with the USFWS (see Section 8: Plan Implementation). The funds generated from the mitigation fees collected could then be used to implement the variety of mitigation measures that would be expected to offset the effects to desert tortoise, banded Gila monster, and western burrowing owl as discussed in Chapter 6, Conservation Measures, and presented in Chapter 7, Expected Outcomes. Specifically, the results of research efforts funded by this MSHCP are expected to have beneficial effects that will likely extend beyond the Covered Area and enhance constituent elements of desert tortoise critical habitat throughout Lincoln County, Nevada.

1.8 CUMULATIVE EFFECTS

The effects of all projects, ongoing and future, in or near the Covered Area of the proposed CSI Development project in Lincoln County were evaluated in Chapter 10, Cumulative Effects, of this document. The evaluation focused on the potential cumulative effects to each of the Covered Species from activities related to water supply and development including transmission/distribution lines, activities related to utility infrastructure, and additional planning efforts.

In summary, significant cumulative impacts to Moapa dace and Virgin River chub could potentially occur as a result of groundwater development projects in the White River Groundwater Flow System. However, measures included in the Muddy River MOA and Stipulation[3] would alleviate potential cumulative impacts of the directly associated projects, as well as those of more distant projects.

Likewise, although adverse, cumulative direct and indirect effects to desert tortoise and their habitat are likely to occur from water supply and development and other activities, they are not likely to jeopardize desert tortoise populations within the local BLM ACECs and critical habitat of the Northeastern Mojave Recovery Unit. Although approximately 20,716 acres of designated critical habitat would be disturbed, the Development Area comprises approximately one-third of a percent (0.34 percent) of the total designated critical habitat.

Additionally, for the banded Gila monster and western burrowing owl, relatively small, localized effects to habitat would occur. These effects are anticipated not be large enough to adversely affect these species at the population level within southern Nevada from the combined activities in or near the Covered Area of the proposed CSI Development.

1.9 IMPLEMENTATION OF THE MSHCP

CSI will be responsible for the administration and implementation of the CSI MSHCP under the conditions of the incidental take permit. CSI will utilize two committees to facilitate implementation of the CSI MSHCP. The Executive Committee (EC) will be established as the decision-making authority for implementation of the HCP. An HCP Administrator will be engaged to assist the EC to manage the CSI MSHCP implementation process. A Technical Advisory Committee (TAC) will be established to provide specific technical guidance related to technical issues associated with implementation of the CSI MSHCP. A CSI representative will chair both of these committees. Funding sources for implementation of the CSI MSHCP is expected to come from mitigation fees and supplemental funding sources as needed.

Implementation of the CSI MSHCP; the structure, roles and responsibilities of the various committees involved; and the funding source and management of funds of the MSHCP is further summarized in Chapter 8, Plan Implementation, of this document.

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CHAPTER 2

Covered Area

Chapter 2: Covered Area

The proposed Covered Area addressed in this CSI MSHCP includes the environment directly and indirectly affected by the Covered Activities and conservation measures. This includes the Development Area, which is affected by the proposed new town, and which includes 21,454 acres of CSI private land located in southern Lincoln County. The Covered Area also includes the adjacent CSI leased land (7,548 acres in Lincoln County and 6,219 acres in Clark County), which will be conserved as part of the CSICL, subject to BLM consent. Mitigation and conservation measures are planned on CSI private and leased lands.

These lands comprising the Covered Area are located approximately 56 miles northeast of Las Vegas in Clark and Lincoln counties. CSI lands occupy most of the Coyote Spring Valley straddling the Pahranagat Wash and a portion of the Kane Springs Wash in Lincoln County. The lands in Lincoln County extend 9 miles north of the Lincoln County-Clark County line. They are bordered by the Delamar Mountains to the north, U.S. Highway 93 to the west, and the Meadow Valley Mountains to the east. The Covered Area lies within sections of Townships 11, 12 and 13 South, and Ranges 63 and 64 East (Mount Diablo Meridian). The geographic boundaries for the proposed Covered Area, proposed CSICL, and proposed Development Area in Lincoln County (with the proposed land configuration) are shown on Figure 1-4.

Although the Muddy Springs area of the Muddy River, various tributaries of the Muddy River, and the Muddy River are not part of the proposed Covered Area, Covered Activities may indirectly affect these downstream areas. Therefore, these downstream areas are included in the effects analyses and in the development of conservation measures in the CSI MSHCP. The Muddy River is located approximately 11 miles downstream from the Covered Area and approximately 17 miles from the Development Area (Figure 2-1).

The proposed Development Area is bordered by the Lincoln County-Clark County line to the south. It is adjacent to the new town being developed by CSI in Clark County. The development in Clark County is covered by the Clark County MSHCP and is not part of the Development Area proposed for coverage in the CSI MSHCP.

2.1 ENVIRONMENTAL SETTING

Information on the Environmental Setting, including climate and meteorology, soils and geology, surface water hydrology, groundwater hydrology, and water quality is included in Volume I: Coyote Springs Planned Development Project EIS. Information on biological resources and existing land use and resource management is included in this section of the MSHCP.

2.1.1 Biological Resources

Coyote Spring Valley is located in the biotic region generally referred to as the Eastern Mojave Desert. However, Coyote Spring Valley has strong biotic relationships with the Great Basin Desert to the north and the Sonoran Desert (Colorado Desert subdivision) to the south. The juxtaposition of Coyote Spring Valley along the periphery of these major biotic regions strongly influences the floral and faunal diversity within the valley.

2.1.1.1 Botanical

2.1.1.1.1 Plant Communities Within and Surrounding the Covered Area

The vegetation communities within and surrounding the Covered Area are characteristic of the Mojave Desert Scrub Ecosystem (Clark County Department of Comprehensive Planning 2000). The USGS Southwest ReGAP landcover classification system (2005), suggests that the dominant plant community within the Covered Area is the Creosotebush-White Bursage Desert Scrub (Figure 2-1). In addition, inclusions of Mojave Mid-elevation Mixed Desert Scrub, Mixed Salt Desert Scrub, North American Warm Desert Wash, and North American Warm Desert Playa are found within the area. Information collected during field surveys conducted by RCI in 2005 and 2006, which included all known potential habitat for sensitive plant species in CSI's lands in Lincoln and Clark counties (primarily in the active channels of the Pahranagat Wash and Kane Springs Wash), was used to ground-truth information available in local databases. Sensitive plant species for which habitat may occur in the Covered Area include three-corner milkvetch (*Astragalus geyeri* var. *triquetrus*), sticky buckwheat (*Eriogonum viscidulum*) and Las Vegas buckwheat (*Eriogonum corymbosum* var. *nilesii*). However, three-corner milkvetch, sticky buckwheat, and Las Vegas buckwheat were not observed during these field surveys.

Generally, vegetation is sparsely distributed and consists of low shrubs, cacti, and perennial grasses. Occasional short stature trees are found in the washes. Creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) are dominant in most areas. Mojave yucca (*Yucca schidigera*), barrel cactus (*Ferocactus* sp.), chollas (*Opuntia* spp.) and beavertail pricklypear (*Opuntia basilaris*) also are prevalent, although less frequently found within the Pahranagat Wash alluvial floodplain. Blackbrush (*Coleogyne ramosissima*) dominated stands occurs along the northern extant of the Development Area. Common shrub species identified throughout the area include Mormon tea (*Ephedra* sp.), indigo bush (*Psorothamnus fremontii*), four-winged saltbush (*Atriplex canescens*), hopsage (*Grayia spinosa*), spiny mendora (*Mendora spinencens*), brittlebush (*Encelia farinosa*), and purple sage (*Salvia dorii*). Associated grass species include big galleta, (*Pleuraphis rigida*), Indian ricegrass (*Acnatherum hymenoides*) and several non-native annual species (*Bromus* spp., *Schismus* spp.).

Within active channels of the Pahranagat Wash, vegetation is generally scarce except along the channel banks, though the species present are primarily the same as in the adjacent badlands and alluvial fans. Older sandbars may support scattered catclaw acacia (*Acacia greggii*), and an occasional small stand of desert willow (*Chilopsis linearis*). The Southwest ReGAP Analysis vegetation database has classified an area within the Pahranagat Wash as salt cedar or tamarisk (*Tamarix ramosissima)*. Recent on-the-ground surveys conducted on all dry washes in the CSI lands in Lincoln County, as well as the BLM Utility Corridor west of U.S. Highway 93, identified two (2) tamarisk stands in the Pahranagat Wash at the crossing of State Route 168 (Table 2 through 4 in Huffman Broadway Group, Inc. and RCI 2006). These tamarisk stands are not located within CSI lands in Lincoln County, but are located at the southern edge of the CSICL in Clark County.

CSI lands remain in nearly natural ecological condition (The Nature Conservancy 2001) with limited site-specific impacts due to past and current human activities. The area was closed to livestock grazing and mineral entry in 1998. Over the years there have been various human-based activities on the landscape; however, these have had relatively limited scope (e.g., grazing, borrow pit, scattered two-track roads and culverts for wash crossings of paved roadways). There are trails for off-road vehicle use in BLM lands around the area.

General descriptions of vegetation associations found within Covered Area, as suggested by the Southwest ReGAP landcover classification system and modified based on recent site reconnaissance, are as follows.

SONORA-MOJAVE CREOSOTEBUSH – WHITE BURSAGE DESERT SCRUB

This vegetation type is dominated by creosotebush and white bursage. Associated shrub species may include blackbrush (*Coleogyne ramosissima*), Mormon tea, indigo bush, shadscale (*Atriplex confertifolia*), hopsage, desert thorn (*Lycium* sp.) range ratany (*Krameria erecta*), burrobrush (*Hymenoclea salsola*), brittlebush, and purple sage. Common yucca and cacti include Mojave yucca, chollas, and beavertail pricklypear. Associated grass species include fluffgrass (*Erioneuron pulchellum*), Indian ricegrass, and big galleta. Associated forb species may include globemallow (*Sphaeralcea* sp.), desert trumpet (*Eriogonum inflatum*), and *Datura* sp.

The distribution of this vegetation class is typically within the Mojave Desert below 4,000 feet in elevation. It is commonly found in valley bottoms, lowlands, and flatlands.

MOJAVE MID-ELEVATION MIXED DESERT SCRUB

This vegetation class typically occurs in transition areas between creosotebush and white bursage and below the lower montane woodlands. It is characterized by the occurrence of creosotebush and white bursage in association with other shrub species, such as blackbrush, California buckwheat (*Eriogonum fasciculatum*), Mormon tea, hopsage, spiny mendora, bladder sage (*Salazaria Mexicana*), and Mojave yucca. Associated grass species are similar to those found in the creosote-bursage type.

CSI Lincoln County MSHCP

Figure 2-1
Distances from Covered Area to Muddy River

SONORA – MOJAVE MIXED SALT DESERT SCRUB

Salt desert scrub is found primarily on playas and in intermountain basins and localized depressions where poorly draining silty loam soils develop into a desert pavement. This vegetation class is usually dominated by one or more of the *Atriplex* species, including shadscale (*Atriplex confertifolia*) and fourwing saltbrush (*A. canescens*). Other shrub species may include: desert thorn, Mormon tea, hopsage, blackbrush, and creosote.

NORTH AMERICAN WARM DESERT WASH

This landcover classification is characterized by intermittently flooded, linear washes that dissect the adjacent desert scrub communities. Vegetation within these washes is sparse and patchy. Desert willow or catclaw acacia is limited to the older, established sandbars. Vegetation occurring on the banks is typical of the adjacent scrubland.

NORTH AMERICAN WARM DESERT PLAYA

Vegetation within the desert playa land cover is typically sparse. Playas form with intermittent flooding, followed by evaporation, leaving behind a saline residue. Typical species may include: saltgrass (*Distichilis spicata*), Indian ricegrass, Tiquillia (*Tiquillia* spp.) and *Atriplex* species.

2.1.1.1.2 Riparian Vegetation in the Upper Moapa Valley along the Muddy River and Some of its Tributaries

In the Upper Moapa Valley along the Muddy River and some of its tributaries, broad-leaf deciduous riparian woodland and riparian scrub vegetation communities represent the Desert Riparian Ecosystem (Clark County Department of Comprehensive Planning 2000). These dense stands of riparian vegetation begin approximately 17 miles downstream of the Development Area where the perennial flow of the Muddy River begins in the Warm Springs Area. Historically, the riparian vegetation bordering the Muddy River consisted of a complex of Fremont cottonwood (*Populus fremontii*), willows (*Salix* spp.), screwbean mesquite (*Prosopsis pubescens*) and velvet ash (*Fraxinus velutina*). However, non-native palm trees (*Washingtonia filifera*) spreading from the spring systems in the Warm Spring area are increasing in abundance along the upper Muddy River (USFWS 1996). The non-native salt cedar has replaced much of the native riparian vegetation and is currently the most common riparian species along the middle and lower Muddy River (Provencher and Andress 2004). Mesquite bosques are present on some upper floodplain terraces and along stream banks, alkali sinks and desert dry washes (ephemeral washes).

2.1.1.2 Wildlife

2.1.1.2.1 Terrestrial Wildlife Species

Wildlife species occurring within the Covered Area include those typically found in and adapted to the arid Mojave Desert Ecosystem. The distribution and abundance of species is influenced by many factors, including plant species diversity, vegetation structure, substrate, predator/prey populations, and availability of cover sites and water. Environmental conditions within the desert are highly variable, and many species are able to quickly take advantage of favorable circumstances (e.g., rainfall) and/or to escape harsh situations through adaptations of physiology (e.g., use of metabolic water) and/or behavior (e.g., hibernation, under ground burrows and migration). Wildlife guzzlers, man-made structures designed to collect and store rainfall and run-off to provide water for quail, doves, rabbits and a variety of other small birds and mammals during the dry season, were constructed along Pahranagat Wash by NDOW in 1982. Several guzzlers are located on CSI property in Lincoln County. Washes and stream courses often serve as corridors for animal movements, providing habitat connectivity across the greater landscape. Generally, wildlife also occurs in greater numbers and diversity with higher structural complexity of the vegetation and plant species diversity.

Mammal species typically occurring in the Mojave Desert and present within the Development Area include coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), rock squirrel (*Spermophilus variegatus*), antelope ground squirrel (*Ammospermophilus leucurus*), desert wood rat (*Neotoma lepida*) and Merriam’s kangaroo rat (*Dipodomys merriamii*). Big game species such as desert bighorn sheep (*Ovis canadensis*) and mule deer (*Odocoileus hemionus*) may be found on CSI lands. Bat species with the potential to occur within the Covered Area include spotted bat (*Eurerma maculatum*), California myotis (*Myotis californicus*), western small-footed myotis (*Myotis ciliolabrum*), Myotis lucifugus (*little brown myotis*), and fringed myotis (*Myotis thysanodes*) (NNHP 2004).

The Mojave Desert Scrub Ecosystem within the Covered Area provides breeding and wintering habitat for many species of birds, most of which forage and nest on the ground or among low shrubs. Of particular importance for bird diversity within the area are the small patches of mesquite or desert willow that occur in scattered locations along Pahranagat Wash. These trees provide feeding, roosting and nesting sites for a variety of species, as well as resting sites for migrating birds. Bird species' diversity within Mojave Desert Scrub habitats within the Development Area is not particularly high. Typical species present in the Development Area would include red-tailed hawk (*Buteo jamaicensis*), common raven (*Corvus corax*), greater roadrunner (*Geococcyx californianus*), mourning dove (*Zenaidura macroura*), Gambel's quail (*Callipepla gambelii*), cactus wren (*Campylorhynchus brunneicapillum*), Say's phoebe (*Sayornis sayi*), western kingbird (*Tyrannus verticalis*), house finch (*Carpodacus mexicanus*) and the non-native house sparrow (*Passer domesticus*).

The herpetofauna within the Covered Area is particularly diverse. Coyote Spring Valley includes snake and lizard species typical of Mojave Desert Scrub as well as several species associated with the Sonoran Desert. The substrate and presence of cover sites often influence the site-specific occurrence of many reptile species. Reptile species present include desert tortoise (*Gopherus agassizii*), chuckwalla (*Sauromalus obesus*), collared lizard (*Crotaphytus bicinctores*), western banded gecko (*Coleonyx variegatus*), zebra-tailed lizard (*Callisaurus draconoides*), western whiptail (*Cnemidophorous tigris*), desert iguana (*Dipsosaurus dorsalis*), large spotted leopard lizard (*Gambelia wislizenii wislizenii*), northern desert horned lizard (*Phrynosoma platyrhinos platyrhinos*), and side-blotched lizard (*Uta stansburiana*). Western patch-nosed snake (*Salvadora hexalepis*), coachwhip snake (*Masticophous flagellus*), Great Basin rattlesnake (Crotalus viridus lotus) and sidewinder (*Crotalus cerastes*) have been found in the project area. Other snake species likely to be present include glossy snake (*Arizona elegans*), California (common) kingsnake (*Lampropeltis getulus californiae*), spotted leaf-nose snake (*Phyllorhynchus decurtatus*), western long-nose snake (*Rhinocheilus lecontei lecontei*), and (Sonoran) lyre snake (*Trimorphodon biscutatus lambda*). Amphibians present in the area include the red-spotted toad (*Bufo punctatus*).

2.1.1.2.2 Aquatic and Riparian Species

There are no wetlands or perennial flows within the Development Area, thus there are no special status aquatic species. The ephemeral nature of the washes precludes the establishment of fish species. Desert riparian and aquatic habitats are present downstream of the Development Area where the perennial flows of the Muddy River begin at Muddy and Warm springs, which is approximately 17 miles away from the Development Area.

Aquatic species, including special status species, occur in the Muddy Springs Area, the Upper Moapa Valley along the Muddy River, and some tributaries of the Muddy River. Moapa dace (*Moapa coriacea*), Moapa White River springfish (*Crenichthys baileyi moapae*), Moapa speckled dace (*Rhinichthys osculus moapae*), Moapa pebblesnail (*Fluminicola avernalis*), Amargosa naucorid (*Pelocoris shoshone shoshone*), Moapa Warm Springs riffle beetle (*Stenelmis moapa*), and grated tryonia (*Tryonia clathrata*) all may occur in the Warm Springs Area of the Muddy River. The nearest spring to the Covered Area is Coyote Spring, which is located approximately 0.61 mile to the north. Two other aquatic species, the Hiko White River springfish (*Crenichthys baileyi grandis*) and the White River springfish (*Crenichthys baileyi baileyi*), occur upstream of the Covered Area. The nearest spring that the Hiko White River may occupy is Crystal Springs, which is located about 46 miles north of the Covered Area. The White River springfish may occupy Ash Springs, which is approximately 39 miles north of the Covered Area.

Riparian communities, as found along portions of the Muddy River, have the highest species diversity of wildlife within the Mojave Desert Ecoregion. This habitat type is extremely limited in this ecoregion. Many riparian-dependant wildlife species have become imperiled due to loss and/or modification of riparian and aquatic habitats within the ecoregion.

The distribution of riparian and aquatic habitats in southern Nevada is limited, and much of the habitats that remain are severely degraded due to water diversions and/or invasion by non-native plant and animal species.

The riparian and aquatic habitats associated with the Muddy River and the numerous springs in Upper Moapa Valley have been heavily impacted, but still provide some of the highest quality riparian habitat in the region.

Broad-leaf deciduous riparian woodlands, such as those along the Muddy River, are of special importance to bird species diversity, providing nesting habitat for species such as great horned owl (*Bubo virginianus*), yellow warbler (*Dendroica petechia*), common yellowthroat (*Geothlypis trichas*), phainopepla (*Phainopepla nitens*), black phoebe (*Sayornis nigricans*) and Bullock's oriole (*Icterus bullockii*). Riparian habitats are also important as migration corridors for neotropical migrant species. However, no such riparian habitats occur within the Covered Area.

2.1.1.3 Special Status Species

Various resource management agencies confer special status designations to species that are considered rare or otherwise sensitive to impacts.

Special status species that could potentially occur within the Covered Area of Coyote Spring Valley were identified. Additionally, special status species were evaluated for potential presence within the Muddy River Basin in Clark County, extending from Pahranagat Wash at the Lincoln County-Clark County line downstream through Coyote Spring Valley to the Muddy River and Lake Mead. As a result of the selection species process, a total of 5 species will be covered, 7 species will be evaluated, and 28 species will be on the Watch List. The special status species are discussed in detail in Chapter 3, Covered Species and Habitat.

2.1.2 Existing Land Use and Resource Management

CSI lands include a mix of leased and privately owned property. Land surrounding the CSI lands is primarily public land. The Development Area is located on privately owned, undeveloped land in the Eastern Mojave Desert, and is adjacent to the proposed CSI new town currently being developed in Clark County directly across the Lincoln/Clark county line to the south. The BLM land leased by CSI is not earmarked for disposal but is eligible for adjustment to modify land configurations to improve species protection and land management objectives. Land use has been developed by BLM and USFWS to protect and preserve desert tortoise habitat. The land within the Development Area, as well as surrounding land, is designated critical habitat for the desert tortoise.

CSI lands are located within the Mormon Mesa Critical Habitat Unit of the Northeastern Mojave Recovery Unit for the desert tortoise (Figure 2-2), as identified in the 1994 Desert Tortoise Recovery Plan (USFWS 1994). The Mormon Mesa Critical Habitat Unit encompasses approximately 427,000 acres. This is part of approximately 6.4 million acres of critical habitat designated in the southwestern United States, of which 1,224,400 acres are located within Clark and Lincoln counties in Nevada. The Recovery Plan established Desert Wildlife Management Areas (DWMA), which grouped areas of critical habitat for management purposes. The approximately 21,454 acres of CSI private lands are located within designated desert tortoise critical habitat.

Federal lands lying west of the Covered Area are within the Desert National Wildlife Range (DNWR) managed by USFWS (except to the extent the 0.5-mile-wide BLM Utility Corridor adjacent to and westerly of U.S. Highway 93 is managed by the BLM). This 1.6 million-acre area contains approximately 150,000 acres of desert tortoise habitat. Critical habitat for the tortoise was not designated in the DNWR, because land management practices were determined to provide sufficient protection for the tortoise.

South of the Development Area and east of the CSICL, privately-owned land located in Clark County is being developed by CSI. That land is currently specified as a planned development as described under Clark County Comprehensive Planning Development Code 30.24. State Route 168, marks the southern boundary of the CSICL and southern boundary of the development area in Clark County. The land south of State Route 168 is managed by the BLM and is designated critical habitat for the desert tortoise. The Las Vegas Resource Management Plan (BLM 1998) specifies the allowable land uses on the land. These land uses were developed by the BLM to protect and preserve desert tortoise habitat. Land located north of State Route 168 also is designated critical habitat for desert tortoise. A Class III landfill exists northwest of the Development Area.

Three ACECs are adjacent to the Covered Area: the Coyote Spring, Kane Springs, and Mormon Mesa ACECs (Figure 2-2). The Mormon Mesa and Coyote Spring ACEC were established under the Las Vegas Field Office Resource Management Plan (BLM 1998). The Kane Springs ACEC was established under the Caliente Management Framework Plan Amendment for directing land management to aid in the recovery of desert tortoise (BLM 2000). At present, the CSI Development Area is bounded on the north and east by the Kane Springs ACEC and on the east by the Mormon Mesa ACEC. Subsequent to the reconfiguration of private and leased lands, the CSICL in Lincoln County will abut the ACECs.

Other ACECs near the Covered Area are the Beaver Dam Slope ACEC to the east, which straddles the Nevada/Arizona border, and the Arrow Canyon and Gold Butte ACECs to the south. The Beaver Dam Slope ACEC is managed partially by the Ely Field Office and partially by the Arizona Strip Field Office. The Arrow Canyon and Gold Butte ACECs are managed by the Las Vegas Field Office (BLM 1998).

To the east and north of the Mormon Mesa and Kane Springs ACECs lie three adjacent wilderness areas managed by the BLM's Ely Field Office (Figure 2-2): Delamar Mountains (111,328 acres), Meadow Valley Range (123,488 acres), and Mormon Mountains (157,938 acres) (BLM 2008). To the south of the CSI lands lies the Arrow Canyon Wilderness (27,530 acres), which is managed by the Las Vegas Field Office (BLM 2008).

Old U.S. Highway 93, an abandoned two-lane road, traverses a portion of the property in a north-south direction on the eastern side of Pahranagat Wash. The road is currently used by the landowner for access to the land and is also used by the NDOW to access several wildlife guzzlers.

A Phase I Environmental Assessment was conducted on CSI property in March 2005 in accordance with American Society for Testing and Materials (ASTM) Practice E 2247-02. The goal of the Phase I Environmental Assessment was to identify recognized environmental conditions on the property. The term "recognized environmental conditions" means the presence or likely presence of any hazardous substance or petroleum products on the property under conditions that indicate an existing release, a past release, or a material threat of a release of hazardous substance or petroleum products into structures on the property or into the ground, groundwater or surface water on the property.

The assessment noted that a small amount of municipal waste had been dumped at sites along Old U.S. Highway 93 and the perimeter of the property, outside of the CSI property. A landfill and recycling operation is located to the west of U.S. Highway 93 at the north end of the development area, outside of CSI property. The assessment also noted drips of hydraulic fluids or petroleum product at the nursery site, which was under construction at the time. These sites were not considered a recognized environmental condition in accordance with ASTM Practice E 2247-02. The primary potential sources for hazardous materials in the area are U.S. Highway 93 and State Route 168. These highways are exposed to the typical petroleum products associated with automotive and truck traffic. The adjacent land and WOUS of the Development Area currently receive storm runoff from these roads.

Airspace above the proposed CSI development is designated as a Military Operations Area and aircraft traffic operating in the area is a Low Altitude Tactical Navigation area. Aircraft flying in the area operates at altitudes as low as 500 feet above ground level (E. Hopper, Nellis Air Force Base, October 2006 scoping comment).

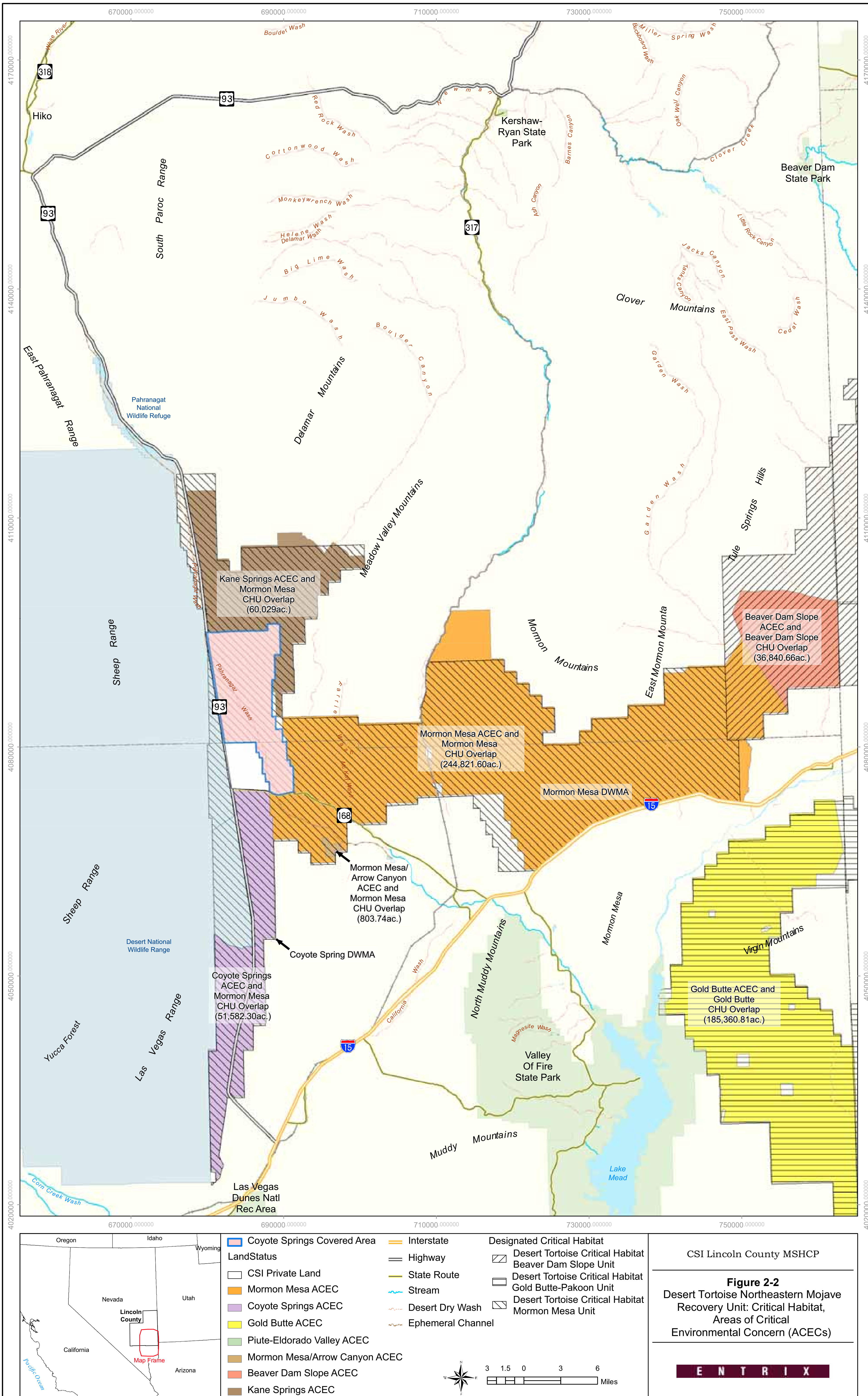

Figure 2-2
Desert Tortoise Northeastern Mojave Recovery Unit: Critical Habitat, Areas of Critical Environmental Concern (ACECs)

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CHAPTER 3

Covered Species and Habitat

Chapter 3: Covered Species and Habitat

Covered Species are those species which coverage under an incidental take permit (ESA Section 10(a)(1)(B) permit) is requested. CSI, in cooperation with the USFWS and BLM, considered 40 species for coverage (Appendix S). The HCP Handbook (USFWS and NMFS 1996) provides the following recommendation for selecting covered species:

> *Generally, permit applicants should be advised to include all federally listed wildlife species likely to be incidentally taken during the life of the project or permit*. (page 3-7 in the HCP Handbook)

The HCP Handbook also suggests:

> *There are also advantages in addressing unlisted species in the HCP (proposed and candidate species at a minimum), particularly those that are likely to be listed within the foreseeable future or within the life of the permit*. (page 3-7 in the HCP Handbook) and
>
> *The Service will encourage permit applicants to address any species in the plan area likely to be listed within the life of the permit. This can benefit the permittee in two ways: (1) the "No Surprises" policy applies to unlisted species that are adequately addressed in an HCP (see Chapter 3, Section B.5(a)); and (2) it prevents the need to revise an approved HCP should an unlisted species that occurs within the plan area but was not addressed in the HCP subsequently be listed* (page 1-16 in the HCP Handbook).

Because of these recommendations, federally listed, proposed, and candidate species, state protected species, and other special status species were considered for inclusion in the request for coverage in the CSI MSHCP. This chapter provides a list of Covered Species for the CSI MSHCP. Additionally, it includes a discussion of the state and federal status, biology, and potential threats for each species. Species described in this chapter are those for which coverage and "No Surprises" assurances would be requested under the incidental take permit application. The treatment of these species requested for coverage would be the same regardless of whether they are federally listed, proposed, or candidate species; are state protected; or have some other form of special protection.

Two additional categories of species have been identified for the CSI MSHCP: 1) Evaluation Species, and 2) Watch List Species. Evaluation Species are those for which additional biological information is required to adequately assess the potential effect of Covered Activities and/or assess the benefits of conservation measures. A discussion of the state and federal status, biology, and potential threats for each Evaluation Species is included below. Watch List Species are those species for which adequate information is not available to assess population range, current status, or conservation potential or that are not considered to be at risk during the planning horizon of the MSHCP, which is equivalent to the length of the incidental take permit being requested. Because of this lack of adequate information or low risk, Watch List Species were not considered for initial inclusion in species to be covered by the incidental take permit.

3.1 SPECIES DESIGNATION CATEGORIES

To best utilize resources and protection efforts, species considered for some level of protection and/or consideration under this MSHCP have been designated hierarchically as Covered, Evaluation, or Watch List Species using a process briefly presented below and further described in Appendix S. Criteria for these designations were adapted from USFWS guidelines and the Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement (RECON 2000).

3.1.1 Covered Species (Incidental Take Requested)

Covered Species are those species for which coverage under an incidental take permit (ESA Section 10(a)(1)(B) permit) is requested. As described in the USFWS Region 1 Guidelines for Determining Covered Species Lists (1995), HCP applicants should consider:

- All federally listed species likely to be incidentally taken during the life of the permit,
- State listed species that are likely to be incidentally taken during the life of the permit,
- Those species for which sufficient information is known and for which adequate existing management prescriptions exist or can be easily defined and implemented sufficient to support an application for an incidental take permit,
- Those species about which a great deal of information may not be available but which are definitively known to share habitat with other Covered Species. For those species, it is believed that the management prescriptions (existing or easily defined) for other Covered Species would benefit sufficiently to support an application for an incidental take permit, and
- Those species whose federal listing appears imminent, unless conservation measures are instituted which would be likely to assure survival and recovery of such species in the wild.

3.1.2 Evaluation Species (Further Assessment Recommended)

Evaluation Species in this CSI MSHCP are those species for which additional information is required or for which sufficient management prescriptions are unlikely to be defined and implemented sufficiently to support an application for an incidental take permit. The application to the USFWS will not initially request an incidental take permit for those species. However, as additional information is accumulated and as management prescriptions are developed, CSI may submit amendments to this MSHCP together with requests that certain Evaluation Species be added to the list of Covered Species. Evaluation Species include:

- Federally listed species where there is a low likelihood of incidental take during the term of the permit,
- State listed species or species designated as imperiled or critically imperiled, where there is a likelihood to be incidentally taken during the life of the permit,
- Those species for which there is insufficient information and for which management prescriptions that exist, or could be easily defined and implemented, would be insufficient to support an application for an incidental take permit, and
- Those species where little information is available but they are known to share habitat with Covered Species. These species may benefit from the management prescriptions proposed to be implemented for the Covered Species in this CSI MSHCP.

3.1.3 Watch List Species (No Further Consideration)

Watch List Species are those species with inadequate information to assess population range, current status, or conservation potential and includes those species considered not to be at risk during the planning horizon of the MSHCP. Watch List Species include:

- Federally listed species where there is no likelihood for incidental take during the life of the permit,
- State listed species where there is a low likelihood to be incidentally taken during the life of the permit,
- Species designated as imperiled where there is a low to medium likelihood to be incidentally taken during the life of the permit,
- All species that have not been designated by state or federal agencies.

3.2 DESIGNATION PROCESS AND RESULTS

A decision matrix (Table 3-1) was developed and used to designate Covered, Evaluation, and Watch List Species by considering the criteria outlined above. As such, species listed as threatened or endangered under the ESA with the likelihood for take to occur at a relatively high level associated with the proposed Covered Activities are considered as Covered Species. However, species that have not been designated as a species of concern by state or federal resource agencies and the likelihood for the potential of take to occur is at a low level associated with the proposed Covered Activities are considered Watch List Species.

Table 3-1 Decision Matrix for Conducting a Designation of Species to be Considered for Coverage under the CSI MSHCP

Preliminary Selection Criteria				
Likelihood for the Potential of Take to Occur	Species Status – Level of Protection Warranted			
	Federal Protection	State Protection	Designated Imperiled	Not Designated
High	Covered Species	Covered Species	Evaluation Species	Watch List Species
Medium	Covered Species	Evaluation Species	Watch List Species	Watch List Species
Low	Evaluation Species	Watch List Species	Watch List Species	Watch List Species
Not Detectable	Watch List Species	Watch List Species	Watch List Species	Watch List Species

The designation of which species are considered Covered, Evaluation, and Watch List species in the CSI MSHCP was based on an adequate description of Covered Activities and an assessment of the overlap of those activities with the species' potential ranges.

3.2.1 Species Designations for the CSI MSHCP

Table 3-2 presents an overview of the species designations, including information on status and potential for take. The CSI MSHCP will cover two species and their habitat that are currently protected under the federal ESA (desert tortoise [Mojave population] and Moapa dace) and three species that are currently protected by the State of Nevada (banded Gila monster, western burrowing owl, and Muddy River population of Virgin River chub). These species have the potential to be incidentally taken during the life of the permit. Two species with federal protection are included as Evaluation Species because of the low potential for take from the Covered Activities. An additional wildlife species is included as an Evaluation Species that may be federally listed in the foreseeable future or within the life of the permit. Two plant species listed as critically endangered by the State of Nevada will be included as Evaluation Species. These plant species are not currently listed under the federal ESA.

Table 3-2 Species Designations Proposed Under the CSI MSHCP

Common Name	MSHCP Classification	Status Warrants Protection	Likelihood for the Potential of Take to Occur	Rationale for Designation
Fish Species				
White River springfish	Watch List	ESA - Endangered Nevada Protected	Negligible	This species is not found in the Covered Area. It is only found upstream of the Covered Area in the Pahranagat Drainage.
Hiko White River springfish	Watch List	Nevada Protected	Negligible	This species is not found in the Covered Area. It is only found upstream of the Covered Area in the Pahranagat Drainage.
Moapa dace	Covered	ESA I - Endangered Nevada Protected	Low to Medium	This species is not found in the Covered Area. It is found in springs, tributaries, and springs along the Muddy River. Lowering of the water table caused by groundwater extraction and subsequent alterations to habitat could affect this species.
Virgin River chub (Muddy River Population)	Covered	ESA – Endangered (Virgin River population only) Nevada Protected	Low to Medium	This species is not found in the Covered Area. It is found in the main channel of the Muddy River. Lowering of the water table caused by groundwater extraction and subsequent alterations to habitat could affect this species.
Moapa White River springfish	Evaluation	Nevada Protected	Low to Medium	This species is not found in the Covered Area. It is found in springs, tributaries, and springs along the Muddy River. Lowering of the water table caused by groundwater extraction and subsequent alterations to habitat could affect this species. Therefore, the proposed Covered Activities may enhance threats that warrant federal protection.
Moapa speckled dace	Evaluation	Nevada Protected	Low to Medium	This species is not found in the Covered Area. It is found in springs, tributaries, and springs along the Muddy River. Lowering of the water table caused by groundwater extraction and subsequent alterations to habitat could affect this species. Therefore, the proposed Covered Activities may enhance threats that warrant federal protection.
Reptiles				
Desert tortoise	Covered	ESA - Threatened Nevada threatened	High	This species occurs within the Covered Area. Additionally, designated critical habitat for this species also occurs within the Covered Area. The proposed Covered Activities may enhance the threats that warranted federal and state protection of the species.
Western banded gecko	Watch List	-	Medium	This species occurs within the Covered Area. Potential habitat occurs across most of the Development Area.
Desert iguana	Watch List	-	Medium	This species occurs within the Covered Area. Potential habitat occurs across most of the Development Area. Species threats include habitat loss or degradation due to conversion to human uses and direct mortality on road systems.
Large spotted leopard lizard	Watch List	-	Medium	Threats include habitat separation barriers resulting from urbanization and roads.

Table 3-2 Species Designations Proposed Under the CSI MSHCP

Common Name	MSHCP Classification	Status Warrants Protection	Likelihood for the Potential of Take to Occur	Rationale for Designation
Reptiles (continued)				
Banded Gila monster	Covered	ESA - Former Species of Concern Nevada protected	High	This species occurs in the Covered Area. The Covered Activities have a high potential to affect the species. The proposed Covered Activities may enhance threats that warrant federal protection.
Northern desert horned lizard	Watch List	-	Medium	This species may potentially occur anywhere in the Covered Area.
Glossy snake	Watch List	-	Medium	This species occurs in the Covered Area.
California (common) kingsnake	Watch List	-	Medium	This species occurs in the Covered Area. This species has the potential to occur on many habitat types that are within the Development Area/Covered Area.
Spotted leaf-nose snake	Watch List	-	Medium	This species occurs in the Covered Area.
Western long-nose snake	Watch List	-	Medium	This species occurs in the Covered Area.
(Sonoran) Lyre snake	Watch List	-	Low	The potential for this species to occur in the Covered Area is low.
Amphibians				
Relict leopard frog	Evaluation	ESA - Candidate Nevada protected	Low to Medium	This species occurs in the lower Muddy River system. Lowering of the water table caused by groundwater extraction could affect this species.
Arizona toad	Watch List	ESA – Former Species of Concern	Low	This species could occur in a small patch of Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland habitat in Covered Area. Additional information is required.
Mammals				
Kit fox	Watch List	–-	Medium	Potential suitable habitat occurs throughout the Covered Area. Higher impact would result if development occurs on top of dens.
Birds				
Western burrowing owl	Covered	ESA – Former Species of Concern Nevada protected	Medium	Potential suitable habitat for this species occurs throughout the Covered Area. Known threats to the species include habitat loss due to agricultural and urban land conversion and fragmentation and isolation resulting in small and localized populations.
Western yellow-billed cuckoo	Watch List	ESA - Candidate Nevada sensitive	Low	This species occurs in the lower Muddy River system. The proposed Covered Activities are unlikely to enhance threats that would warrant federal protection. This species does not occur in the Covered Area.

Table 3-2 Species Designations Proposed Under the CSI MSHCP

Common Name	MSHCP Classification	Status Warrants Protection	Likelihood for the Potential of Take to Occur	Rationale for Designation
Birds (continued)				
Southwestern willow flycatcher	Evaluation	ESA - Endangered Nevada endangered	Low	This species occurs in the lower Muddy River system and in the Pahranagat Drainage upstream of the Covered Area. This species does not occur in the Covered Area. The proposed Covered Activities are unlikely to enhance threats that warranted federal protection.
Phainopepla	Watch List	Nevada protected	Low	This species occurs in the lower Muddy River system and is a common inhabitant of washes and riparian areas. The proposed Covered Activities are unlikely to enhance threats that would warrant federal protection.
Yuma clapper rail	Evaluation	ESA - Candidate Nevada – endangered	Low	This species is not found in the Covered Area. It occurs in the lower Muddy River system. The proposed Covered Activities are unlikely to enhance threats that warranted federal protection.
Invertebrates				
Moapa pebblesnail	Watch List	ESA - Former Species of Concern	Low	This species is not found in the Covered Area. It occurs in the lower Muddy River system.
Pahranagat naucorid bug	Watch List	-	Negligible	This species is not found in the Covered Area. It is only found upstream of the Covered Area in the Pahranagat Drainage.
Amargosa naucorid	Watch List	-	Low	This species is not found in the Covered Area. It occurs in the lower Muddy River system.
Moapa Warm Springs riffle beetle	Watch List	ESA - Former Species of Concern	Low	This species is not found in the Covered Area. It occurs in the lower Muddy River system.
Grated tryonia	Watch List	ESA- Former Species of Concern	Low	This species is not found in the Covered Area. It occurs in the lower Muddy River system.
Plants				
Three corner milkvetch	Evaluation	ESA - Former Species of Concern Nevada critically endangered	Low	This species has not been detected in the Covered Area.
Sheep Mountain milkvetch	Watch List	ESA - Former Species of Concern	Low	This species is endemic to Lincoln and Clark counties, but does not occur in the Covered Area.
Nye milkvetch	Watch List	-	Low	This plant may occur in the Covered Area.
Sticky ringstem	Watch List	-	Low	This plant may occur in the Covered Area.

Table 3-2 Species Designations Proposed Under the CSI MSHCP

Common Name	MSHCP Classification	Status Warrants Protection	Likelihood for the Potential of Take to Occur	Rationale for Designation
Plants (continued)				
White bearpoppy	Watch List	ESA - Former Species of Concern	Low	This plant may occur in the Covered Area.
Meadow Valley sandwort	Watch List	-	Low	This plant may occur in a very small portion of the Covered Area.
Las Vegas buckwheat	Evaluation	ESA – Candidate Species	Low	This species may occur in a small portion of the Covered Area and is endemic to Clark County.
Sticky buckwheat	Evaluation	ESA - Former Species of Concern Nevada – critically endangered	Low	This species has not been detected in the Covered Area. It is found along Muddy River from Weiser Wash to confluence with Virgin River. Changes in habitat caused by water projects and subsequent lowering of water table could affect this species.
White-margined beardtongue	Watch List	ESA - Former Species of Concern	Low	This species may occur in the Covered Area. Relevant threats include dumping, activities associated with transmission line and pipeline, and off-road vehicles.
Yellow two-toned beardtongue	Watch List	ESA - Former Species of Concern	Low	This plant is not found in the Covered Area, but may occur in the one-mile buffer surrounding the Covered Area.

3.3 COVERED SPECIES

3.3.1 Moapa Dace

Source: Moapa Valley NWR

Scientific Name: *Moapa coriacea*

3.3.1.1 Protection Warranted

3.3.1.1.1 Endangered Species Act

- March 11, 1967: listed as Endangered, without critical habitat, under the ESA of 1966, (32 FR 4001); listing carried over to ESA of 1973.
- May 16, 1996: Final Recovery Plan approved (USFWS 1996).

3.3.1.1.2 Nevada Administrative Code

- Classified as Endangered under NAC 503.065 (Protected, Endangered and Threatened Fish).

3.3.1.2 General Description

The Moapa dace was first collected in 1938 and was described by Hubbs and Miller (1948). Key identification characteristics are a black spot at the base of the tail and small, embedded scales, which create a smooth leathery appearance. Coloration is olive-yellow above with indistinct blotches on the sides, with a white belly. A diffuse, golden-brown stripe may also be present. Maximum size is approximately 4.7 inches fork length. The oldest known specimen on record is over four-years old (Scoppettone et al. 1992). The Moapa dace is a member of the North American minnow family, Cyprinidae. The genus *Moapa* is regarded as being most closely related to the dace genera *Rhinichthys* (speckled dace) and *Agosia* (longfin dace) (Coburn and Cavender 1992). These three dace genera, along with the genera *Gila* (chub), *Lepidomeda* (spinedace), *Meda* (spikedace), and *Plagopterus* (woundfin), developed from a single ancestral type (monophyletic) and are only associated with the Colorado River Basin (USFWS 1996).

3.3.1.3 Ecology

Moapa dace is endemic to the headwaters of the Warm Springs Area in Clark County. The Moapa Valley National Wildlife Refuge (MVNWR), a 106-acre area of springs and wetlands located in the Warm Springs Area of the Upper Moapa Valley, was established in 1979 for the protection of Moapa dace. The Moapa dace currently occupies a variety of habitats in the Warm Springs Area, including spring pools, tributaries (spring outflows), and the upper 2.48 mile-long mainstem Muddy River (post-Hoover Dam). The MVNWR consists of three units encompassing the major spring groups; the Pedersen Unit, Plummer Unit, and Apcar Unit.

The USFWS (2006) BO for the Muddy River MOA summarizes the historic distribution and abundance of Moapa dace as follows. Between 1933 and 1950, Moapa dace was abundant in the Muddy River and was estimated to inhabit as many as 25 individual springs and up to 10 miles of stream habitat (Ono et al. 1983). La Rivers (1962) considered the species “common” until at least 1950. However, by 1983, the species only occurred in springs and 2 miles of spring outflows (Ono et al. 1983). The species appears to have declined since 1938, when Hubbs and Miller (1948) considered the species “rather common” in all warm water habitats in the headwaters of the Muddy River (Moapa River), including spring pools, small creeks, and the mainstem.

During 1984 to 1987, the USFWS’s Seattle National Fisheries Research Center, now part of the USGS-Biological Resources Division (BRD), extensively surveyed Moapa dace habitats and estimated the adult Moapa dace population to be between 2,600 and 2,800 individuals (Scoppettone et al. 1992). These areas were re-surveyed by USGS-BRD in August 1994, when approximately 3,841 Moapa dace were recorded (Scoppettone et al. 1996). There was a substantial reduction in the number of individuals counted in 1997, with less than 1,600 adult Moapa dace observed, which was believed to be a result of the introduction of non-native fishes (Scoppettone et al. 1998). In January 2001, a total of 934 Moapa dace were recorded by a consortium of agencies, including NDOW, USGS-BRD, SNWA, and USFWS. In February 2002 and 2003, annual surveys enumerated approximately 1,085 and 907 individuals, respectively. The 2005 survey data indicate that there are approximately 1,300 fish in the population that occur throughout 5.6 miles of habitat in the upper Muddy River system.

The Moapa dace is thermophilic, typically occurring in waters ranging from 78.8 to 89.6°F (Hubbs and Miller 1948); however, one individual was collected in water temperatures of 67.1°F (Ono et al. 1983). Rinne and Minckley (1991) rarely found the species below 86°F. Deacon and Bradley (1972) indicated that the species reaches its greatest abundance at warmer temperatures between 82.4 and 86.0°F.

3.3.1.3.1 Habitat

Habitat use varies among larval, juvenile, and adult life stages. Larval dace are observed only in the upper-warmest reaches of tributaries and occur most frequently in slack water, suggesting that spawning only occurs near the springheads in the extreme upper end of the Muddy River headwaters. Juveniles occur throughout tributaries and occupy habitats with increasing flow velocities as they grow (USFWS 1996). Juveniles are found almost exclusively in the spring-fed tributaries, whereas adults are also found in the mainstem of the Muddy River (Scoppettone et al. 1992).

Adults inhabit both tributaries and the mainstem of the Muddy River but are most often seen in the mainstem, except during spawning when they are in the upper end of the thermal tributaries (Scoppettone et al. 1987, 1992). Larger adults are typically associated with higher velocity flows of 2.6 to 3.0 feet per second (fps) (Cross 1976), with the largest occurring in the Muddy River (Scoppettone et al. 1987). Adults show the greatest tolerance to cooler water temperatures, which appears to be 78.8°F (Scoppettone 1993).

In the Warm Springs Area, water emerges at 89.6°F, cools, and increases in turbidity as it travels downstream (Scoppettone et al. 1992). Cooler water temperatures in the lower Muddy River likely form a natural barrier to downstream movement of the Moapa dace (La Rivers 1962).

Given the species' temperature tolerances and cooling pattern of the river (in a downstream direction), its range appears to be restricted to the warmer waters of the upper springs and tributaries of the Warm Springs Area (Deacon and Bradley 1972, Cross 1976, Scoppettone et al. 1992, Scoppettone et al. 1993).

3.3.1.4 Life History

3.3.1.4.1 Reproductive Biology

Reproduction of Moapa dace is believed to occur within a very narrow temperature range of 86 to 89.6°F (Scoppettone et al. 1992) and is likely isolated with the warmer springs (headwaters) of the Muddy River. Reproduction is confined to the upper, spring-fed tributaries (Scoppettone et al. 1992), where the water temperatures vary from 84.2 to 89.9°F and dissolved oxygen concentrations vary between 4.1 and 6.2 parts per million (ppm) (Scoppettone 1993).

Moapa dace larvae have been observed year-round, indicating year-round reproduction; however, peak spawning activity likely occurs in the spring, with lesser activity in autumn, probably linked to food availability (Scoppettone et al. 1992). Sexual maturity occurs at one year of age, at approximately 1.6 to 1.8 inches fork length (Hubbs and Miller 1948, Scoppettone et al. 1987, 1992). Fecundity is related to fish size; egg counts range from 60 eggs in a 1.77-inch fork length dace to 772 eggs in a 3.5-inch fork length dace (Scoppettone et al. 1992).

Although Moapa dace have never been observed spawning, Scoppettone et al. (1992) observed recently emerged larvae within 492 feet of the warmwater spring discharge, over sandy silt bottoms in temperatures ranging from 86 to 89.6°F, and dissolved oxygen levels of 3.8 to 7.3 ppm. Sexually mature Moapa dace must migrate upstream from the Muddy River into thermal tributaries to spawn successfully (Scoppettone et al. 1987). Several depressions in the sand were similar to "redds" described by Minckley and Willard (1971) for longfin dace (*Agosia chrysogaster*). Depth and velocity at the suspected redds were representative of the outflow channel and similar to other suspected spawning areas in the Warm Springs (Scoppettone et al. 1992). Redds were in sandy-silt substrate at depths of 5.9 to 7.5 inches, water velocities near the nesting redds ranged from 0.12 to 0.24 fps, and mean water column velocities from 0.5 to 0.6 fps (Scoppettone et al. 1992).

The duration of egg incubation is unknown, but is likely relatively short due to the high water temperatures (USFWS 1996). Emigration of young-of-the-year Moapa dace from the Refuge Stream is believed to peak in May (Scoppettone et al. 1987), and dispersal is likely similar in other tributaries with comparable water temperatures. Mortality rates for Moapa dace have been estimated to be 68 percent of the first year (juveniles) and 65 percent in the second year (adults) (Scoppettone et al. 1987).

3.3.1.4.2 Diet

Visual observations of Moapa dace have revealed that they are omnivores, feeding primarily on drift items, but adults forage from the substrate as well. Larval dace feed on plankton in the upper water column, in areas with little or no current, and juveniles feed at mid-water (USFWS 1996). Schools of 30 or more Moapa dace have been observed congregating at drift stations to feed (Scoppettone et al. 1987). They often use sites where cover is provided by overhanging vegetation (USFWS 1996). Drift stations are also located in reaches of low to moderate water velocity adjacent to depressions in the substrate. These depressions may be located downstream of a pebble riffle, thus creating turbulent flows. Moapa dace actively feed 24 hours a day, but peak feeding occurs around dawn and dusk (Scoppettone et al. 1987).

3.3.1.5 Threats

Threats to Moapa dace habitat include introductions of non-native fishes and parasites; habitat loss through water diversions and impoundments; and reductions to surface spring-flows resulting from groundwater pumping, all of which impacts habitat for spawning, nursery, and food base. A brief summary of threats in the context of the five listing factors used to assess species for listing as threatened or endangered under ESA are described below.

3.3.1.5.1 The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

THERMAL BARRIERS

The Muddy River's headwaters emanate from warmwater springs, including the Warm Springs Area. The water does not get warmer as it travels downstream like most riverine systems, but rather cools as it travels downstream. While the species has always had a natural thermal barrier due to the warm spring water cooling as it travels downstream, the tail of the temperature threshold can fluctuate due to reduced flows in the system. Thermal losses can occur as a result of decreasing flows from warmwater springs, water diversion structures, and/or surface sheet flow (water that flows freely out of stream banks across the land). With the potential loss of these warmer waters contributing to the overall decrease in thermal load in the system, the Muddy River cools more rapidly, thus decreasing the distribution potential for the species. Since the Moapa dace is a thermally restricted species, water temperatures that drop below the preference range would not provide sufficient habitat for spawning, foraging, or shelter.

When it was described by Eakin (1964), the Muddy River at the Moapa gage had an average annual discharge of 46.5 cfs and temperatures ranging from 87.8 to 89.6°F at its sources. Flows have declined over the last 40 years to an average of 35 cfs due to a combination of surface water diversions and groundwater pumping (LVVWD 2001). Although the flow in the headwaters is nearly constant seasonally, flow in the mainstem of the Muddy River varies with precipitation events, seasonal water diversions, groundwater recharge, vegetation transpiration, evaporation, and irrigation return flows. Before reaching Lake Mead, nearly 75 percent of the annual inflow is lost to diversions, evaporation, and transpiration (Soil Conservation Service 1993).

PHYSICAL HABITAT ALTERATIONS

Physical alteration of Moapa dace habitats in the Warm Springs Area, initially for irrigation purposes, began even before the species was discovered in 1938 (Scrugham 1920). These habitats have since been developed for recreational, industrial, and municipal uses. Spring orifices and outflow streams have been dug out, lined with concrete and/or gravel, mechanically and/or chemically treated to eliminate aquatic vegetation, and chlorinated to create private and public swimming pools. Several springs are capped and piped directly from the orifices for municipal use, desiccating associated outflow streams. Chlorination and agricultural activities in the Warm Springs have decreased in recent years, but some spring outflow to streams continue to flow through culverts and/or dirt and cement irrigation ditches. Historically, irrigation return flows and runoff from pasture land and alfalfa fields carried significant quantities of sediment in the upper Muddy River.

The upper Muddy River, which has been defined as the 14 miles above where I-15 crosses the Muddy River (Otis Bay 2007), has also been subjected to various physical perturbations. In 1944, the U.S. Bureau of Reclamation (USBR) constructed a 10-foot-high Cipoletti weir gaging station at the Warm Springs Road Bridge. The USGS took ownership of the gage in 1948 and continues to measure flows at this gaging station. This concrete dam impounds approximately 150 ft of riverine habitat. Although the structure serves as a barrier to fish migration upstream during normal flows, it also hinders movement of Moapa dace from accessing the upstream spawning tributaries or escaping turbid river conditions. The structure also cools the river water as it cascades over the structure to a temperature below that preferred by Moapa dace (Deacon and Bradley 1972).

FIRE

Another threat to the Moapa dace is fire. In June of 1994, a flash fire swept through the upper Refuge Stream that either killed or displaced individual Moapa dace that were occupying affected stream reaches. Surveys conducted post-fire in 1994, indicated that only 34 Moapa dace survived on the MVNWR (Scoppettone et al. 1998), and subsequent surveys indicated an overall decline in the total population of Moapa dace. Given the restricted range of the species, and the associated mortality from the fire, it is apparent that the species is vulnerable to catastrophic events.

3.3.1.5.2 Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes

This threat was not included as a basis for warranting protection under the ESA.

3.3.1.5.3 Disease or Predation

It is believed that the first non-native, mosquito fish (*Gambusia affinis*) became established in the Muddy River by 1938 (Hubbs and Miller 1948). A decline in the abundance of Moapa dace was first noted in the 1960s, shortly after the introduction of non-native shortfin mollies (*Poecilia mexicana*) (Deacon and Bradley 1972, Cross 1976). The concurrent decline in the abundance of Moapa dace was likely related in part to interactions between these two species. Habitat use by mollies is similar to that of larval and juvenile Moapa dace (Deacon and Bradley 1972, Scoppettone et al. 1987), and laboratory experiments have demonstrated that shortfin mollies are predators of Moapa dace fish larvae (Scoppettone 1993). Together, these species have introduced fish parasites into the ecosystem, including tapeworms (*Bothriocephalus acheilognathi*), nematodes (*Contracaecum* spp.), and anchor worms (*Lernaea* spp.), which have negatively impacted native fishes of the Muddy River, including Moapa dace (Wilson et al. 1966, Heckman 1988).

The blue tilapia (*Oreochromis aurea*) is the only non-native fish to become established in the Warm Springs Area since the introduction of the shortfin molly (Scoppettone et al. 1998). With the exception of waters on the MVNWR, Apcar and Refuge streams, tilapia occur in the Warm Springs' tributaries and have had devastating effects on Moapa dace and other native fish populations. The Moapa dace population has declined dramatically since the invasion of tilapia. The tilapia is detrimental to native fish species in a number of ways. Shortly after the invasion of tilapia into the Warm Springs Area, most of the aquatic vegetation disappeared. This vegetation provided habitat for invertebrates that Moapa dace rely upon as a food resource. Analysis of tilapia stomach contents revealed the presence of Moapa dace and Moapa White River springfish, indicating that tilapia further degrade native fish populations through predation. Additionally, tilapia significantly altered the streambed through the creation of nesting areas.

The introduction and establishment of tilapia and other non-native fishes have been a major factor in the deterioration of the Muddy River as habitat for native fishes (Deacon and Bradley 1972). Currently, the springs and streams on the MVNWR, and Apcar and Refuge streams are the only Muddy River tributaries free of non-native, blue tilapia. Therefore, invasion of tilapia, first detected in the Warm Springs Area in 1997, has relegated Moapa dace to habitats without the tilapia. The occurrence of tilapia is likely the primary cause for reductions in Moapa dace populations in the South Fork, North Fork, and Muddy River tributaries (Scoppettone et al. 1998). Deacon and Bradley (1972) stated "The marked decrease in abundance of native fishes that follows establishment of a non-native species could conceivably carry a native species to the point of extinction."

3.3.1.5.4 Inadequate Regulatory Mechanisms

This threat was not included as a basis for warranting protection under the ESA.

3.3.1.5.5 Other Natural or Manmade Factors Affecting the Species Continued Existence

This threat was not included as a basis for warranting protection under the ESA.

3.3.1.6 Conservation

A recovery plan was initially prepared in 1983 for Moapa dace and updated in 1996, along with seven other endemic aquatic species (USFWS 1996). The plan identified various tasks to guide recovery Moapa dace, along with addressing current status, threats, and recovery needs of seven other aquatic species endemic to the Muddy River (Virgin River chub, Moapa speckled dace, Moapa River springfish, Moapa pebblesnail, grated tyronia, Moapa Warm Springs riffle beetle, and Amargosa naucorid). These recovery actions for Moapa dace included the protection of existing instream flows and historical habitat in three of five occupied spring systems (Apcar, Baldwin, Cardy Lamb, Muddy Spring, MVNWR) and the Upper Muddy River; conducting restoration/management activities; monitoring Moapa dace population; researching population health; and providing public information and education.

According to USFWS (2006), conservation actions that have been completed or ongoing for Moapa dace include:

- A piscicide called rotenone was used to successfully remove tilapia from waters on the MVNWR, Refuge Stream, and the Apcar Stream to the gabion structure (just upstream of the Refuge Stream and mainstem convergence);
- Various fish barriers (gabion and culvert) have been constructed in the Refuge Stream to prevent further encroachment of non-natives;
- The Pedersen and Pedersen East spring heads have been restored to make use of all available surface water and to maintain good flow records;
- Old concrete channels in portions of the Pedersen Unit have been removed to facilitate a natural flow and recruitment of invertebrates (a food source for the Moapa dace);
- The development stage of restoring habitat on the Plummer Unit has been completed to provide more suitable habitat for and public viewing of the Moapa dace;
- Prevention of wild fire threats has continued through the removal of potential fire sources such as palm trees;
- Hydraulic geometry, water temperature, and groundwater flow models were developed to predict both existing and future conditions that may modify water quality and quantity that supply the warm water supply necessary for the Moapa dace and other aquatic species in the Warm Springs Area; and
- Multi-agency, annual Moapa dace surveys continue to be conducted throughout the range of the species (depending on access to private lands).

The BLM also has constructed a fish barrier on the Muddy River downstream of the gaging station to stop non-native fish from accessing Moapa dace habitat and to increase available habitat for the species (Ronning, C., pers. comm. 2007).

Conservation actions still needed for Moapa dace (USFWS 2006) include:

- Placement of additional fish barriers in the lower reaches of the historic range of the Moapa dace in order to facilitate reestablishment in these areas;
- Eradication/control of remaining non-native invasive species including, but not limited to, fishes, bullfrogs, spiny softshell turtles, and non-native plant species such as palm trees, *Vallisneria*, Russian olive and salt cedar throughout the range of the Moapa dace;
- Continued fire maintenance activities to reduce the threat of wild fires;
- Minimization/elimination of surface water sheet flows that decrease the natural thermal load of water within dace habitat;
- Prevention of illegal water diversions that reduce or modify water quality and quantity in the Muddy River and its tributaries;
- Acquisition of adequate water flows for Moapa dace recovery at the MVNWR and other spring sources, to provide long-term habitat for reproduction, nursery, forage, shelter, etc.;
- Enhancement of existing occupied habitat (i.e., restoring stream dynamics, eradication of non-native fish and vegetation, and removal of barriers to native fish migration in upper Muddy River and tributaries);
- Expansion of research efforts to gain additional knowledge about the biological needs/requirements of the species;
- Establishment of easements or acquisition of private lands within the range of Moapa dace to address the threat of habitat loss as a result of residential/commercial development; and
- Continuation of the multi-agency, annual Moapa dace surveys throughout its range.

3.3.1.7 Recovery Units

There are no designated recovery units for Moapa dace; however, Moapa dace are differentiated by the stream segments they occupy and the parcels within the MVNWR. These stream segments include five occupied spring systems (Apcar, Baldwin, Cardy Lamb, Muddy Spring, MVNWR) and the Upper Muddy River. Parcels within the MVNWR include the Pedersen Unit, Plummer Unit and Apcar Unit, which all encompass major spring groups.

3.3.1.8 Critical Habitat

No critical habitat has been designated for Moapa dace.

3.3.1.9 Species Status

3.3.1.9.1 Rangewide

Moapa dace surveys continue to be conducted annually on both public and private lands throughout the upper Muddy River system (USFWS 2006). The 2008 survey data indicate that there are approximately 627 fish in the population that occur throughout 5.6 miles of habitat in the upper Muddy River system, a decrease from 1,172 fish from the 2007 survey data. Approximately 95 percent of the total population occurs within one major tributary that includes 1.78 miles of spring complexes that emanate from the Pedersen, Plummer, and Apcar (aka Jones) spring complexes on the MVNWR and their tributaries (upstream of the gabion barrier). Approximately 28 percent of the population was located on the MVNWR and 55 percent occupied the Refuge Stream supplied by the spring complexes emanating from the MVNWR. This Refuge Stream reach accounts for the highest density of Moapa dace, with the second and third highest densities occurring on the MVNWR's Plummer and Pedersen units, respectively (USFWS 2006).

Available information indicate that no Moapa dace have been present in the portion of the Muddy River where it converges with the Refuge Stream since 2002, when only eight dace were reported (USFWS 2006, Table 3-3). This loss is most likely the result of competition with non-native tilapia.

Table 3-3 Moapa Dace Survey Results[a]

Stream Survey Segment	1994	1997	Feb 1999	Feb 2000	Jan 2001	Feb 2002	Feb 2003	Feb 2005[b]	2007	2008
Muddy River Mainstem	2,088[c]	260[c]								
- NP to REF	N/A	N/A	X	X	X	8	0	X (due to turbidity)	0	0
- REF to N/S forks	N/A	N/A	X	X	34	49	19	49	16	5
Apcar (off MVNWR)	407[c]	528[c]								
- Lower			X	43	85	55	30	157	56	50
South Fork	355	28	13	9	18	24	14	10	9	1
North Fork	426	106	77	73	46	37	33	9	15	17
Muddy Spring	236	28	14	X	5	2	0	0	0	1
Apcar-Upper (MVNWR)			5	X	87	86	40	6	0	0
Plummer (MVNWR)	0	20	113	X	59	53	60	177	170	148
Pedersen (MVNWR)			185	163	184	172	204	174	395	50
Refuge Stream	313[c]	595[c]								
- Warm Springs Road to A/R	N/A	N/A	566	643	416	599	507	652	457	322
- A/R to Gabion Structure	N/A	N/A	X	X	X	X	X	62	54	14
New sample site – sheet flow from Pedersen outflow										19
Totals	3,841	1,565	973	931	934	1,085	907	1,296	1,172	479

[a]from USFWS [2006] Muddy River BO

[b]2004 surveys not completed throughout the species entire range and not used for comparison.

[c]Entire reach surveyed, not broken into segments. 2005 population surveys were broken into distinct reach segments and included juveniles in the Refuge Stream and Plummer Unit on the MVNWR.

A/R = just above confluence of Refuge and Apcar Streams; N/S = confluence of North and South Forks; NP = Nevada Power diversion; MVNWR = spring heads to Warm Springs Road; REF = confluence of Refuge Stream and Muddy River; X = stream reach not surveyed.

Pumping from the carbonate aquifer has the potential to affect the portion of the White River Groundwater Flow System that discharges into the Muddy River system. Groundwater pumping under existing water rights and possible future water rights may affect spring flows. The highest elevation springs, which are the most susceptible to impacts from groundwater pumping, occur on the Pedersen Unit of the MVNWR (USFWS 2006). The magnitude of potential impacts is not known at this time. The carbonate aquifer system is the focus of ongoing studies and monitoring.

3.3.1.9.2 Recovery Unit/Lincoln County

Moapa dace do not occur in Lincoln County. Moapa dace only inhabit approximately 6 miles of stream habitat in the Warm Springs Area of the Muddy River in Clark County.

3.3.1.9.3 Covered Area

Moapa dace does not occur within the Covered Area, as there are no perennial springs to support the species within this area. Moapa dace occur in the Warm Springs Area of the Muddy River, which is approximately 14 miles away from the Covered Area, and approximately 17 miles downstream from the Development Area.

3.3.1.10 Relevant Consultations

A USFWS intra-service programmatic BO was finalized on January 30, 2006 (File No. 1-5-06-FW-536) for the Muddy River MOA, regarding groundwater withdrawal of 16,100 acre-feet per year from the Regional Carbonate Aquifer in Coyote Spring Valley and California Wash basins and the establishment of conservation measures for Moapa dace in Clark County. This BO determined that the cumulative withdrawal of 16,100 acre-feet per year is likely to adversely affect Moapa dace. USFWS deferred issuance of an incidental take permit until future project-specific consultations were developed. These tiered-consultations would analyze incidental take, identify reasonable and prudent measures and terms and conditions to minimize incidental take, and incorporate conservation measures outlined in the MOA at the specific project level.

A USFWS BO (USFWS 2006) was prepared for the proposed CSI development in Clark County, Nevada (Corps of Engineers Permit Application No. 200125042). This BO is a project-level consultation (File No. 1-5-05-FW-536-Tier 01, Cross Reference 1-5-00-FW-575) that is tiered to the USFWS programmatic Muddy River MOA BO (File No. 1-5-06-FW-536). Included in this BO is an analysis of the effects of the proposed action on the Moapa dace, which includes a groundwater withdrawal of 4,600 afy out of the cumulative 16,100 afy addressed in the programmatic BO. The USFWS determined that the level of anticipated take is not likely to jeopardize the continued existence of Moapa dace.

3.3.2 Virgin River Chub (Muddy River Population)

Scientific Name: *Gila seminuda*

3.3.2.1 Protection Warranted

3.3.2.1.1 Endangered Species Act

- August 24, 1989: Virgin River population listed as Endangered, without critical habitat (54 FR 35305-35311). Muddy River population was not listed, but taxonomically is the same species.
- January 26, 2000: Critical habitat designated (54 FR 4140-4156).
- April 19, 1995: Final Recovery Plan approved for the Virgin River population (USFWS 1994c).

Source: Nevada Natural Heritage Program

- May 16, 1996: Recovery Plan for the Muddy River population approved (USFWS 1996). The Virgin River chub was included as a species of special concern, so specific recovery actions were not developed for the Virgin River chub.

3.3.2.1.2 Nevada Administrative Code

- Classified as Endangered under NAC 503.065 (Protected, Endangered and Threatened Fish). The Muddy River population is classified as sensitive under NAC 503.067 (Sensitive Fish).

3.3.2.1.3 Other Protections

- BLM Sensitive Species

3.3.2.2 General Description

The Virgin River chub is a member of the Cyprinidae family, and is considered the rarest native fish in the Virgin River. It is a silvery, medium-sized minnow that averages about 20 cm in total length, but can grow to a length of 45 cm.

3.3.2.3 Ecology

The Virgin River chub is endemic to 134 miles of the Virgin River in southwest Utah, northwest Arizona, and southeast Nevada. Historically, the Virgin River chub is believed to have occurred throughout most of the Virgin River from its original confluence with the mainstem Colorado upstream to La Verkin Creek, near the town of Hurricane, Utah.

Virgin River chub historically were collected within the Muddy (Moapa) River in Nevada and within the mainstem Virgin River from Pah Tempe Springs (also called La Verkin Springs), Utah, downstream to the confluence with the Colorado River in Nevada (Cope and Yarrow 1875, Cross 1975). It is likely that Virgin River chub historically occurred well above Pah Tempe Springs.

At present, the Virgin River chub occurs within the Muddy River and within the mainstem Virgin River from Pah Tempe Springs downstream to the Mesquite Diversion. Virgin River chub have not been collected below this point, except for a few individuals, since the late 1970s (Virgin River Fishes Data Base). A captive population of Virgin River chub is currently maintained at the Dexter National Fish Hatchery and Technology Center as a refugium population and for propagation studies.

3.3.2.3.1 Habitat

Virgin River chub are most often associated with deep runs or pool habitats of slow to moderate velocities with large boulders or instream cover, such as root snags. Adults and juveniles are often associated together within these habitats. Hardy et al. (1989) indicated that Virgin River chub less than 80 millimeters (mm) total length (TL) utilize depths greater than about 0.18 inches (in) at velocities between 0.08 to 0.15 in/sec over sand substrates in association with large boulders or instream cover. Virgin River chub between 80 mm and 140 mm TL utilize depths greater than 0.30 in at velocities ranging between 0.00 to 0.76 in/sec over sand substrates with boulders or instream cover. Virgin River chub greater than 140 mm TL utilize depths greater than 0.61 to 0.91 in at velocities from 0.00 to 0.55 in/sec with similar substrates as the other size classes noted above. Schumann (1978) and Deacon et al. (1987) found that the final adult thermal preference was approximately 24ºC.

3.3.2.4 Life History

3.3.2.4.1 Reproductive Biology

Hickman (1987) reported ripe females and males in April, May, and June, over gravel or rock substrate, but the time of spawning for Virgin River chub has not been determined. They are known to successfully spawn in the mainstem of the Virgin River (Utah Division of Wildlife Resources, unpub. data). No parental care is provided for the eggs, which hatch in one week or less. Virgin River chub are usually associated with deep, protected areas of swift water.

3.3.2.4.2 Diet

Virgin River chub are omnivorous, showing considerable dietary shifts with age and season. They feed mainly on debris and chironomids in February; *Cladophora* and debris in June; debris and *Spyrogyra* and *Cladophora* in September; and unidentified drift animals, dragonfly larvae, debris, and *Cladophora* in December. Young fish feed almost entirely on macroinvertebrates while adults feed almost exclusively on algae and debris (Greger and Deacon 1988). Cross (1975) reported that up to 90 percent of the diet consisted of filamentous algae.

3.3.2.5 Threats

Threats to Virgin River chub include natural and exotic predators, habitat alteration, toxic spills, and floods. A brief summary of threats in the context of the five listing factors used to assess species for listing as threatened or endangered under ESA are described below.

3.3.2.5.1 *The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range*

Habitat alteration, through water impoundments and diversions, and floods are some of the main threats to the Virgin River chub (USFWS 2001c).

3.3.2.5.2 *Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes*

This threat was not included as a basis for warranting protection under the ESA.

3.3.2.5.3 *Disease or Predation*

Predators on Virgin River chub include piscivorous birds such as kingfishers and herons, soft-shelled turtles, and other vertebrate species. This is especially true during periods of low flow and clear water. Fish that feed on all life-stages of Virgin River chub include the introduced channel catfish (*Ictalurus punctatus*), tilapia, and black bullhead (*Ameiurus melas*). Largemouth bass (*Micropterus salmoides*) and green sunfish (*Lepomis cyanellus*), in addition to native Virgin spinedace, probably prey on Virgin River chub larvae. The introduced mosquitofish (*Gambusia affinis*) may prey on larval life stages. Disease is also a threat to the Virgin River chub (USFWS 2001c).

3.3.2.5.4 *Inadequate Regulatory Mechanisms*

This threat was not included as a basis for warranting protection under the ESA.

3.3.2.5.5 *Other Natural or Manmade Factors Affecting the Species Continued Existence*

Toxic spills threaten the persistence of Virgin River chub (USFWS 2001c).

3.3.2.6 Conservation

The Muddy River population of Virgin River chub was included as a species of special concern in the Recovery Plan for the Rare Aquatic Species of the Muddy River Ecosystem (USFWS 1995). No recovery actions were developed specifically for the Virgin River chub; rather, the actions proposed for the Moapa dace would also benefit the seven endemic aquatic species analyzed in the plan, which includes Virgin River chub. For a description of those recovery actions, see Section 3.3.1.6.

3.3.2.7 Recovery Units

There are no recovery units for the Muddy River population of Virgin River chub.

3.3.2.8 Critical Habitat

Critical habitat has been designated for the Virgin River chub in parts of the Virgin River mainstem and floodplain from the confluence of Ash and La Verkin Creeks to Halfway Wash (above Lake Mead). No critical habitat has been designated in the Muddy River.

3.3.2.9 Species Status

3.3.2.9.1 *Rangewide*

The Virgin River chub historically occurred in the mainstem Virgin River from Pah Tempe Springs, Utah, downstream to the confluence with the Colorado River in Nevada. This species has experienced a general decline in Utah, Arizona, and Nevada, particularly since the mid-1980s (USFWS 2001c). Closer to the Covered Area, the Virgin River chub occurs within a 26-mile stretch (between the Warm Springs Area and the Wells Siding Diversion to Bowman Reservoir) of the Muddy River in Clark County, and the mainstream Virgin River that flows through eastern Lincoln and Clark counties (65 FR 4140-4156).

In 1993, BIO-WEST began studies on the distribution and abundance of native fishes (including woundfin and Virgin River chub) in the lower Virgin River. By 1996, BIO-WEST had sampled most of the Virgin River between Beaver Dam Wash, Arizona, and the confluence with Lake Mead. Since 1996, BIO-WEST has created three long-term monitoring reaches in the lower Virgin River [Beaver Dam Wash (River Mile [RM] 72-68.5), Mesquite, Nevada (RM 58-54.5), and Riverside, Nevada (RM 49-45.5)], which are monitored several times a year to establish trends in native fish populations (Golden and Holden 2004). Results from these studies support the notion that the Virgin River chub is very uncommon in the Virgin River throughout Nevada.

In the Muddy River, Virgin River chub experienced a decline of up to 83 percent between 1938 and 1963. Distribution shifted upstream during the following years (1964 to 1968) and by 1975, chub had been eliminated from the lower Muddy River (RECON 2000). As of 1995, there were still up to 30,000 individuals inhabiting the river and its spring systems; however, surveys in 1998 documented a significant decline in chub numbers in the river and the extirpation of chub from the spring systems (RECON 2000).

3.3.2.9.2 Recovery Unit/Lincoln County

The Muddy River population of the Virgin River chub occurs in the Muddy River. Virgin River chub have been collected throughout the Muddy River, but were historically most abundant between the Warm Springs Area and Logandale (Deacon and Bradley 1972, Cross 1976, as cited in USFWS 1996). The data in Table 3-4 are summarized from USFWS (1996).

Table 3-4 Virgin River Chub Captured or Observed in the Muddy River

Year	No. Observed or Captured	Location	Reference (all cited by USFWS 1996)
1994	8,251	Observed in Upper Muddy River and its five tributary spring systems	Scoppettone unpubl. data
1994-1995	973	Captured in Muddy River between confluence with the Refuge stream and Warm Springs Road bridge	Scoppettone unpubl. data
1994-1995	854	Captured between the Warm Springs Road bridge and White Narrows	Scoppettone unpubl. data
1994-1995	1,915	Captured between White Narrows and Reid-Gardner Station	Scoppettone unpubl. data
1994-1995	717	Captured between Reid-Gardner Station and Interstate 15	Scoppettone unpubl. data

As of 1996, the population in the mainstem Muddy River between the confluence with the Refuge Stream and Interstate 15 was estimated at 20,593 individuals (confidence interval ± 7,339; adjusted Petersen method) (Scoppettone unpubl. data, as cited in USFWS 1996). Virgin River chub are rarely captured downstream of Interstate 15 and have been extirpated downstream of Wells Siding Diversion (Scoppettone unpubl. data, Heinrich, NDOW, unpubl. data, Deacon and Bradley 1972, Cross 1976, all cited in USFWS 1996). Surveys from 2004 and 2005 BIO-WEST found all individuals to occur within 1 to 1.5 miles downstream of Wells Siding Diversion (Golden and Holden 2005).

In the 1960s, a decline in Virgin River chub abundance in the Muddy River was first documented (Wilson et al. 1966, Deacon and Bradley 1972, both cited in USFWS 1996). According to Wilson et al. (1966), the abundance of Virgin River chub at a 1938 collection site had decreased more than 83 percent by 1964, and a similar decrease (approximately 92 percent) was documented at a 1942 collection site (USFWS 1996). An upstream shift in Virgin River chub distribution was noted between 1964 and 1968 (Deacon and Bradley 1972, as cited in USFWS 1996). By 1974 to 1975, Virgin River chub had been eliminated from the lower Muddy River and were further reduced in abundance in the middle portion of the river (Cross 1976, as cited in USFWS 1996). The species' decline may have been related to (USFWS 1996):

- cumulative effects of changes in water quality and quantity, and substrate (Deacon and Bradley 1972, Cross 1976);
- channelization (Cross 1976);

- non-native fish species (Deacon et al. 1964, Hubbs and Deacon 1964, Deacon and Bradley 1972, Cross 1976); and/or
- parasitism (Wilson et al. 1966).

3.3.2.9.3 Covered Area

The Muddy River population of the Virgin River chub does not occur within the Covered Area, as there are no perennial waters within the Covered Area.

3.3.2.10 Relevant Consultations

There have been no consultations for the Muddy River population of Virgin River chub, as it is not listed under the ESA.

3.3.3 Desert Tortoise

Scientific Name: *Gopherus agassizii*

3.3.3.1 Protection Warranted

3.3.3.1.1 Endangered Species Act

- August 4, 1989: Populations north and west of the lower Colorado River in Arizona and Utah (excluding the Beaver Dam slope population) listed as endangered under an emergency rule, without critical habitat (54 FR 32326–32331).
- April 2, 1990: Entire Mojave population west of the lower Colorado River in California and Nevada, and north of the lower Colorado River in Arizona and Utah, including the Beaver Dam slope, listed as threatened (55 FR 12178–12191).
- February 8, 1994: Critical habitat designated (59 FR 5820–5866).
- June 28, 1994: Final Recovery Plan approved (USFWS 1994a).

3.3.3.1.2 Nevada Administrative Code

- Classified as threatened under NAC 503.080 (Reptiles: Classification).

3.3.3.1.3 Other Protections

- Nevada State Imperiled (S2S3).

3.3.3.2 General Description

The desert tortoise is a large, herbivorous reptile found in portions of California, Arizona, Nevada, and Utah. It also occurs in Sonora and Sinaloa, Mexico. The Mojave population of desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Sonoran Desert in California. Desert tortoises reach 8 to 15 inches in carapace length. Adults have a domed carapace and relatively flat, unhinged plastron. Shell color is brownish, with yellow to tan scute centers. The forelimbs are flattened and adapted for digging and burrowing. Optimal habitat has been characterized as creosote bush scrub (*Larrea tridentata*) in which precipitation ranges from 2 to 8 inches, where a diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach 1982, Turner and Brown 1982). Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse. Desert tortoises occur from below sea level to an elevation of 7,300 feet, but the most favorable habitat occurs at elevations of approximately 1,000 to 3,000 feet (Luckenbach 1982).

3.3.3.3 Ecology

Desert tortoises are most commonly found within the desert scrub vegetation type, primarily in creosote bush scrub. In addition, they occur in succulent scrub, cheesebush scrub, blackbrush scrub, hopsage scrub, shadscale scrub, microphyll woodland, Mojave saltbush-allscale scrub, and scrub-steppe vegetation types of the desert and semidesert grassland complex (USFWS 1994a). Within these vegetation types, desert tortoises potentially can survive and reproduce where their basic habitat requirements are met. These requirements include a sufficient amount and quality of forage species; shelter sites for protection from predators and environmental extremes; suitable substrates for burrowing, nesting, and over wintering; various plants for shelter; and adequate area for movement, dispersal, and gene flow. Throughout most of the Mojave Region, desert tortoises occur most commonly on gently sloping terrain with soils ranging from sandy-gravel and with scattered shrubs, and where there is abundant inter-shrub space for growth of herbaceous plants. Throughout their range, however, desert tortoises can be found in steeper, rockier areas.

The size of desert tortoise home ranges varies with respect to location and year. Females have long-term home ranges that are approximately half that of the average male, which range from 25 to 200 acres (Berry 1986). Over its lifetime, each desert tortoise may require more than 1.5 square miles of habitat and may make forays of more than 7 miles at a time (Berry 1986). In drought years, the ability of desert tortoises to drink while surface water is available following rains may be crucial for desert tortoise survival. During droughts, desert tortoises forage over larger areas, increasing the likelihood of encounters with sources of injury or mortality including humans and other predators.

Desert tortoises are most active during the spring and early summer, when annual plants are most common. Additional activity occurs during warmer fall months and occasionally after summer rainstorms. Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert. In Nevada and Arizona, desert tortoises are considered to be active from approximately March 15 through October 15. Further information on the range, biology, habitat and ecology of the desert tortoise can be found in Berry and Burge (1984), Burge (1978), Burge and Bradley (1976), Bury et al. (1994), Germano et al. (1994), Hovik and Hardenbrook (1989), Karl (1981, 1983a, 1983b), Luckenbach (1982), and USFWS (1994a).

3.3.3.4 Life History

3.3.3.4.1 Reproduction

Desert tortoises possess a combination of life history and reproductive characteristics that affect the ability of populations to survive external threats. Desert tortoises grow slowly, require 15 to 20 years to reach sexual maturity, and have low reproductive rates during a long period of reproductive potential (Turner et al. 1984, Bury 1987, Tracy et al. 2004). Desert tortoises emerge to feed and mate primarily in the fall. They typically remain active throughout the spring, and sometimes emerge again after summer storms (Berry 1974, Luckenbach 1982). Eggs are laid in late spring to early summer. At Yucca Mountain, Nye County, Nevada (Northeastern Mojave Recovery Unit), Mueller et al. (1998) estimated that the mean age of first reproduction was 19 to 20 years; clutch size (1 to 10 eggs) and annual fecundity (0 to 16 eggs) were related to female size but annual clutch frequency (0 to 2) was not. Further, Mueller suggested that body condition during July to October may determine the number of eggs a desert tortoise can produce the following spring. The number of eggs that a female desert tortoise can produce in a season is dependent on a variety of factors including environment, habitat, availability of forage and drinking water, and physiological condition (Henen 1997, McLuckie and Fridell 2002).

3.3.3.4.2 Diet

Desert tortoises eat a wide variety of herbaceous vegetation, particularly grasses and the flowers of annual plants (Berry 1974, Luckenbach 1982). Tortoises are well adapted to living in a highly variable and often harsh environment. In adverse conditions, they retreat to burrows or caves, at which time they reduce their metabolism and loss of water, and consume very little food. Adult desert tortoises lose water at such a slow rate that they can survive for more than a year without access to free water of any kind. Desert tortoises apparently tolerate large imbalances in their water and energy budgets (Nagy and Medica 1986). This ability enables them to survive lean years and exploit resources that are only periodically available. During years of average or better than average precipitation and forage production, desert tortoises can balance their water budgets and have a positive energy balance, providing opportunity for growth and reproduction (Nagy and Medica 1986). All the mechanisms by which desert tortoises maintain their energy and water balance in the face of stochastic availability of resources are still not clear, but desert tortoises seem to be flexible in their mechanisms of energy and water gain and in their expenditures of these resources (Wallis et al. 1992).

3.3.3.4.3 Genetics and Morphology

Based on mitochondrial DNA (mtDNA) restriction-fragment polymorphisms, Lamb et al. (1989) described three major genetic units. One unit is found in the Colorado and Mojave deserts and a second in the Sonoran Desert from west-central Arizona to central Sonora. The third major unit is found in southern Sonora and Sinaloa, south of the Yaqui River.

Morphological variation coincides reasonably well with the mtDNA genotypes found north of Mexico. There are three distinct shell phenotypes in the United States: 1) the California phenotype from California and southwestern Nevada; 2) the Sonoran Desert phenotype from Arizona south and east of the Colorado River, and 3) the Beaver Dam Slope phenotype from extreme southwestern Utah and Arizona north of the Grand Canyon (Weinstein and Berry 1987). The California and Sonoran Desert phenotypes correspond to the Mojave region and Sonoran Desert mtDNA genotypes, respectively. Thus, based on genetic and morphological criteria, desert tortoise are divided into at least two well-differentiated entities, one in the Sonoran Desert in Arizona and one in the Mojave region. A third may exist in Sonora and Sinaloa, Mexico.

3.3.3.5 Threats

Threats to the desert tortoise include factors such as loss of habitat from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture. Grazing and off-highway vehicle activities not only degrade tortoise habitat but may collapse burrows, killing any tortoises present. Also, threatening the desert tortoise’s continuing existence are illegal collection by humans for pets or consumption; predation on juvenile desert tortoises by common ravens, coyote, kit foxes and other mammals; and collisions with vehicles on paved and unpaved roads. A brief summary of threats in the context of the five listing factors used to assess species for listing as threatened or endangered under ESA are described below**.**

3.3.3.5.1 The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

LAND USE CHANGE

Habitat is deteriorating and has been lost in many parts of the tortoise’s range due to an accelerating rate of human uses of the desert. Loss of habitat from a variety of human land uses has occurred throughout the Mojave Desert and is particularly acute all over the western Mojave, the Las Vegas area, and the St. George area in Utah. Urbanization in the western Mojave has grown significantly in recent years, especially near the communities of Lancaster, Palmdale, Victorville, Ridgecrest, and Barstow. Other permanent human land uses that have an adverse impact on tortoises and their habitat include agricultural land conversion, construction of roads, some military activities, energy and mineral development, waste disposal areas and other land use. Grazing and off-highway vehicle (OHV) activity have further degraded habitat.

INVASIVE PLANTS

Nonnative plant species such as red brome (*Bromus rubens*), filaree (*Erodium cicutarium*), and split grass (*Schismus arabicus*) have been introduced as result of grazing and have become widely established in the Mojave Desert. Land managers and field scientists identified 116 species of alien plants in the Mojave and Colorado deserts (Brooks and Esque 2002). The proliferation of non-native plant species has also contributed to an increase in fire frequency in desert tortoise habitat by providing sufficient fuel to carry fires, especially in the intershrub spaces that are mostly devoid of native vegetation (USFWS 1994a, Brooks 1998, Brown and Minnich 1986). Indeed, over 500,000 acres of desert lands burned in the Mojave Desert in the 1980s. In 2005, The Southern Nevada fire complex burned approximately 403,000 acres of desert tortoise habitat burned in Lincoln and Clark counties, including 15,559 acres (4 percent) of the Mormon Mesa CHU. In 2006, one fire burned 22 acres of the Mormon Mesa CHU. Changes in plant communities caused by alien plants and recurrent fire may negatively affect desert tortoise by altering habitat structure and species composition of their food plants (Brooks and Esque 2002).

Proportional increases in non-native plant species may also contribute to the incidence of tortoise disease. Desert tortoises have been found to prefer native vegetation over aliens (Jennings 1993). Alien annual plants in desert tortoise critical habitat in the western Mojave Desert were found to compose greater than 60 percent of the annual biomass (Brooks 1998). The reduction in quantity and quality of forage may stress tortoises and make them more susceptible to drought- and disease-related mortality (Jacobson et al. 1991, Brown et al. 1994).

3.3.3.5.2 Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes

Desert tortoises have long been a popular pet in the southwest. It is not known to what extent collecting has reduced wild populations, but it has continued to be a concern across all states in the region. Vandalism, including shooting and crushing of tortoises under vehicles, has also been documented.

3.3.3.5.3 Disease or Predation

Disease is a natural phenomenon in wild populations of animals and can contribute to population declines by increasing mortality and reducing reproduction. However the effects of disease may be enhanced by natural and/or anthropogenic changes in habitat. Changing ecological condition as a result of natural events or human-caused activities may stress individuals and result in a more severe clinical expression of Upper Respiratory Tract Disease (URTD) (Brown et al. 2002). Additionally, URTD appears to be a complex, multi-factorial disease interacting with other stressors to affect desert tortoises (Brown et al. 2002, Tracy et al. 2004). For example, the disease occurs mostly in relatively dense desert tortoise populations, as mycoplasmal infections are dependent upon higher densities of the host (Tracy et al. 2004). Malnutrition has also been associated with several disease outbreaks in both humans and turtles (Borysenko and Lewis 1979). What is currently known with certainty about disease in the desert tortoise relates entirely to individual desert tortoises and not populations; however, virtually nothing is known about the demographic consequences of disease (Tracy et al. 2004).

Predation of young tortoises by ravens is a local and potentially growing threat to the species. In recent years, raven predation on juvenile desert tortoises has been documented in several locations and tortoises in certain smaller size classes could not be found. Recruitment of young tortoises into the adult population probably has been significantly reduced in these localities. For example, at the Desert Tortoise Natural Area, a protected area of 21,320 acres in the western Mojave Desert in California, tortoise eggs are still being laid and hatched, as shown by the presence of very small tortoises. However, raven predation seems to have severely curtailed the abundance of young tortoises (BLM et al. 1989, as cited in USFWS 1994a).

3.3.3.5.4 Inadequate Regulatory Mechanisms

STATE PROTECTION

All four states that desert tortoise (Mojave population) inhabits have laws that provide varying levels of protection for individual desert tortoises.

NEVADA

State of Nevada laws afford limited protection to the desert tortoise. Section 501.110.1(d) of the NRS established that reptiles must be classified as either protected or unprotected. NRS section 501.1102 states that protected wildlife may be further classified as sensitive, threatened, or endangered. Section 503.080.1(a) of the NAC classifies desert tortoise as protected and rare outside the urban areas of Clark County (Las Vegas). NRS Section 503.597 states that it is unlawful to transport a desert tortoise within the state or across state lines, without the written consent of NDOW. Nevada does not have any laws that regulate the degradation of tortoise habitat.

CALIFORNIA

The California Fish and Game Commission adopted a regulation change on June 22, 1989, to amend the California Code of Regulations, § 670.5(b)(4) of title 14, to add the desert tortoise as a state threatened species. Under the Fish and Game Code, article 3, section 2080 prohibits the import or export of endangered or threatened species. This section also indicates that no person shall take, possess, purchase, or sell within the state, any listed species, or any part or product thereof, except as otherwise provided in state law or regulation. California law does allow the lawful possession of tortoises that are hatched in captivity or that were previously captives. Owners of such tortoises are required to obtain a license from the California Department of Fish and Game for these animals.

The California Fish and Game Code, article 4, section 2090 requires that each state agency shall consult with the California Department of Fish and Game to ensure that any action authorized, funded, or carried out by that state lead agency is not likely to jeopardize the continued existence of any state-listed species. This legislation authorizes the California Department of Fish and Game to regulate the modification of tortoise habitat that could occur through the actions of another state agency. California implemented this requirement in June 1989 and is the only state with such authority.

ARIZONA

Removal of desert tortoises from the wild is prohibited under Arizona Game and Fish Department (AGFD) regulations, and has been prohibited since 1989. The sale of tortoises and the export of tortoises from the state also are prohibited. Prior to that, anyone with an Arizona hunting license could take and possess one tortoise for each person in that household. No provisions have been made to permit or otherwise identify those tortoises that were in possession prior to January 1, 1989. Thus, enforcement of the state ban on take may not be possible unless the actual taking of a tortoise from the wild is observed. There is no state authority in Arizona to regulate the modification of desert tortoise habitat.

UTAH

All Utah wildlife species are classified as prohibited, controlled, or noncontrolled. The desert tortoise is considered a "prohibited reptile" under Utah Rule R608—3 Collection. Importation, Transportation, and Subsequent Possession of Zoological Animals. Prohibited species are zoological animals that are prohibited from collection, importation, transportation, possession, sale, transfer, or release because they pose unacceptable disease, ecological, environmental, or human health or safety risks. No state regulations exist to stop loss of tortoise habitat through land development or other actions that result in habitat degradation or loss.

ADDITIONAL REGULATORY MECHANISMS

The desert tortoise has been considered a sensitive species by numerous government agencies, including perhaps most importantly the BLM, for several years. However, sensitive species do not receive full consideration and mitigation when the authorities of other federal laws, such as the Taylor Grazing Act and the 1872 Mining Law, are being implemented. However, under the auspices of the ESA, federal agencies must consult with the USFWS regarding all actions that may affect the tortoise. The numerous activities occurring on the vast landholdings of the BLM, Department of Defense, and U.S. National Park Service (NPS) within the tortoise's range will require extensive consultation between the USFWS and these federal agencies.

During the period of emergency listing and subsequent listing as threatened, the impacts of federal actions have been subject to the rigorous evaluation that results from the ESA Section 7 consultation process. The consultations completed to date have insured that actions authorized, funded, or carried out by federal agencies have not jeopardized the continued existence of the Mojave population of desert tortoise.

3.3.3.5.5 Other Natural or Manmade Factors Affecting the Species Continued Existence

An ancillary effect of continued declines in a species' numbers and loss of habitat is the fragmentation of remaining populations. Long-term survival of these isolated pockets will be aggravated by normal random fluctuations in the population or the environment and catastrophic events that could lead to extirpation. Of particular concern with the tortoise is the continued drought that has affected most of its Mojave range over the past several years. The resulting physiological stress caused by poor nutrition can be accentuated by other perturbations in the environment, such as the increased presence of predators, fire, OHVs, and competition for existing forage. The synergistic effects of these disturbances could result in the complete inability of both individual animals and isolated groups to return to and maintain population levels that are viable on a long-term basis.

3.3.3.6 Conservation

On August 4, 1989, the USFWS published an emergency rule listing the Mojave population of the desert tortoise as endangered (54 FR 42270). On April 2, 1990, the USFWS determined the Mojave population of the desert tortoise to be threatened (55 FR 12178). Reasons for the determination included significant population declines, loss of habitat from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture. Grazing and OHV activity have degraded additional habitat. Also cited as threatening the desert tortoise's continuing existence was the illegal collection by humans for pets or consumption, URTD, predation on juvenile desert tortoises by common ravens and kit foxes, fire, and collisions with vehicles on paved and unpaved roads.

On June 28, 1994, the USFWS approved the final Desert Tortoise (Mojave Population) Recovery Plan (USFWS 1994a). The Desert Tortoise Recovery Plan divides the range of the Mojave population of the desert tortoise into 6 recovery units and recommends establishment of 14 DWMAs throughout the recovery units. Within each DWMA, the Recovery Plan recommends implementation of reserve-level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The design of DWMAs should follow accepted concepts of reserve design. As part of the actions needed to accomplish recovery, the Desert Tortoise Recovery Plan recommends that land management within all DWMAs should restrict human activities that negatively impact desert tortoises (USFWS 1994a). The DWMAs have been designated by the BLM through development or modification of their land use plans in Arizona, Nevada, Utah, and parts of California.

In Nevada, BLM's Las Vegas, Ely, and Battle Mountain field offices manage desert tortoise habitat; 941,800 acres of desert tortoise habitat were designated as ACECs by the Las Vegas and Ely field offices. BLM regulations (43 CFR part 1610) define an ACEC as an area "within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards." The Kane Springs and Mormon Mesa ACECs, adjacent to the Covered Area, encompass important desert tortoise critical habitat. Management direction for ACECs reduces or eliminates certain resource uses and activities identified in the Desert Tortoise (Mojave Population) Recovery Plan as incompatible with desert tortoise recovery (Morse et al. 2003). The regulation of activities within critical habitat through ESA Section 7 consultation is based on recommendations in the Desert Tortoise Recovery Plan (USFWS 1994b).

3.3.3.7 Recovery Units

There are six recovery units designated for desert tortoise: Northern Colorado, Eastern Colorado, Upper Virgin River, Northeastern Mojave, Eastern Mojave, and Western Mohave. Only the Northeastern and Eastern Mojave Recovery Units are located in Nevada.

3.3.3.7.1 Northeastern Mojave Recovery Unit

The Northeastern Mojave Recovery Unit occurs primarily in Nevada, but it also extends into California along the Ivanpah Valley and into extreme southwestern Utah and northwestern Arizona. Vegetation within this unit is characterized by creosote bush scrub, big galleta-scrub steppe, desert needlegrass scrub-steppe, and blackbrush scrub (in higher elevations). Topography is varied, with flats, valleys, alluvial fans, washes, and rocky slopes. Much of the northern portion of the Northeastern Mojave Recovery Unit is characterized as basin and range, with elevations from 2,500 to 12,000 feet. Desert tortoises typically eat summer and winter annuals, cacti, and perennial grasses. Desert tortoises in this recovery unit, the northern portion of which represents the northernmost distribution of the species, are typically found in low densities (about 10 to 20 adults per square mile).

A kernel analysis was conducted in 2003-2004 for the desert tortoise (Tracy et al. 2004) as part of the assessment of the 1994 Desert Tortoise Recovery Plan. The analyses revealed several areas in which the kernel estimations for live desert tortoises and carcasses did not overlap. The pattern of non-overlapping kernels that is of greatest concern is those in which there were large areas where the kernels encompassed carcasses but not live animals. These regions represent areas within DWMAs where there were likely recent die-offs or declines in desert tortoise populations. The kernel analysis indicated large areas in the Piute-Eldorado Valley, where there were carcasses but no live desert tortoises. For this entire area in 2001, 165 km (103 miles) of transects were walked, and a total of 6 live and 15 dead desert tortoises observed, resulting in a live encounter rate of 0.06 desert tortoise per mile of transect for this area. This encounter rate was among the lowest that year for any of the areas sampled in the range of the Mojave desert tortoise (Tracy et al. 2004).

Kernel analysis for the Coyote Spring DWMA showed areas where the distributions of carcasses and living desert tortoises do not overlap; however, densities of adult desert tortoises for the region do not show a statistical trend over time. Thus, while there may be a local die-off occurring in the northern portion of this DWMA, this does not appear to influence the overall trend in the region as interpreted by study plot data. Because permanent study plots for this region were discontinued after 1996, if there have been recent declines in numbers they are not reflected in the analysis. Nevertheless, large regions of non-overlapping carcass and live desert tortoise kernels in the regions were not identified adjacent to the Coyote Spring DWMA. The probability of finding either a live desert tortoise or a carcass was relatively very low for Beaver Dam Slope and Gold-Butte Pakoon, and moderately low for Mormon Mesa/Coyote Spring.

3.3.3.7.2 Eastern Mojave Recovery Unit

The Eastern Mojave Recovery Unit is situated primarily in California, but also extends into Nevada in the Amargosa, Pahrump, and Piute valleys. In the Eastern Mojave Recovery Unit, desert tortoises are often active in late summer and early autumn, in addition to spring, because this region receives both winter and summer rains and supports two distinct annual floras on which they can feed. Desert tortoises in the Eastern Mojave Recovery Unit occupy a variety of vegetation types and feed on summer and winter annuals, cacti, perennial grasses, and herbaceous perennials. They den singly in caliche caves, bajadas, and washes. This recovery unit is isolated from the Western Mojave Recovery Unit by the Baker Sink, a low-elevation, extremely hot and arid strip that extends from Death Valley to Bristol Dry Lake. The Baker Sink area is generally not considered suitable for desert tortoises. Desert tortoise densities in the Eastern Mojave Recovery Unit can vary dramatically, ranging from 5 to as much as 350 adults per square mile (USFWS 1994a).

Ivanpah and Piute–Eldorado valleys contained study plots that were analyzed in the Eastern Mojave Recovery Unit analysis. While there was no overall statistical trend in adult density over time, the 2000 survey at Goffs and the 2002 survey at Shadow Valley indicate low densities of adult desert tortoises relative to earlier years. Unfortunately, there are no data in the latter years for all five study plots within this recovery unit; therefore, while there is no statistical trend in adult densities, one cannot conclude that desert tortoises have not experienced recent declines in this area. The probability of finding a carcass on a distance sampling transect was considerably higher for Ivanpah, Chemehuevi, Fenner, and Piute-Eldorado, which make up the Eastern Mojave Recovery Unit.

3.3.3.7.3 Revised Recovery Unit Delineation

The prescriptions for recovery in the 1994 Desert Tortoise Recovery Plan were for individual populations and assumed that preserving large blocks of habitat and managing threats in that habitat would be principally all that would be necessary to recover the species. However, that original paradigm, and associated prescriptions, may be wrong. Existing data have revealed population crashes that have occurred asynchronously across the range. There are reports that some populations, which have crashed previously, have subsequently increased in population density. Additionally, all known dense populations of desert tortoises have crashed. This suggests that density-dependent mortality occurs in desert tortoise populations, and that population dynamics may be asynchronous.

These characteristics indicate that desert tortoises may exist in a classic metapopulation structure (Hanski 1999, Levins and Culver 1971), and this should portend profoundly different prescriptions for recovery. In particular, if desert tortoises have historically existed in metapopulations, then connections among habitat patches are a necessary part of conservation prescriptions. Additionally, habitat which is suitable for desert tortoises but currently unoccupied should be regarded as equally necessary for recovery. Long-term persistence cannot be determined from desert tortoise density or desert tortoise numbers alone, but assessment must include the complexities of metapopulation dynamics and the habitat characteristics that promote metapopulation dynamics including habitat connectivity through inefficient corridors (i.e., partial connectivity), asynchrony of subpopulation dynamics, and several separate habitat patches. Some of the characteristics of proper metapopulation function may already have been obviated by proliferation of highways and habitat fragmentation due to satellite urbanization. Thus, management may require artificially facilitating metapopulation processes such as movement among patches.

The genetic distinctness of desert tortoise populations and their pathogens should be assessed to guide all manipulative management actions (e.g., head starting, translocation, habitat restoration, and corridor management). The Desert Tortoise Recovery Plan Assessment Committee (DTRPAC) proposed a revision to the previous delineation of recovery units, or distinct population segments (DPSs), based on new scientific information. The recommended delineations reflect the prevailing concepts of subpopulation “discreteness,” and “significance,” and incorporate morphological, behavioral, genetic, and environmental information. The DTRPAC’s recommendation reduces the number of DPSs from six to five by leaving the original Upper Virgin River and Western Mojave units intact and recombining the four central units into three reconfigured units: Lower Virgin River Desert, Northeastern Mojave Desert (including Amargosa Valley, Ivanpah Valley, and Shadow Valley), and Eastern Mojave and Colorado Desert. These recommended DPSs are based largely on the best resolving biochemical/genetic data of Lamb et al. (1989), Lamb and Lydehard (1994), and Britten et al. (1997). Because these delineations are general and not definitive at this time, more data and analyses are required which may result in additional modification. Although, DPSs have been proposed by the DTRPAC, no DPSs have been officially designated by the USFWS.

The 1994 Desert Tortoise Recovery Plan conceived desert tortoises to be distributed in large populations that required large areas and large densities to recover. However, existing data are consistent with the possibility that desert tortoises have evolved to exist in metapopulations. Metapopulation theory conceives that desert tortoises are distributed in metapopulation patches connected with corridors that allow inefficient and asynchronous movements of individuals among the patches. This paradigm conceives that some habitat patches within the range of desert tortoise will have low population numbers or no desert tortoises at all, and others will have higher population numbers. Movement among the patches is necessary for persistence of the “system.” If desert tortoises evolved to exist in metapopulations, then long-term persistence requires addressing habitat fragmentation caused by highways and satellite urbanization. Ensuring the integrity and function of natural corridors among habitat patches might require active management of desert tortoise densities in habitat patches and associated corridors.

3.3.3.8 Critical Habitat

On February 8, 1994, the USFWS designated approximately 6.45 million acres of critical habitat for the Mojave population of desert tortoise in portions of California (4.75 million acres), Nevada (1.22 million acres), Arizona (339 thousand acres), and Utah (129 thousand acres) (59 FR 5820-5846, also see corrections in 59 FR 9032-9036), which became effective on March 10, 1994. Desert tortoise critical habitat was designated by the USFWS to identify the key biological and physical needs of the desert tortoise and key areas for recovery, and focuses conservation actions on those areas. Desert tortoise critical habitat is composed of specific geographic areas that contain the primary constituent elements of critical habitat, consisting of the biological and physical attributes essential to the species’ conservation within those areas, such as space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats. The specific primary constituent elements of desert tortoise critical habitat are:

- Sufficient space to support viable populations within each of the six recovery units, and to provide for movement, dispersal, and gene flow;
- Sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species;

- Suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; and
- Sufficient vegetation for shelter from temperature extremes and predators and habitat protected from disturbance and human-caused mortality.

Critical habitat units (CHUs) were based on recommendations for DWMAs outlined in the Draft Recovery Plan for the Desert Tortoise (Mojave Population) (see Figure 2-2) (USFWS 1993a). These DWMAs are also identified as "desert tortoise ACECs" by BLM. Because the critical habitat boundaries were drawn to optimize reserve design, the CHU may contain both "suitable" and "unsuitable" habitat. Suitable habitat can be generally defined as areas that provide the primary constituent elements.

Although recovery planning for desert tortoise will focus on DWMAs/ACECs, section II.A.6. of the Desert Tortoise Recovery Plan and section 2(b) of the ESA provide for protection and conservation of ecosystems on which federally-listed threatened and endangered species depend, which includes both recovery and non-recovery areas. The Mojave Desert ecosystem, of which the desert tortoise and its habitat are an integral part, consists of a dynamic complex of plant, animal, fungal, and microorganism communities and their associated non-living environment interacting as an ecological unit (Noss and Cooperrider 1994). Actions that adversely affect components of the Mojave Desert ecosystem may directly or indirectly affect the desert tortoise. The Desert Tortoise Recovery Plan further states that desert tortoises and habitat outside recovery areas may be important in the recovery of the tortoise. Healthy, isolated tortoise populations outside recovery areas may have a better chance of surviving catastrophic effects such as disease, than large, contiguous populations (USFWS 1994a).

The Desert Tortoise Recovery Plan recommended DWMAs and subsequently, the USFWS designated CHUs based on these proposed DWMAs (USFWS 1994b). When designated, desert tortoise critical habitat contained all the primary constituent elements of desert tortoise critical habitat. The following seven principles of conservation biology serve as the standards by which the USFWS determines whether or not the CHUs are functioning properly:

- Reserves should be well-distributed across the species' range. The entire range of the Mojave desert tortoise occurs within six recovery units identified in the Desert Tortoise Recovery Plan and at least one DWMA and CHU occurs within each recovery unit. The reserves remain well-distributed across the range of the desert tortoise.
- Reserves should contain large blocks of habitat with large populations of target species. The desert tortoise requires large, contiguous areas of habitat to meet its life requisites. Each DWMA and its associated CHUs were designated to conserve contiguous blocks of habitat that exceed 500,000 acres, with the exception of the Upper Virgin River Recovery Unit. The Upper Virgin River Recovery Unit does not meet the minimum size requirement identified in the Desert Tortoise Recovery Plan; however, the USFWS anticipates that reserve-level management will adequately conserve the desert tortoise within this recovery unit. Designation of CHUs were based largely on transect data and included areas with the largest populations of desert tortoises.
- Blocks of habitat should be close together. This principle was met when CHUs were designated and remains valid.
- Reserves should contain contiguous rather than fragmented habitat. This principle was met when CHUs were designated, and generally continues to be met. Desert tortoise-proof fencing has been constructed along major roads and highways that traverse critical habitat including Interstate 15 in Nevada and California (Ivanpah Valley DWMA/CHU), U.S. Highway 95 in Nevada (Piute-Eldorado DWMA/CHU), and Highway 58 in California (Fremont-Kramer DWMA/CHU). Major roads and highways alone constitute a barrier to tortoise movements without fencing; however, fencing minimizes take of tortoises, and culverts or underpasses allow for limited tortoise movement across the road or highway.
- Habitat patches should contain minimal edge-to-area ratios. This principle was met when CHUs were designated and generally continue to be valid. Notable exceptions include the northern Gold Butte-Pakoon CHU, and the southern termini of the Mormon Mesa, Ivanpah Valley, and Chuckwalla CHUs which have

large edge-to-area ratios and further compromised by highways that traverse these relatively narrow areas within the CHUs.

- Blocks should be interconnected by corridors or linkages connecting protected, preferred habitat for the target species. Most CHUs are contiguous with another CHU with the exception of Ord-Rodman, Ivanpah Valley, Gold Butte-Pakoon, and Upper Virgin River CHUs. Interstate 15 and the Virgin River separate the Gold Butte-Pakoon CHU from other CHUs in the Northeastern Mojave Recovery Unit. Similarly, Interstate 40 separates the Piute-Eldorado and Chemehuevi CHUs, and Ord Rodman and Superior-Cronese CHUs.

Blocks of habitat should be roadless or otherwise inaccessible to humans. Achieving this principle is the most problematic. A 2001 inventory of roads in the Western Mojave Desert suggests that road density increased from the mid-1980's. Further evaluation should be conducted, especially with the advent of effective mapping capabilities (Tracy et al. 2004). Roads provide means for human access to tortoise habitat, thereby increasing human-tortoise encounters and disturbance of constituent elements.

3.3.3.9 Species Status

3.3.3.9.1 Rangewide

In 1998, the Desert Tortoise Management Oversight Group identified line distance sampling as the appropriate method to determine rangewide desert tortoise population densities and trends. Monitoring of populations using this method is underway across the range of the desert tortoise. Successful rangewide monitoring will enable managers to evaluate the overall effectiveness of recovery actions and population responses to these actions, thus guiding recovery of the Mojave desert tortoise. Rangewide desert tortoise population monitoring using the line distance sampling method began in 2001 and is conducted annually (Tracy et al. 2004).

Long-term study plots that were established in the 1970s for rangewide desert tortoise population monitoring used various methods to assess population size in the initial surveys on those plots (e.g., 30-day spring surveys, 20-day fall surveys, and winter den surveys). Eventually, the standard method used on these plots was the 60-day spring survey of a one-mile square plot. The annual survey consisted of two periods of roughly equal duration (capture and recapture periods) (Tracy et al. 2004). The survey results indicate that desert tortoise populations have declined both in numbers of desert tortoises found during surveys and in densities of live desert tortoises at most sites, since the plots were first established 20 to 30 years ago (Berry et al. 2002). Declines of 50 to 96 percent have occurred regardless of initial desert tortoise densities. Increases in the occurrence of shell-skeletal remains have been found to correspond with declines in numbers and densities of live desert tortoises with the exception of certain plots where poaching has been documented (Berry 2003).

Results of desert tortoise surveys at three survey plots in Arizona indicate that all three sites have experienced significant die-offs. Six live desert tortoises were located in a 2001 survey of the Beaver Dam Slope Exclosure Plot (Walker and Woodman 2002). Three had definitive signs of URTD, and two of those also had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 31 live desert tortoises in 1996, 20 live desert tortoises in 1989, and 19 live desert tortoises in 1980. The 2001 survey report indicated the likelihood that there is no longer a reproductively viable population of desert tortoises on this study plot. Thirty-seven (37) live desert tortoises were located in a 2002 survey of the Littlefield Plot (Young et al. 2002). None had definitive signs of URTD. Twenty-three (23) desert tortoises had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 80 live desert tortoises in 1998 and 46 live desert tortoises in 1993. The survey report indicated that the site might be in the middle of a die-off due to the high number of carcasses found since the site was last surveyed in 1998. Nine (9) live desert tortoises were located during the mark phase of a 2003 survey of the Virgin Slope Plot (Goodlett and Woodman 2003). The surveyors determined that the confidence intervals of the population estimate would be excessively wide and not lead to an accurate population estimate, so the recapture phase was not conducted. One desert tortoise had definitive signs of URTD. Seven (7) desert tortoises had lesions indicative of cutaneous dyskeratosis. Previous surveys of this plot detected 41 live desert tortoises in 1997 and 15 live desert tortoises in 1992. The survey report indicated that the site might be at the end of a die-off that began around 1996-1997.

The Western Mojave has experienced marked population declines as indicated in the Recovery Plan, and these declines continue today. Spatial analyses of the Western Mojave show areas with increased probabilities of encountering dead rather than live animals, areas where kernel estimates for carcasses exist in the absence of live animals, and extensive regions where there are clusters of carcasses where there are no clusters of live animals. Collectively, these analyses point generally toward the same areas within the Western Mojave, namely the northern portion of the Fremont-Kramer DWMA and the northwestern part of the Superior–Cronese DWMA. Together these independent analyses, based on different combinations of data, all suggest the same conclusion for the Western Mojave. Data are not currently available with sufficient detail for most of the range of the desert tortoise with the exception of the Western Mojave (Tracy et al. 2004).

Declines in desert tortoise abundance appear to correspond with increased incidence of disease in desert tortoise populations. The Goffs permanent study plot in Ivanpah Valley, California, suffered 92 to 96 percent decreases in desert tortoise density between 1994 and 2000 (Berry 2003). The high prevalence of disease in Goffs tortoises likely contributed to this decline (Christopher et al. 2003). Upper respiratory tract disease has not yet been detected at permanent study plots in the Sonoran Desert of California, but is prevalent at study plots across the rest of the species' range (Berry 2003) and has been shown to be a contributing factor in population declines in the Western Mojave Desert (Brown et al. 1999, Christopher et al. 2003). High mortality rates at permanent study plots in the Northeastern and Eastern Mojave and Sonoran deserts appear to be associated with incidence of shell diseases in tortoises (Jacobson et al. 1994). Low levels of shell diseases were detected in many populations when the plots were first established, but were found to increase during the 1980s and 1990s (Jacobson et al. 1994, Christopher et al. 2003). A herpes virus has recently been discovered in desert tortoises, but little is known about its effects on desert tortoise populations at this time (Berry et al. 2002).

The kernel analysis of the Eastern Colorado Recovery Unit shows that the distributions of the living desert tortoises and carcasses overlap for most of the region. The Chuckwalla Bench study plot occurs outside the study area, which creates a problem in evaluating what may be occurring in that area of the recovery unit. However, the few transects walked in that portion of the DWMA yielded no observations of live or dead desert tortoises. This illustrates the Service's concern for drawing conclusions from areas represented by too few study plots and leaves them with guarded concern for this region. The percentage of transects with live animals was relatively high for most DWMAs within the Eastern Colorado Recovery Unit. In addition, the ratio of carcasses to live animals was low within this recovery unit relative to others.

3.3.3.9.2 Northeastern Mojave Recovery Unit/Lincoln County

Maintaining tortoise populations within the individual recovery units will ensure that future evolutionary processes will not be overly constrained in the future (USFWS 1994a). The Covered Area is located within the Northeastern Mojave Recovery Unit (USFWS 1994a). Topography within the Northeastern Mojave Recovery Unit is varied, with flats, valleys, alluvial fans, washes, and rocky slopes; much of the northern portion of the unit is characterized as basin and range. Creosote bush scrub, big galleta-scrub steppe, desert needlegrass scrub-steppe, and blackbrush scrub (in higher elevations of tortoise habitat) characterizes the vegetation of tortoise habitat within the recovery unit. The northern portion of the Northeastern Mojave Recovery Unit is where the tortoise reaches its northernmost extent in the distribution of the species, and where tortoises are typically found in low densities (about 10 to 20 adults per square mile) (USFWS 2004a).

The Northeastern Mojave Recovery Unit includes four critical habitat units, of which two are located partially within Lincoln County: the Mormon Mesa CHU, and the Beaver Dam Slope CHU (see Figure 2-2). The Mormon Mesa CHU is located in both Lincoln and Clark counties, and in total encompasses 427,900 acres (USFWS 1994b). The portion of the Mormon Mesa CHU located in Lincoln County is 133,911 acres (31% of the Mormon Mesa CHU). The Beaver Dam Slope CHU is located in Nevada, Utah, and Arizona, and in total encompasses 204,629 acres. The portion of the Beaver Dam Slope CHU located in Lincoln County is 87,400 acres (43% of the Beaver Dam Slope CHU) (USFWS 1994b).

A total of 221,311 acres of critical habitat have been designated within Lincoln County. The BLM's approved Caliente Management Framework Plan Amendment and Record of Decision for the Management of Desert Tortoise Habitat (Framework Plan Amendment; BLM 2000) outlines how 754,600 acres of public lands administered by the BLM Ely Field Office will be managed to aid in the recovery of the desert tortoise, in compliance with the Desert Tortoise Recovery Plan. Within Lincoln County, the BLM has designated three ACECs, which are managed by the BLM primarily for the recovery of the desert tortoise: Kane Springs, Mormon Mesa, and Beaver Dam Slope ACECs (BLM 2000). The Kane Springs ACEC encompasses a total of 65,900 acres in Lincoln County (BLM 2000). The Mormon Mesa ACEC includes 261,060 acres in Lincoln County (BLM 2000). The Beaver Dam Slope ACEC includes 36,900 acres in Lincoln County (BLM 2000). Overall, a total of 194,500 acres (26 percent) of tortoise habitat within Lincoln County are designated as ACECs (see Figure 2-2). No ACECs are located in the Covered Area. Management guidelines set forth in the Framework Plan Amendment no longer allow livestock grazing within ACECs, although prior to the approval of the Framework Plan Amendment in 2000, grazing was allowed in four of the nine allotments located partially or completely within ACECs. Within ACECs, OHVs are allowed only on roads and vehicle trails specifically designated for OHV use, but only for casual use; competitive OHV use is not allowed. Management guidelines are for zero wild horses and burros, and no disposal of public lands within ACECs. Additional guidelines for the management of rights-of-ways (for utility/transportation corridors, communication sites, and materials sites), fire outbreaks, and transportation/public access are also outlined in the Framework Plan Amendment (BLM 2000).

Within Clark County near the Covered Area, the BLM has designated three ACECs: Mormon Mesa (151,360 acres in Clark County), Arrow Canyon (2,084 acres), and Gold Butte (186,909 acres) ACECs (BLM 1998, 2007). The Mormon Mesa and Gold Butte ACECs were designated primarily to protect desert tortoise habitat, while the Arrow Canyon ACEC was established to protect paleontological and geological values (BLM 2007).

Outside of ACECs, habitat for the desert tortoise is also considered in BLM management decisions, with the goal of maintaining or improving existing habitat conditions to stabilize tortoise populations at existing trend levels, improve habitat, and be consistent with recovery efforts by other agencies. Livestock grazing is allowed on BLM lands outside of ACECs as long as forage utilization does not exceed given levels for various times of the year. OHV use, both casual and competitive, is limited to existing roads and trails outside of ACECs. A maximum of 16,926 acres of desert tortoise habitat outside of ACECs may be disposed of through appropriate laws; however, no disposal of public lands designated as critical habitat is allowed, with one exception. Legislatively leased lands could be adjusted with legislatively conveyed lands because BLM would obtain critical habitat for critical habitat (i.e., there would be no net loss of critical habitat). Guidelines for management of rights-of-way and fire management outside of ACECs are also outlined in the Framework Plan Amendment.

Overall, little development has occurred in tortoise habitat within Lincoln County; however, a few houses and ranch buildings are scattered in various areas, primarily along Meadow Valley Wash and in other areas that are privately owned, mainly outside of the Covered Area. A landfill is located near the center of the LCLA parcel and a paved road leads from the landfill to the city of Mesquite. There is also a landfill/recycling/aggregate operation west of U.S. Highway 93 at the north end of the Covered Area, in the vicinity of Kane Springs Road intersection area, adjacent to and partly in the Pahranagat Wash. Numerous secondary and unimproved roads are present within tortoise habitat in Lincoln County. Most of the secondary roads have graded-surfaces suitable for travel at moderate speeds. Portions of some of these roads are paved. Rainbow Pass Road is a graded road running north-south through the Mormon Mesa ACEC. Another graded road runs north-south through the Mormon Mesa ACEC and along Meadow Valley Wash parallel to the Union Pacific Railroad providing private access within the railroad right-of-way. A graded road runs from the LCLA parcel toward the Toquop Energy Project parcel; this road was previously addressed in the BO issued by the USFWS in 1993. State Route 317 passes northeast-southwest through the Kane Springs ACEC, and portions of this roadway are paved. Other graded roads bisect tortoise habitat throughout the Covered Area. It should be noted that because Lincoln County is mostly undeveloped, the roads currently get relatively little use compared to nearby high-traffic-volume highways (e.g., Interstate 15).

Between June 22, 2005 and July 10, 2005, large fires consumed 750,000 acres in southern Nevada (i.e., Clark and Lincoln counties) including extensive areas of Mojave Desert scrub (Matchett 2006). Lightning strikes caused most of the fires, which were fueled by high levels of non-native grasses resulting from the above-average precipitation during the past three years. Burn patterns were highly variable with most acres burned under a low fire severity; however, the fires still resulted in the loss of surface vegetation over large portions of the landscape. In Lincoln County, these fires burned approximately 47 percent (357,093 acres) of all tortoise habitat, which included 5 percent (10,088 acres) of tortoise habitat in ACECs. Within the Kane Springs ACEC, 3,471 acres (7 percent) burned; approximately 23 percent of the entire Beaver Dam Slope ACEC in Utah and Nevada burned (Matchett 2006) of which 1,977 acres were in Lincoln County (5 percent of the ACEC within

Lincoln County); and 4,640 acres (2 percent) of the Mormon Mesa ACEC burned (all burned acres being within Lincoln County) (BLM GIS data) (see Figure 2-2). Between 1980 and 2001, 12.6 percent of the Northeastern Mojave Recovery Unit burned (Brooks 2006); during the record fires of 2005, 12.5 percent of the recovery unit burned (Matchett 2006). In Lincoln County, a total of 34,904 acres of critical habitat was consumed including 25,772 acres (29 percent) of the Beaver Dam Slope Critical Habitat Unit and 9,132 acres (7 percent) of the Mormon Mesa Critical Habitat Unit. Overall, 355,894 acres of tortoise habitat on BLM lands and 1,199 acres of private lands in Lincoln County were consumed during the 2005 fires. These fires also extended into Utah, where the Utah Division of Wildlife Resources (Matchett 2006) estimated that 37.5 percent of adult tortoises in a burn area within the Red Cliffs Reserve might have died as a direct result of fire. However, for those tortoises surviving these fire, the fires have caused the loss of food plants, cover sites under shrubs, available water (due to increased run-off and evaporation in the absence of vegetation), and facilitated the spread of non-native plants. No post-fire tortoise survey data are available for Lincoln County. Burned areas may take years, decades, or longer before pre-fire densities of tortoises can be supported.

Desert tortoise transect surveys conducted by BLM in the vicinity of the LCLA parcel indicate that tortoise densities in this area range from very low (less than 10 tortoises per square mile) to low (10 to 45 tortoises per square mile) (USFWS 2001a). Those areas that are considered to provide some of the best tortoise habitat in the vicinity have been designated by BLM as ACECs. Tortoise densities within the Mormon Mesa ACEC have been estimated at 41 to 87 tortoises per square mile with an average adult density of 20 per square mile (USFWS 2001a). Desert tortoise density estimates for the Beaver Dam Slope ACEC range from 5 to 56 per square mile, with an average adult density of 10 per square mile (USFWS 2001a). Nevada Heritage data document 51 tortoise occurrences throughout Lincoln County at elevations ranging from 2,030 to 3,840 feet.

3.3.3.9.3 Covered Area

Results of surveys for desert tortoise in Coyote Spring Valley and CSI lands in Clark County, just south of the Covered Area, are likely representative of tortoise densities within the Covered Area. These surveys indicate wide variability in tortoise densities across the landscape, with estimates ranging from less than 10 to more than 100 animals per square mile, with summed survey data indicating 52 to 60 tortoises per square mile, overall. However, recent tortoise removal efforts on nearly 6,000 acres of CSI lands in Clark County yielded only 90 adult desert tortoises. These efforts were on lands that appeared marginally suitable near the intersection of U.S. Highway 93 and State Route 168, to lands increasingly suitable for occupancy north and east of that area. These findings indicate current densities of about 10 per square mile. In the southern and western portion of the CSI lands in Clark County, estimated tortoise densities are relatively low (as low as 2 to 3 animals per square mile), possibly reflecting increased mortality associated with State Route 168 to the south and U.S. Highway 93 to the west.

In October 2000, biologists with Knight & Leavitt Associates, Inc. surveyed for desert tortoises between October 14 and 29, 2000, as part of the environmental studies for the proposed CSI project in Clark County (Knight & Leavitt Associates 2000). The survey protocol followed the strip triangle method: 31 triangular transects of 0.5 mile per side were surveyed within a 34 square mile area of the Coyote Spring Valley, encompassing the CSI project area in Clark County and adjacent lands to the south and west. Biologists from Knight & Leavitt Associates surveyed each transect, walking the length of each side and recording tortoises and sign (e.g., scat, burrows) observed within 16 feet of the transect line. The total number of tortoise sign per transect was then adjusted such that multiple sign obviously associated with a single individual was reduced to one sign (referred to as the Corrected Sign [CS]). The total CS per transect was then averaged over the survey area, and this number was used to estimate the number of adult tortoises inhabiting the survey area based on methods described by Berry and Nicholson (1984). The use of indices to estimate wildlife population size or density has been discouraged due to uncertainties (or unfounded assumptions) about the relationship between the index (e.g., scat, tracks, etc.) and the population parameter (e.g., density); high sampling variance; and a typical lack of validation, necessary during each year of survey (Anderson 2001, 2003, Thompson et al. 1998). Berry and Nicholson (1984) examined the relationship between tortoise sign and density at several sites in the Mojave Desert of California in the 1970s, subsequently developing estimates of tortoise density based on CS counts that have been broadly applied across the range of the species. In 1981, Karl examined this relationship at sites in southern Nevada (Lincoln and Nye counties) and developed slightly different estimates of tortoise density based on CS. The relationship between tortoise sign and density in the Coyote Spring Valley and on the CSI project site in Clark County has not been validated for these surveys. Findings indicated densities between 45 and 90 individuals per square mile (Table 3-5), which may be more than double the densities expected from the highest quality habitat areas in the Coyote Spring Valley based on removal data available from CSI.

Table 3-5 Tortoise Density Estimates on Adjacent Lands in Clark County, Nevada, Based on Triangular Strip Transect Surveys (USFWS 2005a)

Survey Area	Square Miles of Habitat	Number of Transects	Corrected Sign	Relative Density	Estimated Number of Tortoises
Knight & Leavitt Associates Triangular Strip Transect Surveys, 2000					
CSI Project Area (Clark County)	10.75	7	22	10-45	108-484
Coyote Springs Resource Area (Clark County)	9.72	11	70	45-90	438-875
Total CSI Clark County Lands	20.47	18	92	45-90	921-1842
Knight & Leavitt Associates Survey Area: CSI & Adjacent Land	34.00	31	144	45-90	1,530-3,060
BLM Triangular Strip Transect Surveys, prior to 1987					
CSI Project Area (Clark County)	10.75	14	66.5	45-90	484-968
Coyote Springs Resource Area (Clark County)	9.72	11	36	10-45	97-437
Total CSI Clark County Lands	20.47	25	102.5	45-90	921-1,842

Prior to 1987, BLM surveyed for tortoises within the CSI project area in Clark County, in the Mormon Mesa CHU and surrounding lands, using the strip triangle method, recording all tortoise sign within approximately 16 feet of the transect, estimating species density based on methods described by Karl (1981) for southern Nevada (BLM 1998). Generally, tortoise densities appeared to be low (0 to 45 tortoises per square mile) in the southern part of the CSI project area in Clark County, but moderate to high (45 to 140 tortoises per square mile) in the northern part of the CSI project area in Lincoln County. The majority of transects on the CSICL in Clark County (100 percent of BLM transects and 55 percent of Knight & Leavitt Associates transects) show low to moderate tortoise densities (in the range of 10 to 90 tortoises per square mile). Again, data suggesting densities in the higher end of that range are contradicted by recent data from removals in northern Clark County.

The USFWS (2005a) have converted the tortoise density estimates reported by Knight & Leavitt Associates (2000) using the methods described by Karl (1981) for southern Nevada, rather than methods described by Berry and Nicholson (1984) for California sites (Table 3-6). As noted above, estimating tortoise density from sign is problematic; relationships between sign and census population sizes have not been validated. Current survey methods for desert tortoise also have reduced accuracy, among other reasons, due to low sample sizes (Freilich et al. 2005). Acknowledging these crucial limitations and problems, density estimates from the CSI transect surveys may still be useful for establishing areas of tortoise presence and absence, as well as identifying distribution patterns across the landscape (refer to Figure 3-1 for observed presence records). Throughout the majority of the Development Area, desert tortoise densities appear to be low but may approach moderate densities (10 to 90 tortoises per square mile) (Figure 3-1, Table 3-5). The northeast portion and the southeast portion of the Development Area may have moderate desert tortoise densities, although the estimates in previous surveys of more than 90 tortoises per square mile are most likely too high.

Table 3-6 Population Estimate for Desert Tortoises at the Coyote Springs One-Square-Mile Permanent Study Plot, Lincoln County, Nevada

Year	All Size Classes	Tortoises 180 mm MCL	Tortoises < 180mm MCL
1986	96±6	49±4	N/A
1992	116±29	67±20	48±19
1995	96±31	58±18	48±42

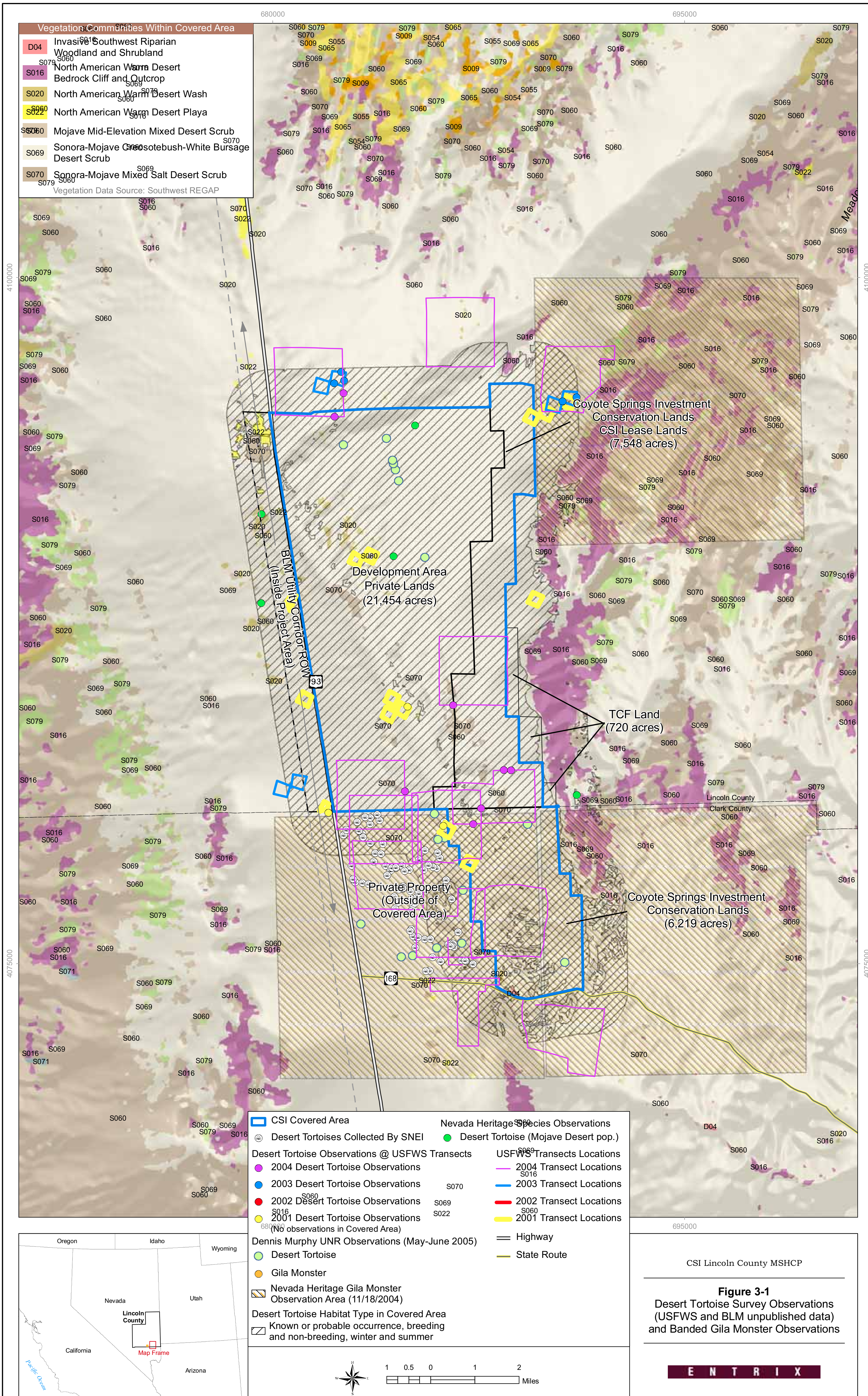

Figure 3-1
Desert Tortoise Survey Observations (USFWS and BLM unpublished data) and Banded Gila Monster Observations

Consultants for CSI conducted tortoise clearance surveys in phases on nearly 10 square miles from 2005 through spring of 2007. The locations of desert tortoises found during the clearance surveys were recorded using a global positioning system (GPS) and are presented on Figure 3-1. Just two tortoises were located on the most southwestern 660 acres on the project site in Clark County in October 2005. Between October 29 and November 1, 2005, the USFWS conducted tortoise clearance surveys on another roughly 475 acres (0.74 square miles) north of the first cleared area and east of U.S. Highway 93. One live sub-adult tortoise was found. While the areas cleared to date appear to have low tortoise densities, this may be partly due to the close proximity of U.S. Highway 93 and State Route 168. Researchers have previously found lower tortoise densities near paved highways, which has been assumed to be due to vehicle-related tortoise mortality, as well as other impacts associated with roads (increased noise and vibrations that may disrupt behavior and communication, human access to areas that may result in increased collection of tortoises for food and pets, among other things) (59 FR 5820, Boarman 2002). Recent visits to the site by USFWS staff found that while some areas looked suitable for desert tortoises, little sign was observed (K. Field, USFWS, pers. comm., as cited in USFWS 2005a). The estimate of one to two tortoises per square mile from the initial CSI Clark County removal efforts constitute the lower end of subarea densities in the project area vicinity. Other sites within the CSI project area in Clark County, such as along west-east drainages and sites with sandier soils, likely contain higher concentrations of desert tortoises; however, tortoise numbers may be depressed from historical densities due to numerous factors, including but not limited to road effects, illegal collection, past grazing practices, and perhaps drought, which has been hypothesized to cause declines in desert tortoise populations (Tracy et al. 2004).

Other tortoise surveys in the vicinity of the CSI Covered Area may provide useful information on tortoise density and status in the Coyote Spring Valley and Mormon Mesa area. Two 1-square-mile Permanent Study Plots (PSPs) are located within the Mormon Mesa CHU: the Coyote Spring PSP in Coyote Spring Valley, Lincoln County, Nevada and the Mormon Mesa PSP in the eastern portion of the Mormon Mesa CHU. These plots have been surveyed periodically from the mid-1980s through the mid-1990s. The original purpose of these PSPs was to generate data on tortoise demography and population trends using 60-day mark-recapture survey protocol and also collect data on habitat (biotic and abiotic) conditions and tortoise health (EnviroPlus Consulting 1995, Tracy et al. 2004). However, because plots were not randomly located, the ability to draw inferences about tortoise density, status, and trends beyond the plots themselves is limited. Still, realizing these limitations and using appropriate caution, data from these plots were used to estimate status and trends of tortoise populations in the Northeastern Mojave Recovery Unit and the Lower Virgin River DPS (in which these study plots and the CSI project area in Clark County are located) as part of the 2004 assessment of the Desert Tortoise Recovery Plan (Tracy et al. 2004). This analysis found no significant statistical trend in adult density over the survey time period in these areas.

The closest permanent plot to the Development Area is the Coyote Springs plot, which is located approximately 1.9 miles north of the northern boundary of the CSI Development, 1.9 miles east of U.S. Highway 93 and 1.9 miles north of Kane Springs Road. This plot was established in 1986 and resurveyed in 1992 and 1995. EnviroPlus Consulting (1995) characterized this site as having moderately high tortoise numbers, with a size distribution typical of that observed on other PSPs and a significantly skewed sex ratio with female tortoises comprising two-thirds of the observed sub-adult and adult population However, this effect was not significant for tortoises >208 mm mid-carapace length. Over the three survey periods, total estimated population size on the plot ranged from 96 ± 31 to 116 ± 29 (EnviroPlus Consulting 1995, Table 3-6). This is slightly higher than the high-end density estimate for all CSI lands in Clark County, and more than twice Knight & Leavitt Associate's high-end density estimate for CSI project lands in Clark County (USFWS 2005a). The annual adult mortality rate for the Coyote Springs plot in 1995 was estimated at 4 percent, which is higher than the 2-3 percent rate that the USFWS believes necessary to sustain desert tortoise populations (USFWS 1994a). However, the tortoise population at the Coyote Spring PSP was apparently stable over the 10 years that the surveys spanned (EnviroPlus Consulting 1995). Tortoises with symptoms of cutaneous dyskeratosis and URTD were observed during plot surveys; however, comparisons across survey periods are unreliable due to differences in diagnosis/evaluation criteria used to evaluate health status. In 1995, approximately one-third of tortoises had trauma-related injuries, likely caused by a predator. Overall, mortality by predation was characterized as present, but not at a high rate. Human impacts on tortoise populations in this area were considered low and inconsequential (EnviroPlus Consulting 1995). The plot estimates are not inconsistent with assumed low to moderate densities of tortoise in the CSI project area.

For the Las Vegas Resource Management Plan and Final Environmental Impact Statement, BLM estimated relative tortoise densities and numbers for proposed ACECs and adjacent areas (BLM 1998). Tortoise densities were estimated using both strip transect and PSP data. For the CSI (Aerojet) property in Coyote Spring Valley, the estimated relative density of adult desert tortoises was 25 to 75 individuals per square mile, and the estimated number of adult tortoises was 1,575 to 4,725 (median of 3,150) over the 63 square miles of Aerojet land. Relative density estimates for the Coyote Spring ACEC were generally 25 to 75 adult tortoises per square mile other than for that portion of the ACEC on USFWS land where densities were lower (10 to 45 adult tortoises per square mile).

For the Proposed Caliente Management Framework Plan Amendment and Final Environmental Impact Statement for the Management of Desert Tortoise Habitat, BLM also presented relative tortoise densities for proposed ACECs within the jurisdiction of the Caliente Field Office (BLM 1999). Relative densities were 25 to 75 adult tortoises per square mile for the Kane Springs ACEC (population estimate of 2,575 to 7,723 tortoises) and 10 to 20 adult tortoises per square mile for the Mormon Mesa ACEC (population estimate of 1,716 to 3,431 tortoises). The western portion of the Mormon Mesa ACEC was classified as higher quality desert tortoise habitat with corresponding higher tortoise density estimates (25 to 75 adult tortoises per square mile) (BLM 1999). In contrast strip-transect data in the Coyote Spring Valley and adjacent ACECs (Karl 1981, Garcia et al. 1982 in BLM 1999, Knight & Leavitt Associates 2000) indicate wide variability in tortoise densities across the landscape. Data from some of these areas suggest densities of close to 100 adult tortoises or more per square mile, including some sites within the CSI project site in Clark County and the northern portion of CSI's lands in Lincoln County, as well as to the north-northwest on adjacent BLM land. Data from other areas suggest densities of less than 10 adult tortoises per square mile. This variability in tortoise density is also evident from strip-transect surveys on the CSI project in Clark County. By considering this variability when calculating average tortoise density on the CSI project in Clark County, the USFWS (2005a) estimated tortoise densities of approximately 52 (Knight & Leavitt Associates) to 60 (BLM) adult tortoises per square mile. These data are not inconsistent with the conclusion that the Lincoln County portion of the CSI Development Area supports low to moderate densities of tortoises, but it contrasts with the more reliable removal data, which suggest much lower densities.

As described above, past surveys based on strip triangular methods have been conducted on CSI private and lease lands in Clark County. Data from strip triangular methods suggested higher tortoise densities, although the relationship between tortoise sign and census population sizes have not been validated. Therefore, there are limitations to the triangular strip method. However, density estimates from CSI transect surveys may still be useful for establishing presence and absence, as well as identifying distribution patters along the landscape.

In 2001, a long-term monitoring program began to obtain trend data for the desert tortoise which includes annual range-wide population monitoring using line-distance transects (1999 in the Upper Virgin River Recovery Unit; McLuckie et al. 2002). This is the first comprehensive effort undertaken to date to assess densities across the range of this species (USFWS 2006). Between 2001 and 2005, the monitoring goal was to collect baseline densities between recovery units. The baseline information would be used to refine monitoring design because it includes estimates for transect-to-transect variability in tortoise counts as well as regional variability in detention functions (USFWS 2006). Over the first five years of monitoring, tortoises were least abundant in the Northeast Mojave Recovery Unit (1 to three tortoise per kilometer^2 [2 to eight tortoises per mile^2]; USFWS 2006), and the highest reported densities occurred in the Upper Virgin River Recovery Unit (17 to 30 tortoise per kilometer^2 [44 to 78 tortoises per mile^2] (McLuckie et al. 2002, 2006).

CSI lands within the project area located within the Mormon Mesa CHU of the Northeastern Mojave Recovery Unit. Survey data from 2005 line-distance sampling in the Coyote Spring Valley, which includes transects in the CSI private and lease lands located in the Mormon Mesa CHU, estimated the tortoise densities in the valley to be 3.2 tortoise per kilometer^2 (8.3 tortoises per mile^2) (Figure 4-4). Tortoise densities in the Coyote Springs Valley are almost 50 percent more dense than the rest of the Northeastern Mojave Recover Unit (USFWS unpublished data). These results are preliminary as additional analysis that incorporates 2006 and 2007 survey data and a correction for survey effort is needed to finalize the results. Other recent surveys (2006-2007) were conducted in similar habitat immediately adjacent to the Development Area and include 100 percent clearance surveys on 5,302 acres or 21.07 kilometer^2 of CSI private lands in Clark County. Using total number of tortoises, 108 adults and juveniles, cleared during surveys, we estimate a density of 5.0 tortoises per one kilometer^2 (13 tortoises per mile^2) on the CSI private lands in Clark County.

CSI would develop on up to 20,716 acres or 83.83 kilometer^2 of desert tortoise critical habitat. Based on the 2006-2007 clearance surveys density estimate, extrapolation can be used to estimate approximately 419 tortoises occur on CSI private lands in Lincoln County.

3.3.3.10 Relevant Consultations

A USFWS BO (USFWS 2006) was prepared for the proposed CSI development in Clark County, Nevada (Corps of Engineers Permit Application No. 200125042). This BO (File No. 1-5-05-FW-536 Tier 01) amends a 2000 programmatic BO (File No. 1-5-00-FW-575) for issuance of an incidental take permit under a MSHCP for Clark County. Included in this BO is an analysis of the effects of the proposed action on the desert tortoise, which is included within the coverage area and acreage amount of the Clark County MSHCP. The USFWS determined that the level of anticipated take is not likely to jeopardize the continued existence of desert tortoise or adversely modify its critical habitat. This BO has been reinitiated (FWS File No. 1-5-05-FW-536 Tier 01R) to address the effects of constructing detention basins located west of U.S. Highway 93 in Clark County.

The BLM disposal of the LCLA parcel and development of the Toquop Energy parcel have each been addressed in separate USFWS BOs (USFWS File No. 1-5-01-F-517, September 7, 2001; and 1-5-02-F-494, June 16, 2003, respectively). Both BOs concluded that the consulted actions are not likely to jeopardize the continued existence of the desert tortoise, and that neither action is likely to adversely modify or destroy designated critical habitat to the extent that the constituent elements are appreciably diminished and the habitat no longer serves its role in the survival and recovery of the species. In addition, these BOs deferred issuance of an incidental take permit for desert tortoise associated with the development of private lands until such time that an HCP addressing those lands is completed. That HCP is being developed under a separate effort.

3.3.4 Banded Gila Monster

Scientific Name: *Heloderma suspectum cinctum*

Source: Arizona Fish and Game Department

3.3.4.1 Protection Warranted

3.3.4.1.1 Endangered Species Act

- 1996, Category 2 category of candidate species was removed, no longer a candidate species, 61 FR 7596-7613.
- November 15, 1994, Candidate for federal listing, Category 2, 59 FR 58994.
- 1989, Removed from candidate list, 54 FR 559.
- 1985, Candidate for federal listing, 50 FR 37963.

3.3.4.1.2 Nevada Administrative Code

- The species Heloderma suspectum is protected under NAC 503.080 (Reptiles: Classification). The banded Gila monster is protected under NRS 501 (NNHP 2004).

3.3.4.1.3 Other Protections

- BLM sensitive species.
- Nevada State imperiled (S2).

3.3.4.2 General Description

The banded Gila monster is a large, heavy-bodied lizard with a large-head, rounded body and has a short, swollen tail. This species can attain total lengths of up to 56 cm (22 in). The legs are short and muscular with large feet and toes unusual among lizards in having its fourth toe nearly as long as the third toe (Stebbins

2003). The species coloration is primarily black and pink, although color variation can range from orange to yellowish in color (AGFD 2002a). The dorsal surfaces of the animal are covered with bead-like scales, with the ventral (belly) scales being more square in shape. This species has a well-developed gular fold and loose folds of skin on the neck. This species also has a dark colored forked tongue that it uses in a snake-like fashion (Stebbins 2003).

3.3.4.3 Ecology

The banded Gila monster ranges from the Vermillion Cliffs (Washington County), Utah southward through the Lower Colorado River Basin, including extreme southern Nevada, southeastern California, and Arizona west of the Central Plateau to Yuma (Jennings and Hayes 1994). The elevational distribution of this species ranges from 45 m (150 ft) along the lower Colorado River near Yuma to 1,124 m (3,500 ft) at Congress (Yavapai County), Arizona. In California, the banded Gila monster is known from isolated records in the Clark, Kingston, Paiute, and Providence mountains of eastern San Bernardino County. No specimens or photographs are available to verify other California localities (Jennings and Hayes 1994). Within Nevada, the banded Gila monster is known from Clark, Lincoln, and Nye counties. Its geographic range approximates that of the desert tortoise (NDOW 2005b).

While there is not much known in regards to the abundance of the banded subspecies, the species' (*H. suspectum*) numbers are placed at least several thousand individuals (NatureServe 2002). One study (Degenhardt et al. 1996), determined the density of Gila monsters in one locality in New Mexico, to be around five animals per acre. Campbell and Lamar (2004) have determined that the species is declining over the extent of its range. Beck (1985) estimated that the population in Utah has declined from a range of 2,000 to 5,000 individuals in the 1930's to between 450 and 800 individuals at the time the study was conducted.

3.3.4.3.1 Habitat

Banded Gila monster inhabits shrubby, grassy and succulent desert type habitat, occasionally entering oak woodland (Stebbins 2003). They occur in several desert plant associations. They may also occur in mesquite-grassland, creosote bush, and single-leaf pinyon and western juniper vegetation types (Jennings and Hayes 1994). They typically inhabit desert washes and are occasionally found on alluvial fans. This species tends to frequent the lower slopes of mountains and nearby plains. They are found in canyon bottoms or arroyos with perennial or intermittent streams. They seek shelter in self-excavated burrows or alternatively, those made by small mammals, and occasionally in woodrat nests. They are also found in dense thickets, under rocks and in other natural cavities. This species seems to prefer rocky areas and are often found at dawn or dusk following warm summer rains. Banded Gila monsters are primarily ground dwelling and subterranean, spending greater than 95 percent of their lives underground (NDOW 2005b), but will occasionally climb trees in search of food resources.

Crevices are generally found on rocky slopes where banded Gila monsters find refuge in both the winter and summer (NDOW 2005b). Significant differences exist between winter and summer homesites (Jennings and Hayes 1994). Banded Gila monsters winter at more elevated locations (i.e., on rocky slopes, in rocky outcrops, or below cliffs) often with other reptiles such as rattlesnakes and desert tortoises. Summer ranges, however, are located in adjacent lower valleys or alluvial fans (Jennings and Hayes 1994). Preferred shelters normally face to the east, southeast, or south, and appear to be similar for both juveniles and adults (Jennings and Hayes 1994). Data are lacking on nest sites (Jennings and Hayes 1994).

Vegetation communities that serve as habitat for the banded Gila monster are as follows: Mogollon Chaparral, Apacherian-Chihuahuan Mesquite Upland Scrub, Mojave Mid-Elevation Mixed Desert Scrub, Chihuahuan Succulent Desert Scrub, Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub, Sonoran Paloverde-Mixed Cacti Desert Scrub, Sonora-Mojave Creosotebush-White Bursage Desert Scrub, Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, North American Warm Desert Lower Montane Riparian Woodland and Shrubland, North American Warm Desert Riparian Woodland and Shrubland, North American Warm Desert Riparian Mesquite Bosque, Chihuahuan-Sonoran Desert Bottomland and Swale Grassland, Madrean Pinyon-Juniper Woodland, Madrean Juniper Savanna, Sonoran Mid-Elevation Desert Scrub (Southwestern Regional Gap Analysis Project [SWReGAP] 2005).

3.3.4.4 Life History

3.3.4.4.1 Reproductive Biology

Banded Gila monster breeding generally occurs in the early summer. Mating adults pair up, occupying the same burrow, and probably mate underground (Jennings and Hayes 1994). Males appear to be territorial during the mating season, and often combat with other males (Jennings and Hayes 1994). Gravid females deposit 2 to 12 eggs (averaging 5), which average 59.8 mm long and 30.6 mm wide, in a shallow depression excavated in moist sand arroyos or similar soils (Jennings and Hayes 1994, AGFD 2002a). Oviposition occurs just before or during the start of the rainy season of July and August. Deposited eggs overwinter underground and hatch during May of the following year after incubating approximately 10 months. However, no natural banded Gila monsters have been studied to date, only individuals in captivity (Hardenbrook, D.B., pers. comm.).

The hatching schedule is dependent on soil temperature, which varies across latitude and elevation across the species' range (AGFD 2002a). Hatching typically occurs between late April and early June. Hatchling banded Gila monsters average 12 centimeter (cm) snout to vent length (SVL) at birth, growing approximately 7 to 10 mm SVL per year, slowing to 4 to 7 mm per year as adults (Jennings and Hayes 1994). Sexual maturity is reached at around 4 years of age, and individuals have lived up to 40 years old in captivity (Jennings and Hayes 1994).

3.3.4.4.2 Diet

Banded Gila monsters are diurnal predators, but have also been known to forage at night, using their tongue to locate prey, feeding primarily on bird eggs and young mammals. Primary prey include mourning dove (*Zenaida macroura*), Gambel's quail (*Lophortyx gambelii*) desert tortoise eggs, desert cottontail (*Sylvilagus audubonii*), and ground squirrel (*Ammospermophilus leucurus)* young, which it finds while robbing nests over a broad area (Jennings and Hayes 1994). This species may travel up to 1 km per day looking for food (Jennings and Hayes 1994). The venom is thought to be used for defensive purposes, rather than for assisting in prey capture. When prey resources are abundant, usually in the spring, banded Gila monsters accumulate fat stores in their tail, to use as energy when food resources are scarce (Jennings and Hayes 1994). The amount of time spent foraging is highly variable and is dependant on prey availability and daily temperatures.

3.3.4.5 Threats

Threats to banded Gila monster and its habitat include natural and exotic predators, habitat alteration, development, habitat fragmentation, illegal collection, and pets. A brief summary of threats in the context of the five listing factors used to assess species for listing as threatened or endangered under ESA are described below.

3.3.4.5.1 The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Destruction of habitat due to the rapid urbanization within this species range is considered the main reason for declining populations. Phoenix had the largest human population increase of any city in the United States between 2004 and 2005; North Las Vegas, Nevada and Gilbert, Arizona are also on the list of the five biggest numerical population-gaining cities, according to a June 21, 2006 press release by the U.S. Census Bureau (U.S. Census Bureau 2006). Clark County currently has an 8 percent annual growth rate (Clark County 2000). This rate of growth is typical for urban development throughout this species' range.

With rapid urbanization within the banded Gila monster's range comes the rapid construction of infrastructure. The fragmentation of habitat caused by roads is isolating populations from each other. More importantly, animals crossing the roads are subject to being hit by vehicles.

Other factors contributing to population declines are off-road vehicles and off-road-vehicle events causing habitat degradation as well as direct mortality of this species. Participant vehicles, spectators, and spectator vehicles all pose possible threats. Additional recreational activities which may result in possible impacts are equestrian trail rides, dog field trials, flying machine events (remote and piloted), skydiving, and subsequent parking for these events (RECON 2000).

3.3.4.5.2 Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes

Although the collection of the banded Gila monster is now illegal without proper permits, animals for sale in the pet trade carry a price tag of up to $2,000 apiece. Therefore, poaching for black market sales is also thought to be contributing to banded Gila monster declines (Jennings and Hayes 1994).

3.3.4.5.3 Disease or Predation

As urbanization becomes more prevalent in previously uninhabited deserts, human and pet densities increase. Pet encounters with wildlife are presumed to be a contributing factor in banded Gila monster declines (Jennings and Hayes 1994).

3.3.4.5.4 Inadequate Regulatory Mechanisms

Stringent prohibitions against commercial exploitation and unnecessary killing are needed (NDOW 2005c).

3.3.4.5.5 Other Natural or Manmade Factors Affecting the Species Continued Existence

The banded Gila monster has a poisonous bite, and has therefore been the target of unwarranted persecution (NDOW 2005c).

3.3.4.6 Conservation

The banded Gila monster is included in the Nevada Comprehensive Wildlife Conservation Strategy (NDOW 2005c). Single-species investigations are recommended to develop an adequate conservation strategy. The banded Gila monster was identified in the conservation strategy as one of the highest priority reptilian species for conducting studies on.

3.3.4.7 Species Status

3.3.4.7.1 Rangewide

Banded Gila monster occurs in Clark, Lincoln, and Nye counties in Nevada, and portions of Arizona, California, and Utah. The rangewide status is not currently known.

3.3.4.7.2 Lincoln County

The status in Lincoln County is currently unknown.

3.3.4.7.3 Covered Area

Potential range for banded Gila monster is found within the Covered Area (see Figure 3-1). Methodology for how this potential range was mapped is included in Appendix S: Species Selection Process. The banded Gila monster may potentially occur within the Covered Area and within the Development Area. Rocks and canyons provide protection from predators in Mojave/Sonoran Warm Desert Scrub, while rock outcrops provide protection from predators and foraging ground in Mojave Mid-Elevation Mixed Desert Scrub (NDOW 2005c).

No known surveys have been conducted within the Covered Area. However, current collaborative monitoring effort have commenced between NDOW, Nevada Biodiversity Initiative, and Clark County MSHCP (NDOW 2005c).

3.3.4.8 Relevant Consultations

No relevant consultations have been conducted for the banded Gila monster in the vicinity of the Covered Area.

3.3.5 Western Burrowing Owl

Scientific Name: *Athene cunicularia hypugaea*

3.3.5.1 Protection Warranted

3.3.5.1.1 Endangered Species Act

- Not currently listed under ESA
- February 28, 1996: Category 2 category of candidate species was removed, no longer a candidate species,, 61 FR 7596-7613.
- November 15, 1994: Candidate for federal listing, Category 2, although information was lacking to support the finding of endangered or threatened (59 FR 58982-59028).
- Nevada Administrative Code
- Protected under NAC 503.050 and NRS 501.

3.3.5.1.2 Other Protections

- Protected under the MBTA.
- Listed as State Endangered in Minnesota, Threatened in Colorado, and as a Species of Concern in California, Montana, Oklahoma, Oregon, Utah, Washington, and Wyoming.
- Listed as a Bird of Conservation Concern by USFWS (USFWS 2002b).
- BLM sensitive species

3.3.5.2 General Description

A relatively small, long-legged owl, the western burrowing owl is a ground-dwelling bird that stands 20 to 25 cm tall and weighs approximately 130 to 150 grams (g). Its rounded wings extend to a wingspan of approximately 60 cm. Adults display brown plumage with white spotting on the back and a white belly marked with brown bars. Females are generally darker than males. The eyes of the western burrowing owl are bright yellow while the bill is a pale yellow. It has a rounded head that lacks ear-tuffs and the yellow eyes are placed relatively high on its face. Juveniles are similar size, but are buff in color and lack the streaking (Haug et al. 1993, as cited in Commission for Environmental Cooperation [CEC] 2005).

3.3.5.3 Ecology

In general, the breeding range of the western burrowing owl has contracted primarily on the eastern and northern edges (Wellicome and Holroyd 2001, as cited in Klute et al. 2003) and extends from southern Canada south into central Mexico. In the United States, the historical breeding range included much of the continental landmass: Utah, Nevada, Arizona, Texas, Wyoming, Colorado, New Mexico, North Dakota, South Dakota, Nebraska, eastern parts of Washington and Oregon, much of California, and parts of Montana, Idaho, Kansas, Oklahoma, Minnesota, and Iowa (Klute et al. 2003).

Burrowing owls are known to migrate north during March and April, arriving the first week of May in southern Canada, although little information exists on migration routes and times (Haug et al. 1993). The majority of burrowing owls that breed in Canada and the northern United States are believed to migrate south during September and October spending the winter in southern parts of the United States and Mexico (Klute et al. 2003).

Surveys conducted during a Breeding Bird Survey (BBS) revealed a mixture of population trends throughout the burrowing owl breeding range in North America. However, when taken as a whole, generally declining populations are present in the northern half of the Great Plains, and generally increasing populations are present in the northwest interior and in some southwestern deserts of the United States (Sauer et al. 2002 as cited in Klute et al. 2003). Reported densities range from nearly one pair per hectare in agricultural lands along the Colorado River in Arizona (Brown 1998 as cited in NatureServe 2006) to 13-16 hectares per pair in Saskatchewan (Anon).

3.3.5.3.1 Habitat

Although very little is known about the wintering and migratory habitats of burrowing owls, much is known about their breeding habitat requirements since they nest on the ground and are easily located and examined. Breeding habitats consist of open areas with mammal burrows including native prairie, tame pasture, hayland, fallow fields, road and railway rights-of-way, and even some urban habitats (e.g., campuses, airports, and golf courses). They use a wide variety of arid and semi-arid environments, often associated with well-drained, level to gently sloping areas characterized by very little vegetation and bare ground (CEC 2005, Klute et al. 2003). Black-tailed prairie dog burrows especially are favored and utilized by burrowing owls. When burrows are scarce however, owls have been found nesting in natural rock and lava cavities (Gleason 1978 as cited in Klute et al. 2003). Satellite burrows are often used by owls and are thought to be an avoidance response to predation and or parasites.

3.3.5.4 Life History

3.3.5.4.1 Reproductive Biology

Western burrowing owls are generally found on the northern breeding grounds from mid-March through September (Haug et al. 1993) and are capable of breeding at one year of age (Klute et al. 2003). Courtship and pair formation occur in March and April in most areas, but may begin as early as late December in California. Clutch size averages over the entire range between six and seven eggs and ranges from 4 to 12 (Haug et al. 1993, as cited in Klute et al. 2003). Incubation, performed entirely by the female, lasts approximately one month. The male provides food during the incubation period and the early nestling stage. The burrowing owl averages between three and five fledglings per brood (NatureServe 2006). The young are able to run and forage for themselves at four weeks and achieve sustained flight at six weeks (NatureServe 2006, Klute et al. 2003).

3.3.5.4.2 Diet

Burrowing owls are opportunistic feeders, primarily taking large insects, small mammals, birds, amphibians and reptiles (Haug et al. 1993). Vertebrates were more common in the winter diet and arthropods were taken more frequently during the summer months (Haug et al. 1993). Prey may be caught in flight or from the ground.

3.3.5.4.3 Migration

The western burrowing owl makes annual migrations from breeding sites in southern Canada and northern parts of the U.S. to the wintering grounds in the southern U.S. and parts of Mexico (Klute et al. 2003). There are some non-migratory populations. Breeding populations in southern California are sedentary and remain in the area year-round (NatureServe 2006).

3.3.5.5 Threats

Threats affecting burrowing owls include: habitat loss and fragmentation, reduction in burrow numbers, and predation by uncontrolled populations of small predators. A brief summary of threats in the context of the five listing factors used to assess species for listing as threatened or endangered under the ESA are described below.

3.3.5.5.1 The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Primary threats across the North American range of the burrowing owl are habitat loss and fragmentation primarily due to intensive agricultural and urban development, and habitat degradation due to declines in populations of colonial burrowing mammals (Grant 1965, Konrad and Gilmer 1984, Ratcliff 1986, Haug et al.

1993, Dundas and Jensen 1995, Rodriguez-Estrella et al. 1998, Sheffield 1997a, Dechant et al. 1999, as cited in Klute et al. 2003). The dramatic reduction of prairie habitat in the United States has been linked to reduction of burrowing owl populations (Sheffield 1997a, as cited in Klute et al. 2003). Fragmentation of nesting habitat may reduce the opportunity for unpaired owls to find mates (Sheffield 1997a, as cited in Klute et al. 2003). Larger home ranges have been observed in fragmented landscapes (Warnock and James 1997, as cited in Klute et al. 2003).

Elimination of burrowing rodents through control programs has been identified as the primary factor in the recent and historical decline of burrowing owl populations (Butts and Lewis 1982, Pezzolesi 1994, Desmond and Savidge 1996, 1998, 1999, Toombs 1997, Dechant et al. 1999, Desmond et al. 2000, Murphy et al. 2001, all cited in Klute et al. 2003). For example, in western Nebraska, a 63 percent decline in burrowing owl numbers over a seven year period in 17 black-tailed prairie dog colonies was associated with declines in black-tailed prairie dog densities due to population control activities (Desmond et al. 2000, as cited in Klute et al. 2003).

Burrowing owls prefer grasslands moderately or heavily grazed by cattle or prairie dogs (James and Seabloom 1968, Butts 1973, Wedgwood 1976, MacCracken et al. 1985, Bock et al. 1993). Klute et al. (2003) speculates that the response of burrowing owls to cattle grazing is related to the effects of prairie dog grazing and must be evaluated in conjunction with the presence of previously excavated burrows.

3.3.5.5.2 Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes

This threat was not included as a basis for warranting protection under state and federal regulations.

3.3.5.5.3 Disease or Predation

Usually tolerant of humans, and often found in urban or semi-urban areas, burrowing owls are susceptible to predation by dogs and cats (NatureServe 2006). Efforts to reintroduce the species into Minnesota over four years were abandoned after failure due to high predation rates (Martell et al. 2001 as cited in Klute et al. 2003). Disease is not thought to be a direct threat to burrowing owls (Klute et al. 2003).

3.3.5.5.4 Inadequate Regulatory Mechanisms

Burrowing owls are protected by the MBTA (1918) in the United States and Mexico, which makes it illegal to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 CFR, Part 10 (Klute et al. 2003). In the United States, the burrowing owl was listed as an ESA Category 2 Candidate species until February 1996, when the Category 2 designation was discontinued. Burrowing owls are listed as endangered in Canada and as threatened in Mexico (Klute et al. 2003).

3.3.5.5.5 Other Natural or Manmade Factors Affecting the Species Continued Existence

Burrowing owls may be susceptible to collisions with vehicles, because burrowing owls often fly low to the ground. Collisions with vehicles have been cited as a significant source of mortality by several researchers (Haug et al. 1993, as cited in Klute et al. 2003). Military aircraft have been involved with strikes to burrowing owls in eastern New Mexico (W. Howe, pers. comm., as cited in Klute et al. 2003). Additionally, Gillihan (2000) documented a burrowing owl killed by a collision with a barbed wire fence (Klute et al. 2003).

Pesticides, particularly insecticides and rodenticides in burrowing owl habitat, have been reported as a potential factor in burrowing owl declines (James and Espie 1997, as cited in Klute et al. 2003). Pesticides not only reduce the food supply and the number of burrowing mammals, but these chemicals also may be toxic to burrowing owls (Ratcliff 1986, James and Fox 1987, James et al. 1990, Baril 1993, PMRA 1995, Hjertaas 1997, Sheffield 1997b, as cited in Klute et al. 2003). Burrowing owls have been reported to ingest poisoned rodents and to forage on the ground for insects in areas with poison grains also on the ground (Butts 1973, James et al. 1990, as cited in Klute et al. 2003).

3.3.5.6 Conservation

A status assessment and conservation plan has been prepared for western burrowing owl by the USFWS (Klute et al. 2003). Included in this assessment and plan were conservation recommendations for burrowing owls in the United States. Recommendations for Nevada included (Klute et al. 2003):

- Development of BMPs for rangeland pesticides and minimizing use, particularly in areas of high burrowing owl density. The impacts of off-road vehicles could be mitigated by adjustment of sanctioned event routes and closure of casual use in burrowing owl breeding centers, presumably regulated by state and federal agencies.
- Recommended that artificial burrows be used as a means of maintaining current populations or encouraging populations to immigrate to new sites. Artificial burrows should be placed in protected areas suitable to support burrowing owls.
- Surveys should also be conducted to locate new nest sites or monitor known sites.
- Research on the impacts of rangeland pesticides and off-road vehicles on burrowing owls, and the degree to which populations are reliant on agriculture was also recommended in Nevada.
- Education of farmers and off-road vehicle enthusiasts should be targeted for education in Nevada. The USDA Natural Resource Conservation Service extension services could assist in this effort.
- Habitat protection and management, and burrowing animal management for Nevada included leaving drain ditches unburned and ditch banks and turnrows undisturbed; protecting burrow sites; establishing conservation easements with private landowners to secure good burrowing owl habitats; preserve salt desert scrub habitat and its burrowing mammal community; and work with developers in urban and suburban areas to preserve open space within developments for burrowing owls.

The Nevada Partners in Flight Plan (Neel 1999) identifies western burrowing owl as a priority bird species and establishes strategies to stabilize the current decreasing population trend of this species in Mojave shrub habitats in southern Nevada. Most of the plan's recommendations are reflected in the recommendations made above by Klute et al. (2003).

3.3.5.7 Recovery Units

Western burrowing owl is not listed under the ESA and a recovery plan has not been developed; therefore, there are no recovery units proposed for western burrowing owl.

3.3.5.8 Critical Habitat

Western burrowing owl is not listed under the ESA. Therefore, there is no critical habitat proposed for western burrowing owl.

3.3.5.9 Species Status

3.3.5.9.1 Rangewide

Klute et al. (2003) summarized the rangewide status of western burrowing owl. The BBS revealed a mixture of population trends throughout the burrowing owl breeding range in North America (Sauer et al. 2002). BBS trends for burrowing owls are largely limited by small sample size and the species not adequately being sampled over a large part of their breeding range. Trends in nearly all regions are limited by important or potential deficiencies (Sauer et al. 2002). However, when taken as a whole, generally declining populations are present in the northern half of the Great Plains, and generally increasing populations are present in the northwest interior and in some southwestern deserts of the United States.

Surveys in California in 1986 to 1991 found population decreases of 23 to 52 percent in the number of breeding groups and 12 to 27 percent in the number of breeding pairs of owls (DeSante et al. 1997). Populations in western Nebraska declined 58 percent (91 to 38 nesting pairs) between 1990 to 1996 (Desmond and Savidge 1998). Populations in New Mexico have exhibited mixed trends with stable or increasing populations associated with the presence of suitable habitat and increased precipitation and food availability while decreasing populations were associated with loss of suitable habitat (Arrowood et al. 2001). In Wyoming, only 11 percent of 86 historical sites were occupied in 1998; however, the importance of this finding is uncertain due to the tendency for burrowing owl colonies to move (Korfanta et al. 2001). The Wyoming Game and Fish Department's Wildlife Observation System showed populations generally increasing between 1974 to 1980 and then decreasing between 1981 to 1997 (Korfanta et al. 2001). In North Dakota, the burrowing owl has disappeared from the eastern third of the state and is uncommon to rare in the best habitats north and east of the Missouri River (Murphy et al. 2001). In southwestern North Dakota, the current population trend is not clear, but is probably closely tied to populations of prairie dogs (Murphy et al. 2001). In Oklahoma, there are an estimated 800 to 1,000 breeding burrowing owls, restricted primarily to the panhandle of the state (Sheffield and Howery 2001). In a survey of National Grasslands, Sidle et al. (2001) found higher occupancy of active prairie dog towns in the southern Great Plains (93 percent) than in the northern Great Plains (59 percent).

3.3.5.9.2 Lincoln County

Burrowing owls breed throughout Nevada in natural settings: salt desert scrub, Mojave shrub, and some sagebrush habitat, as well as in agricultural landscapes. Burrowing owls often breed around the fringes of agricultural lands and use crop and pasture lands for foraging during the breeding season. General habitat condition in many of the known nesting territories is poor. Excessive grazing by large ungulates does not seem to decrease nest site suitability, and may be preferred because of increased visibility. Burrowing owls also nest in open urban areas with open space (e.g., golf courses, airport runways, and industrial areas) if burrows are available. Over-wintering is more common in the southern half of Nevada, but has been recorded throughout the state during all months (Herron et al. 1985 as cited in Klute et al. 2003).

Habitat condition of salt desert scrub varies with grazing and fire history. Indian ricegrass was likely much more prevalent historically in this habitat than it is today, and is an important plant for kangaroo rats, a key component in the ecology of this habitat and a prey item for burrowing owls. Invasion of exotic plants such as cheatgrass, halogeton, Russian thistle, and in certain places tamarisk has compromised native communities (Neel 1999, as cited in Klute et al. 2003). The effect of this type of habitat conversion on burrowing owls has not been measured (Klute et al. 2003).

The Las Vegas Field Station of the USGS-BRD, in cooperation with the NPS, initiated a research study in 2002 on burrowing owls at the Lake Mead National Recreation Area (Klute et al. 2003). The results of this study are not yet available.

3.3.5.9.3 Covered Area

Western burrowing owls may potentially occur in the Development Area. Burrows for this species were found during clearance surveys on private land in Clark County, south of the Development Area in 2006. Of the 48 burrows detected, three were active at the time. Given that western burrowing owls have high site fidelity, additional nests may be currently active (Goodwin, pers. comm. 2007). The methodology for the potential range identified is explained in Appendix S: Species Selection Process.

Although the study site is not within the Covered Area, intensive burrowing owl monitoring has been conducted on the Nevada Test Site (NTS) in southern Nevada from 1996 through 2001 (Hall et al. in review, Steen et al. 1997, as cited in Klute et al. 2003). Three main ecoregions are recognized on the NTS: Great Basin Desert, Mojave Desert, and a transitional ecoregion between the two deserts. A total of 114 burrowing owl locations, including 84 burrowing sites and 30 sighting locations, were documented on the NTS for a density of 2.4 burrowing owl burrows per 100 km^2. Sixty-two locations (54 percent) occurred in the transition ecoregion, 37 (33 percent) occurred in the Mojave, nine (8 percent) occurred in the Great Basin, and six (5 percent) were at historic, unspecified locations.

Most of the locations occurred in areas with disturbances containing partially buried metal culverts and pipes, relatively deep washes with defined banks, mounds of dirt or excavations, or roadcuts (Klute et al. 2003).

Burrowing owls were monitored on the NTS at least monthly from November 1997 to July 1998 and November 1998 to December 2001. Owls were found on the NTS year-round. Generally, they wintered on the

NTS in low numbers with a large influx around mid-March. Owl numbers fluctuated slightly during the spring and summer, increased slightly during September to October, and then steadily declined through late fall and early winter until they reached their lowest point, usually in January (Steen et al. 1997, Hall et al. in review, as cited in Klute et al. 2003).

Local declines within Nevada are noted where habitat is lost to development at the suburban fringe. For example, observations suggest a decline of up to 50 percent in the Lahontan Valley since 1946 (Klute et al. 2003). In 1992, the statewide population was roughly estimated at 1,000 to 10,000 pairs, based on a survey of state wildlife agencies during that year (James and Espie 1997 as cited in Klute et al. 2003). Habitat loss due to agricultural cultivation and development is probably the main threat to burrowing owls in Nevada, although loss of native components and invasion of exotics in shrub habitats may also have negative implications (Klute et al. 2003).

3.3.5.10 Relevant Consultations

Western burrowing owl is a high-priority evaluation species under the Clark County MSHCP (RECON 2000). The Clark County MSHCP minimizes and mitigates to the maximum extent practicable the adverse effects of Covered Activities on western burrowing owl. This document provides protection for the species and replacement of habitats lost from implementation of the covered activities for the plan.

3.4 EVALUATION SPECIES

3.4.1 Moapa White River Springfish

Scientific Name: *Crenichthys baileyi moapae*

Source: University of Michigan Museum of Zoology; Photo of *Crenichthys baileyi*

3.4.1.1 Protection Warranted

3.4.1.1.1 Endangered Species Act

- The Moapa White River springfish is not currently protected under the ESA.
- February 28, 1996: Category 2, category of candidate species was removed, no longer a candidate species, 61 FR 7596-7613.
- November 15, 1994: Candidate for federal listing, Category 2, 59 FR 58982-59028.

3.4.1.1.2 Nevada Administrative Code

- Not protected under NAC, however, the Moapa White River springfish is protected under NRS 501.

3.4.1.1.3 Other Protections

- Clark County MSHCP High Priority species.
- Nevada State Imperiled (S2).

3.4.1.2 General Description

The Moapa White River springfish is a subspecies of *Crenichthys baileyi* of the Cyprinodontidae family. It differs from the four other subspecies of White River springfish (*C. b. albivallis*, *C. b. baileyi*, *C. b. grandis*, and *C. b. thermophilus*) in body shape, coloration, and number of fin rays (Williams and Wilde 1981 as cited in USFWS 1996).

The back of Moapa White River springfish is olive colored, fading to almost white on the lower sides and belly. At the base of the tail and pectoral fins, it is yellow-orange, and two horizontal rows of black spots along the sides are present. Females are not as brightly colored as the males. Springfish are deep-bodied, with a maximum length of approximately 5 to 7.6 cm (2 to 3 in), and typically live 3 to 4 years (USFWS 1996).

3.4.1.3 Ecology

Moapa White River springfish occur in 5 spring systems (Apcar, Baldwin, Cardy Lamb, Muddy Spring, Refuge) and the upper Muddy River, but are most abundant in the spring systems (Deacon and Bradley 1972, Cross 1976, Scoppettone et al. 1987, Sada pers. comm., all cited in USFWS 1996).

3.4.1.3.1 Habitat

Springfish are very tolerant of low levels of dissolved oxygen and high water temperatures. For example, Moapa White River springfish may occupy Preston Big Spring, with parameters of 21ºC (69.8ºF) and 3.3 ppm dissolved oxygen, or 37ºC (98.6ºF) and 0.7 ppm dissolved oxygen at Mormon Spring (NDOW 2005c). Typically, they occur at or near springheads and pools and backwaters along spring outflow systems and in the upper Muddy River until water temperatures become too cold. In the Muddy River system, this subspecies utilizes habitat similar to Moapa dace. However, springfish have historically been collected in the Muddy River as far downstream as the Hidden Valley Road bridge since 1941(Deacon and Bradley 1972, as cited in USFWS 1996). In 1986, springfish were documented in an artificial pond downstream of the Hidden Valley Road Bridge (Scoppettone et al. 1987 as cited in USFWS 1996).

3.4.1.4 Life History

3.4.1.4.1 Reproductive Biology

Moapa White River springfish will spawn year round, although peak spawning activity occurs from April through August (Scoppettone et al. 1987, as cited in USFWS 1998).

The following is a summary of spawning behavior of Moapa White River springfish held in aquaria as reported by Kopec (1949) as described in USFWS 1998: “The male began courting the female at a 45 degree angle with his head down, from a distance of 2.5 to 7.6 centimeters (1 - 3 inches) directly ahead of the female, allowing her to witness his intense colors and markings. The male then approached the female and attempted to corner her in dense vegetation. Soon they formed an S-shaped clasp with both fish vibrating very quickly as they laid on their sides. As the anal fin of the male folded under the female’s ovipositor, insuring a direct pathway for fertilization, one egg was deposited. The egg then fell onto and adhered tightly to nearby vegetation. Spawning females deposited 10 to 17, 1.9 millimeter-diameter (.07 inch) eggs. Larval springfish were hatched after a 5 to 7 day incubation period.”

3.4.1.4.2 Diet

Springfish primarily eat filamentous algae, but also eat aquatic insects (RECON 2000), depending on food availability and time of year (USFWS 1998).

3.4.1.5 Threats

Threats to Moapa White River springfish are water loss, habitat modifications, and competition and predation by non-native fishes.

3.4.1.5.1 The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Much of the subspecies’ habitat has been lost to groundwater pumping and alteration through illegal diversions in the Muddy River system (NDOW 2005c). Changes in water quality have resulted from grazing and agriculture (pesticides, herbicides, and fertilizer) (RECON 2000). Additionally, habitat degradation and population decreases have resulted from introductions, competition, and encroachment of non-native species (i.e., tamarisk, Vallsineria, fan palm invasion, red shiners, and tilapia) (RECON 2000).

3.4.1.5.2 Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes

This threat was not included as a basis for warranting protection under state and federal regulations.

3.4.1.5.3 Disease or Predation

Competition for food and predation by non-native fishes continues to threaten the subspecies (NDOW 2005c). Springfish are more aggressive amongst themselves in the presence of shortfin molly, which increase mortality among springfish (Scoppettone unpublished data, as cited in USFWS 1998).

3.4.1.5.4 Inadequate Regulatory Mechanisms

Approximately 95 percent of existing Moapa White River springfish habitat is in private ownership, while only 5 percent is in public ownership within the MVNWR (RECON 2000). Therefore, coordination between federal, state, and private interests is necessary for protection of the Moapa White River springfish.

3.4.1.5.5 Other Natural or Manmade Factors Affecting the Species Continued Existence

This threat was not included as a basis for warranting protection under state and federal regulations.

3.4.1.6 Conservation

The Moapa White River springfish was included as a species of special concern in the Recovery Plan for the Rare Aquatic Species of the Muddy River Ecosystem (USFWS 1996). No recovery actions were developed specifically for the Moapa White River springfish, rather, the actions proposed for the Moapa dace would also benefit the seven other endemic aquatic species analyzed in the plan.

The Moapa White River springfish is also included in the Clark County MSHCP as an evaluation-high priority species (RECON 2000). Conservation actions beneficial to Moapa White River springfish in the Clark County MSHCP include monitoring and protecting water sources and flows; restoration habitat in adjacent uplands, tributaries, and the Muddy River; eradicating non-native species; and restricting pesticide/herbicide use near aquatic habitats (RECON 2000). The MVNWR also provides protected habitat for this species.

3.4.1.7 Recovery Units

The Moapa White River springfish is not listed under the ESA and therefore does not have designated recovery units.

3.4.1.8 Critical Habitat

The Moapa White River springfish is not listed under the ESA and therefore does not have critical habitat designated.

3.4.1.9 Species Status

3.4.1.9.1 Rangewide

Within the Muddy River system, distribution and numbers appear to have declined significantly since 1980, although good baseline data for comparison of changes is lacking (NDOW 2005c). Summer surveys in 1984 produced a springfish population estimate of nearly 25,000 fish from the spring systems, although the upper Muddy River was not surveyed (Scoppettone et al. 1987, as cited in USFWS 1996). In 2002, the population was estimated at 3,596, and 4,681 individuals rangewide in warm spring outflows (NDOW 2002, 2003). Numbers of native springfish were negatively correlated with blue tilapia abundance (NDOW 2002). Along the middle Muddy River, a small population at an off-channel location near Hidden Valley Dairy was sampled in 2002, catching 58 individuals in 17 minnow traps left overnight. Fifty-two (52) of those individuals were captured near a small warm water seep on one side of the pond (NDOW 2002).

In February 2003, NDOW visually counted Moapa White River springfish during Moapa dace surveys and estimated the population to be 11,823. Where a May 2003 fire altered 90 percent of the North Fork and South Fork drainages, initial counts of springfish were in the single digits (NDOW 2003).

3.4.1.9.2 Lincoln County

The Moapa White River springfish only occurs in five springs in the upper Muddy River system in Clark County, Nevada. It does not occur in Lincoln County.

3.4.1.9.3 Covered Area

The Moapa White River springfish does not occur in the Covered Area, as there are no perennial springs to support the species within this area. Moapa White River springfish only occur in the upper Muddy River system. As Moapa White River springfish may occupy similar springs with Moapa dace, the approximate distance to the Warm Springs Area of the Muddy River is approximately 14 miles away from the Covered Area, and approximately 17 miles from the Development Area.

3.4.1.10 Relevant Consultations

There are no relevant consultations that have been conducted in the vicinity of the Covered Area specifically for the Moapa White River springfish.

3.4.2 Moapa Speckled Dace

Scientific Name: *Rhinichthys osculus moapae*

Source: Nevada Natural Heritage Program; Photo of *Rhinichthys osculus*

3.4.2.1 Protection Warranted

3.4.2.1.1 Endangered Species Act

- Not currently listed under ESA.
- February 28, 1996: Category 2 was removed as a category for candidate species, no longer considered a candidate species, 61 FR 7596-7613.
- November 15, 1994: Candidate for federal listing, Category 2, although information was lacking to support the finding of endangered or threatened (59 FR 58982-59028).

3.4.2.1.2 Nevada Administrative Code

- Classified as Sensitive under NAC 503.067 (Sensitive Fish).
- Protected under NRS 501.
- Nevada State Critically Imperiled.

3.4.2.1.3 Other Protections

- BLM Sensitive Species.
- Clark County MSHCP Medium Priority species.

3.4.2.2 General Description

The Moapa speckled dace is closely related to the Pahranagat speckled dace (*R. o. velifer*) and Virgin River speckled dace (*R. o. yarrowi*) (USFWS 1996). Moapa speckled dace are generally olive or tan colored on the back with faint darker specks. The lower sides and belly are yellowish or cream colored. The body is rounded and elongated with a somewhat pointed head (USFWS 1996). Its tail is deeply forked; all other fins are large and sickle-shaped. During the spawning season, males may develop orange-red coloration on the mouth, gill covers, and fins. Maximum size is approximately 10 cm (4 inches), and individuals typically live 3 years or less (USFWS 1996).

3.4.2.3 Ecology

Moapa speckled dace historically have occurred in relatively low numbers, primarily in the middle Muddy River (Deacon and Bradley 1972, Cross 1976, as cited in USFWS 1996). The creation of Lake Mead created a barrier to downstream dispersal due to unsuitable habitat (Miller 1952, as cited in USFWS 1996). Although, Moapa speckled dace typically are abundant in clear thermal waters fed by hot springs, such as those found in the upper portions of the Muddy River, the Moapa dace may exclude the Moapa speckled dace from occurring in the upper portions of the Muddy River (Deacon and Bradley 1972, as cited in USFWS 1996).

3.4.2.3.1 Habitat

Moapa speckled dace typically live on the bottom in shallow, cobble riffles, hiding in low flow velocity areas behind rocks (Cross 1976, as cited in USFWS 1996). Spawning habitat consists of small patches of bare rocks and pebbles that are cleared of debris by the males (USFWS 1996). Larval speckled dace remain down in the pebbles for a short time and then move into lower velocity areas.

3.4.2.4 Life History

3.4.2.4.1 Reproductive Biology

Reproductive biology specific to the Moapa speckled dace is largely unknown. Data collected for speckled dace varies with location. NatureServe (2006) compiled the following information from various studies for speckled dace. Cross (1975) collected ripe females in late June and mid-July 1973 from the Virgin River drainage in Utah, but in Aravaipa Creek, Arizona, speckled dace were collected in breeding coloration or with tubercles from December to August, with mature gonads from November to March, or seen engaged in spawning activities from January to April. Larvae were collected from January to April.

John studied reproduction in Cave Creek, Chiricahua Mountains, Arizona (John 1963 as cited in NatureServe 2006). Females matured at two years of age. Peaks in reproductive activity were in early spring and late summer. John believed spawning efforts were triggered by flash floods. Males defended territories, and activities of the male often resulted in circular, clean gravel areas that John (1963) called nests. A female entered a defended area and partially buried or wedged herself under the edge of a stone. Males took positions next to the buried female, and the pair or group vibrated for a few seconds, after which the female departed. A female entered a nest several times, depositing a portion of her ripe eggs during each spawning event. John (1963) gave data for the total number of eggs laid in an aquarium by each of eight females. From these data, the number of eggs laid related to standard length was calculated using the equation: number of eggs laid = -264.41 + 10.45 mm standard length (SL) (R- squared = 0.89, $p < 0.001$). Females ranged from 45 to 75 mm SL and numbers of eggs laid ranged from 174 to 514. Eggs hatched in 6 days at 18 to 19ºC under laboratory conditions.

Maximum age of speckled dace in streams of the Chiricahua Mountains is three years (John 1964). Moyle et al. (1989) stated that some may live up to 5 to 6 years. Females from the Kettle River, British Columbia, Canada, however did not mature until the end of their second year (Peden and Hughes 1981, NatureServe 2006).

3.4.2.4.2 Diet

Young speckled dace feed primarily on plankton, while adults feed primarily on aquatic insects and algae (USFWS 1996). Speckled dace may also feed on detritus and plant material (Schreiber and Minckley 1981 and Williams and Williams 1982, as cited in Hobbes 1999). Feeding is most active at night (Van Eimeren 1988 as cited in Hobbes 1999).

3.4.2.5 Threats

Speckled dace have likely been adversely affected by reductions in water quality and quantity, habitat modifications, parasites, and competition and/or predation by non-native fish species (USFWS 1996).

3.4.2.5.1 The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

The Moapa speckled dace is vulnerable to habitat alteration. Reductions in water quality and quantity may particularly affect Moapa speckled dace in the Muddy River.

3.4.2.5.2 Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes

This threat was not included as a basis for warranting protection under state and federal regulations.

3.4.2.5.3 Disease or Predation

A threat to the Moapa speckled dace is the introduction and proliferation of non-native fishes (RECON 2000).

3.4.2.5.4 Inadequate Regulatory Mechanisms

This threat was not included as a basis for warranting protection under state and federal regulations.

3.4.2.5.5 Other Natural or Manmade Factors Affecting the Species Continued Existence

This threat was not included as a basis for warranting protection under state and federal regulations.

3.4.2.6 Conservation

The Moapa speckled dace was included as a species of special concern in the Recovery Plan for the Rare Aquatic Species of the Muddy River Ecosystem (USFWS 1996). No recovery actions were developed specifically for the Moapa speckled dace; rather, the actions proposed for the Moapa dace would also benefit the seven other endemic aquatic species analyzed in the plan.

The Moapa speckled dace is also included in the Clark County MSHCP as an evaluation-medium priority species (RECON 2000). The Clark County MSHCP includes conservation actions beneficial to Moapa speckled dace, including monitoring and protecting water sources and flows; restoration habitat in adjacent uplands, tributaries, and the Muddy River; conducting life history and habitat assessments; eradicating non-native species; and restricting pesticide/herbicide use near aquatic habitats (Clark County 2000). The MVNWR also provides protected habitat for this species.

3.4.2.7 Recovery Units

Moapa speckled dace are not listed under the ESA; therefore, recovery units are not delineated for this fish.

3.4.2.8 Critical Habitat

Moapa speckled dace are not listed under the ESA; therefore, critical habitat has not been proposed for this fish.

3.4.2.9 Species Status

3.4.2.9.1 Rangewide

Moapa speckled dace currently inhabit approximately 16.7 km (10.4 mi) of the Muddy River. In a 1994 survey, a total of 706 Moapa speckled dace were captured and released in the mainstem Muddy River (Scoppettone unpubl. data, as cited in USFWS 1996). Twenty-eight percent were captured between Warm Springs Road Bridge and White Narrows, 64 percent between White Narrows and Reid-Gardner Station, and 8 percent between Reid-Gardner Station and Interstate 15 (Scoppettone unpubl. data as cited in USFWS 1996).

One speckled dace was captured below the Interstate 15 Bridge. In 1995, surveys by NDOW initially measured Moapa speckled dace as occurring from 900 to 1600 individuals per river mile (Desert Fishes Council [DFC] 1997). Survey transects were conducted by NDOW at four points along the Muddy River in 1999, 2000, and 2001. In 2001, although only a portion of total habitat was sampled, a total of 86 individual speckled dace were captured with hoop nets (NDOW 2002).

Deacon and Bradley (1972) noted that the distribution of Moapa speckled dace shifted upstream between 1964 and 1967, as did the Virgin River chub (USFWS 1996).

3.4.2.9.2 Lincoln County

Moapa speckled dace do not inhabit Lincoln County, but, rather, Clark County in the Muddy River basin.

3.4.2.9.3 Covered Area

The Moapa speckled dace does not occur in the Covered Area, as there are no perennial springs to support the species within this area. Moapa speckled dace may occur in the Warm Springs Area of the Muddy River, which is approximately 14 miles away from the Covered Area and 17 miles from the Development Area.

3.4.2.10 Relevant Consultations

There are no relevant consultations that have been conducted in the vicinity of the Covered Area specifically for the Moapa speckled dace.

3.4.3 Relict Leopard Frog

Scientific Name: *Rana onca*

Source: reptilesofaz.com; Photo of Rana onca

3.4.3.1 Protection Warranted

3.4.3.1.1 Endangered Species Act

- June 13, 2002: Listing as Federal Candidate Species (67 FR 40657-40679). This listing has been continued to present time (69 FR 24875-24904, 70 FR 24869-24934, 71 FR 53755-53835).

3.4.3.1.2 Nevada Administrative Code

- Classified as Protected under NAC 503.075 (Amphibians: Classification).

3.4.3.1.3 Other Protections

- This species is considered Sensitive by the USDA Forest Service, and The Nevada Natural Heritage Program (NNHP) ranks the relict leopard frog as critically imperiled.

3.4.3.2 General Description

The adult relict leopard frog is a small spotted frog with a body length of 1.75 to 3.5 inches (Stebbins 2003). The dorsal coloration is brown, gray or greenish with distinct greenish-brown spots. These spots occur on the back and thighs and become reduced or obscure anteriorly with no spots usually present on the nose (Stebbins 2003). The dorsolateral folds, characteristic of members of the genus *Rana*, become indistinct well before the groin. The relict leopard frog is whitish ventrally with dark mottling on the throat and yellow or yellow-orange under the legs and groin. Males tend to be more uniform in color and less spotted than females, have a darkened, enlarged thumb base and tend to be slightly smaller than females (Jennings 1988).

Relict leopard frog larvae are moderately sized (3.3 inches in TL), have a dull citrine or greenish olive dorsum, are heavily mottled, and have an elongate, pale green-yellow tail with a rounded tip. Larvae are ventrally semitransparent (Wright and Wright 1949, Jennings 1988).

The relict leopard frog is a member of the *Ranid* or true frog genus and based on a number of gross morphological characteristics, *R. onca* is considered part of the *Rana pipiens* complex (leopard frogs). This is a grouping of more than 25 species in North and Central America (Hillis 1988, Relict Leopard Frog Working Group [RLFWG] 2001). While there is some debate as to whether the relict leopard frog is the same species as the extinct Las Vegas Valley Leopard Frog (*Rana fisheri*), Jennings et al. (1995) concluded that the relict leopard frog is not synonymous with *R. fisheri* and should be considered a separate and distinct species.

3.4.3.3 Ecology

The known historical distribution of relict leopard frog was springs, streams and wetlands within the Virgin River drainage in Utah, Arizona, and Nevada, downstream from Hurricane, Utah, and along the Muddy River drainage, Nevada (Platz 1984). It also occurred along the Colorado River from its confluence with the Virgin River downstream to Black Canyon below Lake Mead in Nevada and Arizona (RLFWG 2001).

Relict leopard frog was thought to be extinct since the 1950s; however, it was re-discovered in 1991 (Bradford and Jennings 1997). The relict leopard frog was confirmed to occupy eight sites within its historic range following its rediscovery. Populations at two of these sites have subsequently been extirpated (Center for Biological Diversity [CBD] and Southern Utah Wilderness Alliance [SUWA] 2002). Currently, the relict leopard frog is extant at six sites in two general areas, both occur within the Lake Mead National Recreation Area; one near the Overton Arm area of Lake Mead and the other in Black Canyon (CBD and SUWA 2002). These areas represent less than 10 km of linear habitat, which is less than 1 percent of their original distribution (CBD and SUWA 2002).

3.4.3.3.1 Habitat

Relict leopard frog habitat includes permanent small streams, springs, and spring-fed wetlands below 760 m (Jennings 1988). Historically, relict leopard frogs were limited to habitats characterized by deep and shallow aquatic habitats with clean, clear water. The relict leopard frog prefers areas with submerged, emergent and perimeter vegetation to forage and for refuge (RLFWG 2001). Such vegetation includes bulrush, cattail, spikerush and small tules and is likely required as cover and as a substrate for oviposition (Jennings and Hayes 1994). Current observations suggest that adults prefer moderately vegetated shorelines. Remnant populations of relict leopard frog are confined to perennial desert springs along the Virgin and Colorado rivers (CBD and SUWA 2002). Water sources for all six sites with extant populations of frogs are geothermally influenced and subsequently water temperatures remain between 16°C and 55°C (Pohlmann et al. 1998). The remaining habitats seem to reflect a preference for minimally disturbed sites implying that spring-influenced habitats may be critical for key life history traits of relict leopard frog (Jennings pers. comm. 2002, as cited in CBD and SUWA 2002).

The three areas recently inhabited by the relict leopard frog differ greatly. Littlefield is a small, marshy wetland fed by a spring near the shore of the Virgin River (CBD and SUWA 2002). These frogs are now extirpated. The Overton Arm sites of Lake Mead are fast moving springs formed by geothermal upwelling (CBD and SUWA 2002). Black Canyon habitats are geothermal springs that flow over rocky substrate with mesquite and tamarisk vegetation cover (CBD and SUWA 2002).

3.4.3.4 Life History

3.4.3.4.1 Reproductive Biology

Male relict leopard frogs appear to reach sexual maturity within the first year (42 mm SVL) (Bradford unpublished data, as cited in RLFWG 2001). The age at which females become sexually mature is unknown, but mark recapture studies suggest high turnover within a population and survivorship averaging 27 percent per year (Bradford unpublished data, as cited in RLFWG 2001).

The relict leopard frog breeds in late January through April, with peak oviposition occurring in February and March. Water temperature does not appear to influence the breeding season as it differs among sites with extant frogs. Favored breeding habitat seems to be quiet, shallow pools outside the channel or in slow moving microhabitats within a stream (Bradford et al. 2001). Eggs discovered are deposited in clusters 4 to 6 cm in diameter and contain upwards of 250 eggs. Egg clusters are attached to vegetation within a few centimeters of the water surface. Sites with moderate cover are preferred.

While the exact duration between oviposition and hatch are unknown, anecdotal field observations suggest approximately one week is needed. Additional anecdotal evidence suggests that several months are needed to attain metamorphosis (Bradford et al. 2001). In a laboratory setting, relict leopard frog larvae exposed to natural photoperiods and abundant food metamorphose 6.5 months after hatch. Hatchling larvae are usually found in motionless congregations in shallow, open pool margins for up to one week after hatching. Larvae are active diurnally and evidence of flocking has not been found.

3.4.3.4.2 Behavior

Relict leopard frogs are observed most often sitting motionless in shallow water along channel edges. Individuals are generally spaced one to two meters apart with frogs occurring at higher densities at favorite sites (RLFWG 2001).

Relict leopard frogs are active year-round, although they likely hibernated at the higher elevations (above 600 m) within their historic range. Within the current range, the relict leopard frog display no evidence of torpor or hibernation during cold weather, although adult frogs are more difficult to find during cold periods, even in geothermal springs (Bradford et al. 2001). Activity levels appear to differ seasonally. Frogs tend to be more nocturnal in the summer months transitioning to a diurnal activity pattern in the winter (RLFWG 2001). There is no evidence of aestivation during summer or dry periods as the relict leopard frog is found only around permanent wet areas.

3.4.3.4.3 Diet

While no dietary studies of the relict leopard frog have been conducted, presumably their diet is similar to that of other ranid frog species. Ranid species eat small invertebrates such as spiders, crustaceans, many varieties of insects, and small vertebrates as well (AGFD 1997). Ranid larvae consume plant materials such as algae, detritus, plant tissue and potentially small invertebrates (AGFD 1997).

3.4.3.4.4 Migration

Relict leopard frog appears to be a relatively stationary frog that moves only short distances. A 3-year mark-recapture study recorded the mean distance moved by adult frogs to be only 18 m. The longest distance recorded was 120 m (Bradford unpublished data, as cited in RLFWG 2001). Another study conducted by Jennings et al. (1995) recorded the longest movement at 200 meters. Furthermore, studies have shown no evidence of seasonal migration or hibernation (Bradford et al. 2001). Due to the fragmentation of extant sites and the lack of protective vegetation or wet periods to serve as migration corridors, remaining populations are effectively allopatrically isolated (Jennings pers. comm. 2002, as cited in CBD and SUWA 2002).

3.4.3.4.5 Predator Avoidance

Adult relict leopard frogs flee by jumping into deep water or into a cluster of thick vegetation when disturbed. In diurnal conditions, frogs are flighty, usually jumping prior to being spotted, however at night, frogs will remain motionless unless threatened. Frogs will generally reemerge in 10 to 15 minutes (RLFWG 2001).

Larvae appear to randomly flee when disturbed. Displaced individuals tend to seek cover among vegetation and in loose mud, often burying themselves, or under rocks or ledges depending on substrate availability.

3.4.3.5 Threats

Threats to the relict leopard frog include alterations to habitat, disease, predation, illegal collection, grazing, habitat fragmentation, and low genetic diversity. A brief summary of threats in the context of the five listing factors used to assess species for listing as threatened or endangered under ESA are described below.

3.4.3.5.1 The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Water development within the historic range of relict leopard frog, including the impoundment of water, loss of the natural flow regime, the damming of the Colorado River and subsequent inundation of suitable habitat, are all likely factors that caused and continue to endanger remaining populations (CBD and SUWA 2002).

Relict leopard frog is extremely susceptible to the lowering of the water table via diversions and ground water pumping (AGFD 1996, 1998). Due to this species reliance on spring water, such a lowering of the water table could result in the drying of the spring-influenced wetlands they inhabit. The extinction trajectory throughout the frogs' historic range occurred concurrently with the alteration of aquatic habitat due to marsh draining and water development for agriculture and urban development (Jennings 1988, Jennings and Hayes 1994). Clark County currently has an 8 percent annual growth rate (Clark County 2000), not atypical of other counties in the region. Continued use of diminishing water resources and additional demand due to expanding urban centers could foreseeably cause such a scenario (CBD and SUWA 2002).

Cattle and feral burro impacts may be a significant cause of decline throughout the relict leopard frog's historic range. Physical destruction of habitat such as erosion from trampling may cause severe enough water quality impacts to cause decline in herpetofauna (Jones 1979, Jennings and Hayes 1994), and the exclusion of cattle has seen the reestablishment of other periled ranid frogs in California (Dunne 1995). Grazing animals may also serve as a vector for disease and fungal infection and cause direct mortality and loss of recruitment by trampling adult frogs and egg masses (USFWS 2000b).

3.4.3.5.2 Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes

The relict leopard frog populations are so small that any collection or utilization for commercial, recreational, scientific or educational purposes may prove significant (CBD and SUWA 2002). However, if scientific collections of eggs and small larvae for research and laboratory experiments are coordinated, it is not likely to pose a significant threat, as this age class has high mortality under natural conditions (99% mortality) (Romin, pers. comm., as cited in CBD and USFWS 2002).

3.4.3.5.3 Disease or Predation

Disease and fungal infections may serve as a significant cause of mortality. A bacterial infection caused by *Aeromanas hydrophila* killed a large portion of a lowland leopard frog (*R. yavapaensis*) population in Arizona in 1992. This particular infection may be triggered by stress (Sredl 1997).

Chytrid fungus (*Batrachochytrium dendrobatidis*) was identified in numerous Arizona amphibians in 1998 including several species of leopard frogs (Sredl et al. 2000, Bradley et al. 2002). Chytrid is highly virulent attacking the keratin in the skin and mouthparts of frogs, eventually killing them. Infections have been recorded and correlated with major die-offs and population declines in the lowland leopard frog and Chiricahua leopard frog (*R. chiricahuensis*). It does not appear that Chytrid has yet infected extant relict leopard frog populations (Romin, pers. comm., as cited in CBD and SUWA 2002).

Introduced exotic species exist that predate upon and/or compete with native ranid frogs and which have become established and widely distributed along the Virgin, Muddy and Colorado rivers (CBD and SUWA 2002). These species include bullfrogs (*R. catesbeiana*) and predatory fishes such as bass (*Micropterus* spp.), sunfish (*Lepomis* spp.) and catfish. Red swamp crayfish (*Procambarus clarkii*) and western spiny soft-shell turtles (*Trionyx spiniferus emeryi*) are also present (Jennings and Hayes 1994, RLFWG 2001). These introduced species are suspected to have contributed to population declines of the relict leopard frog along with other amphibian species (Corn 1994, Jennings and Hayes 1994). These species may all exert a strong negative influence on frog populations through predation at all life history stages (CBD and SUWA 2002).

While the relict leopard frog currently has no federal protection against take under the ESA, all remaining extant populations occur within the Lake Mead National Recreation Area managed by the NPS. This affords certain blanket protections against possessing, destroying, injuring, defacing, removing, or disturbing wildlife. Additionally NPS has regulations against introducing non-native predators into a national park.

3.4.3.5.4 Inadequate Regulatory Mechanisms

Arizona, Nevada, and Utah all limit the collection, study, or use of relict leopard frogs to those with a scientific collecting permit, and each state has regulations limiting or prohibiting the anthropogenic dispersal of threats, such as non-native organisms, to the frog (Relict Leopard Frog Conservation Team 2005). However, these regulations have not completely prevented illegal non-native species introductions at some locations, such as various species of fishes at Rogers and Blue Point springs (Relict Leopard Frog Conservation Team 2005). Relict leopard frogs and their habitat are protected by federal regulations (Relict Leopard Frog Conservation Team 2005).

3.4.3.5.5 Other Natural or Manmade Factors Affecting the Species Continued Existence

Due to the low population numbers and the severe fragmentation of the relict leopard frog habitat, low genetic variation may threaten remaining frog populations (CBD and SUWA 2002). Invasive plant species such as tamarisk, with high evapo-transpiration rates, may further lower groundwater and may cause higher salinity levels within relict leopard frog habitat.

3.4.3.6 Conservation

The Relict Leopard Frog Conservation Team (2005) prepared a Conservation Agreement and Rangewide Conservation Assessment and Strategy for the relict leopard frog. Signatories to this agreement include federal and state agencies, local interests, academia and non governmental organizations. The primary purpose of the Conservation Agreement is to expedite implementation of conservation measures for relict leopard frog in Clark County, Nevada and Mohave County, Arizona. Immediate conservation actions are needed to reduce threats to relict leopard frog, increase both the size and number of populations, and maintain associated riparian and wetland habitats (Relict Leopard Frog Conservation Team 2005). Some examples of conservation actions needed to address threats include: protect and enhance occupied and nearby habitats; prevent illegal collection or use of relict leopard frogs; selectively control detrimental non-native aquatic species; identify and control the spread of disease; prevent detrimental modifications and degradation of relict leopard frog habitat; and develop distribution and life history information; and establish populations in new areas to alleviate small population size, limited habitat, and fragmentation of populations (Relict Leopard Frog Conservation Team 2005).

3.4.3.7 Recovery Units

The relict leopard frog is not yet listed under the ESA, nor has a recovery plan been developed. Therefore, there are no designated recovery units for the relict leopard frog.

3.4.3.8 Critical Habitat

The relict leopard frog is not yet listed under the ESA. Therefore, there is no designated Critical Habitat for the relict leopard frog.

3.4.3.9 Species Status

3.4.3.9.1 Rangewide

The relict leopard frog was historically found in the Muddy and Virgin River drainages. The current distribution is reduced to six populations in two areas of the Lake Mead National Recreation Area: Overton Arm area of Lake Mead and Black Canyon below Lake Mead. Both areas represent historical localities, with specimen records dating from 1936 at the Overton Arm area and from 1955 at Black Canyon (USFWS 2004b). These two areas comprise only a fraction of the historical distribution of the species, encompassing maximum linear extents of only 3.6 and 5.1 km (2.2 and 3.2 mi), respectively (USFWS 2004b). USFWS (2004b) believes that within the Overton Arm area, dispersal of relict leopard frogs may be possible between Blue Point and Rogers springs, which are separated by a minimum of 1.6 km (1 mi). Two relict leopard frogs have been observed by NPS staff at a small spring located between Rogers and Blue Point Springs (R. Haley, pers. comm. 2004 as cited in USFWS 2004b).

Populations at two additional localities have recently been extirpated (Littlefield, Arizona, and Corral Spring, Nevada). In addition, three individual leopard frogs have been observed on different occasions in 2000, 2001, and 2002 at the Willow Beach National Fish Hatchery at Willow Beach, Arizona, located 10 km downstream from Bighorn Sheep Spring in Black Canyon (C. Fiegel pers. comm., as cited in Relict Leopard Frog Conservation Team 2005). One of these was collected and confirmed as the relict leopard frog based on mtDNA sequence similarity (J. Jaeger unpublished data, as cited in Relict Leopard Frog Conservation Team 2005), and another possessed a mark used in recent sampling of upstream populations. A population of leopard frogs of undetermined identity has been found in Surprise Canyon, a tributary to the Colorado River in the lower Grand Canyon. In 1987, Barry Adams, an associate of Lawrence Stevens (ecological consultant, Flagstaff), took a photograph of a leopard frog in Surprise Canyon. The frog was not collected. In 1997, Michael Douglas (Colorado State University, Fort Collins) found a dead, badly degraded leopard frog (Relict Leopard Frog Conservation Team 2005). In 2004, surveys within Surprise Canyon documented a large population of these frogs. Analysis of mtDNA samples indicate that these frogs are most closely related to lowland leopard frogs (J. Jaeger pers. comm., as cited in Relict Leopard Frog Conservation Team 2005).

An extant population of leopard frogs at Wahweap Creek near Big Water, Utah, and Page, Arizona is morphologically similar to the relict leopard frog and the lowland leopard frog. The taxonomy of these frogs also needs resolution, although these frogs were not similar to any known southwestern leopard frog based on mtDNA analysis (Rorabaugh et al. 2002, as cited in Relict Leopard Frog Conservation Team 2005).

POPULATION ESTIMATES

The Relict Leopard Frog Conservation Team (2005) summarized the following population estimates. Visual encounter surveys (VES) have been conducted multiple times at all sites, and mark-recapture studies have been conducted at two sites (Bradford et al. 2004, Romin pers. comm., as cited in Relict Leopard Frog Conservation Team 2005). At the upper 555 m segment of Blue Point Spring, 96 adult frogs (≥ 42 mm SUL) were captured and marked during 13 visits over the 2-year period from 1995 to 1996. The estimated number of frogs averaged 36 (95% confidence limits, 27 to 45), and estimated annual survivorship averaged 0.27. Visual encounter surveys between 1991 and 2001 at this site showed considerable variation in numbers encountered (4 to 32 frogs over a 385 m reach; n = 23 visits). There was no consistent pattern of increase or decrease in numbers detected over this time period, although the data suggested an increase rather than a decrease. At Bighorn Sheep Spring in Black Canyon, which extends approximately 450 m in length, a single mark-recapture effort (60 initially marked adults) in March to April 2001 yielded an estimate of 637 adults (95% confidence limits, 381 to 1210). VESs on 3 to 4 visits during 1997 to 2001 at the sites in Black Canyon yielded average counts of 110, 5, and 13 at Bighorn Sheep Spring, Salt Cedar, and Boy Scout springs, respectively.

To obtain a rough estimate of the total number of relict leopard frog adults, mark-recapture estimates of population size, VES counts, and estimates for extent of available habitat are combined (Bradford et al. 2004). At the Northshore sites, the estimated total linear extent of aquatic habitat is 5.1 km, based on ground measurements, aerial photographs, and USGS digital orthophotoquads. Assuming a frog density similar to that observed in the upper segment of Blue Point Spring in 1995 to 1996 (i.e., mean of 35.9 adults/555 m), the estimated total number of frogs in the Northshore Arm Area is 330 adults. This is likely an overestimate, because the density of frogs encountered in most of the aquatic habitat in this area is conspicuously lower than the density seen at the upper Blue Point Spring Area. In Black Canyon, the population estimate at Bighorn Sheep Spring was 637 adults for a time when 104 frogs were counted in the VES, a factor of 6.1. Applying this factor to the average VES counts at the other 2 sites in Black Canyon (mean counts of 5 and 13), an estimate of 750 frogs is obtained for the total adult population size in Black Canyon, 85 percent of which are at Bighorn Sheep Spring. This yields approximately 1,100 adult frogs as the rough estimate for the total population of adult relict leopard frogs, more than half of which occur at one site. These estimates should be interpreted with caution as numbers of relict leopard frogs in a population are expected to vary considerably within and among years (Sredl et al. 1997, Skelly et al. 1999, Sartorius and Rosen 2000).

RECENT POPULATION EXTIRPATIONS

The Relict Leopard Frog Conservation Team (2005) also summarized information for recent population extirpations. At Corral Spring, frogs were counted and marked during 16 visits between November 1991 and December 1994 (Bradford et al. 2004). The maximum number of frogs observed of all sizes was 40, but the population became extirpated by early 1995. Between 1991 and 1995, the change in habitat was conspicuous at Corral Springs. The pools that were initially largely open with scattered emergent vegetation became choked with emergent vegetation, primarily *Scirpus* spp. By early summer of 1994, most of these pools had virtually no open water. This extirpation may have been a natural process, because individuals may periodically colonize this site from Rogers Spring during wet periods after the site is scoured by flood waters, and populations may subsequently be extirpated due to shrinkage of aquatic habitat and vegetation encroachment as drier conditions prevail.

The surveys were initiated in late 1991, a year with high-precipitation storms associated with an El Niño/Southern Oscillation event that scoured vegetation at Corral Spring (R. Jennings pers. comm., as cited in Relict Leopard Frog Conservation Team 2005). Moreover, aquatic habitats were more extensive along the creek below Rogers Spring than in subsequent years. During such wet times, frogs possibly could colonize Corral Spring from Rogers Spring by traveling 3.0 km along a drainage channel that currently contains desert wash habitat, or by traveling 1.6 km straight-line distance. Similar dispersal distances have been reported for other ranid species in the Southwest, albeit in more mesic environments (Marsh and Trenham 2001). For example, Frost and Bagnara (1977) noted movement of plains leopard frogs (*R. blairi*) for 8 km or more along a creek in the Chiricahua Mountains. Rosen and Schwalbe (1998) found up to 25 young adult and subadult Chiricahua leopard frogs (*R. chiricahuensis*) at a roadside puddle in the San Bernardino Valley, Arizona. They believed that the only possible origin of these frogs was a stock tank located 5.5 km away.

Whether the relict leopard frog persisted at Corral Spring between 1957 (when several specimens were collected) and 1991 is not known. The demise of the relict leopard frog at Corral Spring may have been influenced by the construction of a fence in 1991 to exclude feral burros (*Equus asinus*) from most of the site. Prior to the fence, burros may have kept emergent vegetation from completely covering pools.

At the Littlefield site, frogs were observed during the daytime in 1992 and 1996, and six were counted at night in both April and July 1998. None of the frogs captured in July were those marked in April. No frogs were found during three nighttime surveys between March and May 2001 (Bradford et al. 2004). Bullfrogs were observed in an artificial pond at the site in 1992 and 2001, whereas relict leopard frogs were observed only within open marshy habitat near one spring source. As at Corral Spring, the demise of the relict leopard frog population occurred concomitantly with loss of pool habitat due to rapid encroachment of emergent vegetation. Between 1992 and 2001, vegetation cover (primarily *Scirpus* spp.) had increased dramatically such that no pools of open water remained exposed except for the artificial pond. Until some years ago, vegetation within the marsh was kept open by livestock grazing. Subsequently, with the absence of grazing, emergent vegetation grew over virtually all the former open water at the site (Bradford et al. 2004). Introduced bullfrogs have also become established in wetlands along this portion of the Virgin River (BIO-WEST 2001).

3.4.3.9.2 Lincoln County

The relict leopard frog does not occur in Lincoln County, Nevada.

3.4.3.9.3 Covered Area

Relict leopard frog is unlikely to occur within the Covered Area, as there are no springs or other perennial waters within the Covered Area.

3.4.3.10 Relevant Consultations

The relict leopard frog is a covered species under the Clark County MSHCP (RECON 2000) and the Lower Colorado River Multiple-species Conservation Program (LCR MCP) (Jones and Stokes 2004). These HCPs minimize and mitigate to the maximum extent practicable the adverse effects of covered activities to the relict leopard frog. These documents provide protection for the species and replacement of habitats lost from implementation of the covered actions for each plan. The subsequent BO for the LCR MCP (File No. 02-21-

04-F-0161; USFWS 2005b) found that the action would not likely jeopardize the continued existence of the species.

3.4.4 Southwestern Willow Flycatcher

Scientific Name: *Empidonax traillii extimus*

Source: U.S. Bureau of Reclamation, Lower Colorado region Resources Management Office

3.4.4.1 Protection Warranted

3.4.4.1.1 Endangered Species Act

- February 27, 1995: Listed as Endangered, without critical habitat (60 FR 10694-10715).
- July 22, 1997: Critical habitat designated (62 FR 39129-39146).
- August 20, 1997: Critical habitat correction notice to clarify lateral extent of designation (62 FR 44228).
- May 11, 2001: Critical habitat set aside by 10th circuit court of appeals in New Mexico; USFWS subsequently set aside critical habitat designated in all other states (California and Arizona).
- August 30, 2002: Final Recovery Plan approved (USFWS 2002d).
- 2005: Critical habitat designated in Nevada, Arizona, California, Utah, and New Mexico (70 FR 60886).

3.4.4.1.2 Nevada Administrative Code

- Southwestern willow flycatchers are classified as Protected and Endangered under NAC 503.050 (Protected, Endangered and Sensitive Birds).
- BLM sensitive species.

3.4.4.1.3 Other Protections

- The species is listed as endangered in the states of California, New Mexico, and Arizona.

3.4.4.2 General Description

The southwestern willow flycatcher is a small grayish-green passerine bird (Family Tyrannidae) measuring approximately 5.75 inches. It has a grayish-green back and wings, whitish throat, light gray-olive breast, and pale yellowish belly. Two white wingbars are visible (juveniles have buffy wingbars). The eye ring is faint or absent. The upper mandible is dark, and the lower is light yellow grading to black at the tip. The song is a sneezy fitz-bew or a fit-a-bew; the call is a repeated whitt. The southwestern willow flycatcher is one of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993).

3.4.4.3 Ecology

The historic range of southwestern willow flycatcher is similar to the current range, although reductions in quantity and quality of habitat have contributed to isolation and fragmentation of suitable habitat (USFWS 2005c). The historic breeding range of southwestern willow flycatcher includes southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

As of 2004, there were 220 to 265 known southwestern willow flycatcher breeding sites in California, Nevada, Arizona, Utah, New Mexico, and Colorado ((data compiled by USGS and USFWS, Phoenix, Arizona). [4]

[4] A site is a location where one or more pairs of flycatchers attempt to nest, holding approximately 1,000 to 1,250 territories.

Population estimates vary based on numerous factors (e.g., incomplete survey effort, double-counting males/females, composite tabulation methodology, natural population fluctuation, and random events), and it is likely that the actual breeding population of southwestern willow flycatchers fluctuates from year to year. Known numbers of breeding pairs have increased since the bird was listed, and some habitat remains unsurveyed. Rangewide, the population is comprised of extremely small, widely-separated breeding groups including unmated individuals. The distribution of breeding groups is highly fragmented, often separated by considerable distance. The large distances between breeding groups and the small size of those populations reduces overall population stability and increases the risks of local extirpation due to stochastic events (USFWS 2002d).

Southwestern willow flycatchers are known to winter from the west coast of central Mexico to northern South America.

3.4.4.3.1 Habitat

Southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to approximately 8,500 ft in Arizona and southwestern Colorado. Historical egg/nest collections and species' descriptions throughout its range describe the southwestern willow flycatcher's widespread use of willow (*Salix* spp.) for nesting (Phillips 1948, Phillips et al. 1964, Hubbard 1987, Unitt 1987). Southwestern willow flycatchers primarily use Geyer willow (*Salix geyerana*), Goodding's willow (*Salix gooddingii*), boxelder (*Acer negundo*), saltcedar (*Tamarix* spp.), Russian olive (*Elaeagnus angustifolia*) and live oak (*Quercus agrifolia*) for nesting (USFWS 2002d). Based on the diversity of plant species composition and complexity of habitat structure, 4 basic habitat types can be described for the southwestern willow flycatcher: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge et al. 1997). Saltcedar, an exotic from the Old World, is an important component of the flycatcher's nesting and foraging habitat.

Comparisons of reproductive performance and physiological conditions (Owen and Sogge 2002) of flycatchers breeding in native and exotic vegetation have revealed no difference (USFWS 2002d). Open water, cienegas, marshy seeps, or saturated soil are typically in the vicinity of flycatcher territories and nests; flycatchers sometimes nest in areas where nesting substrates are in standing water (Maynard 1995, Sferra et al. 1995, 1997). However, hydrological conditions at a particular site can vary remarkably in the arid Southwest within a season and among years. At some locations, particularly during drier years, water or saturated soil is only present early in the breeding season (i.e., May and part of June). However, the total absence of water or visibly saturated soil has been documented at several sites where the river channel has been modified (e.g., creation of pilot channels), where modification of subsurface flows has occurred (e.g. agricultural runoff), or as a result of changes in river channel configuration after flood events (Spencer et al. 1996).

3.4.4.4 Life History

3.4.4.4.1 Reproductive Biology

Throughout its range, the southwestern willow flycatcher arrives on breeding grounds in late April and May. Nesting begins in late May and early June and young fledge from late June through mid-August (Whitfield 1990, Sogge et al. 1993, Maynard 1995). Southwestern willow flycatchers typically lay three to four eggs per clutch (range is 1 to 5); eggs are laid at one-day intervals and are incubated by the female for approximately 12 days; and young fledge approximately 12 to 13 days after hatching (Bent 1960, McCabe 1991). Typically, one brood is raised per year, but birds have been documented raising two broods during one season and renesting after a failure (Whitfield 1990, Sogge and Tibbitts 1992). The entire breeding cycle, from egg laying to fledging, is approximately 28 days (USFWS 2002d).

Southwestern willow flycatcher nests are fairly small (3.2 inches tall and 3.2 inches wide). Nests are open cup structures, and are typically placed in the fork of a branch. Nests have been found against the trunk of a shrub or tree (in monotypic saltcedar and mixed native broadleaf/saltcedar habitats) and on limbs as far away from the trunk as 10.8 feet (Spencer et al. 1996). Typical nest placement is in the fork of small-diameter (e.g., 0.4 in), vertical or nearly vertical branches (USFWS 2002d). Occasionally, nests are placed in down-curving branches. Nest height varies considerably, from 2.0 to 59.1 feet, and may be related to height of nest plant, overall canopy height, and/or the height of the vegetation strata that contain small twigs and live growth (USFWS 2002d). Most typically, nests are relatively low, 6.5 to 23 feet above ground (USFWS 2002d).

Riparian patches used by nesting southwestern willow flycatchers vary widely in size and shape; from as small as 0.25 acre along the Rio Grande to 175 acres on the upper Gila River in New Mexico. Mean patch size is 21.2 acres and the median size is 4.4 acres. Flycatchers do not typically nest in narrow strips of riparian vegetation less than 33 feet wide, although they may use these strips if they extend out into larger patches and during migration. Flycatchers often cluster their territories into small portions of riparian sites, and large parts of these sites may be irregularly occupied or not occupied at all. Territories are often bordered by additional habitat that is not defended as breeding territory, but may be important in attracting flycatchers to the site and/or providing an environmental buffer from wind or heat, for post-nesting use and dispersal (USFWS 2002d).

3.4.4.4.2 Diet

The southwestern willow flycatcher is an insectivore, foraging in dense shrub and tree vegetation along rivers, streams, and other wetlands. The bird typically perches on a branch and makes short direct flights, or sallies to capture flying insects. Major prey items of southwestern willow flycatcher in Arizona and Colorado consist of true flies (Diptera), ants, bees, wasps (Hymenoptera), and true bugs (Hemiptera). Other insect prey taxa include leafhoppers (Homoptera: Cicadellidae), dragonflies and damselflies (Odonata), and caterpillars (Lepidoptera larvae). Non-insect prey includes spiders (Araneae), sowbugs (Isopoda), and fragments of plant material (Drost et al. 2001).

3.4.4.4.3 Migration

Southwestern willow flycatcher is a neotropical migrant that breeds in the southwestern United States and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Ridgely and Tudor 1994, Howell and Webb 1995).

3.4.4.5 Threats

Declines in southwestern willow flycatcher populations have been attributed to loss, modification, and fragmentation of habitat, and brood parasitism by brown-headed cowbirds (Finch et al. 2000, Whitfield 1990, Sferra et al. 1995). A brief summary of threats in the context of the five listing factors used to assess species for listing as threatened or endangered under ESA are described below.

3.4.4.5.1 The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Habitat loss has occurred through water management, land use practices, fire, and introduction of exotic species. Water management reduces suitable riparian habitat with dams or reservoirs, diversions, and groundwater pumping. Riparian habitat is reduced or modified by these management practices by alterations in flood frequency and duration, sediment and nutrition deposition, floodplain hydration, inundation period, and seed dispersal of riparian species. Land use practices have also reduced southwestern willow flycatcher habitat. Channelization and bank stabilization have similar effects as general water management, but also increase stream velocity and raise streambeds above groundwater levels, preventing adequate water supply to the roots of riparian vegetation. Agricultural development has converted much riparian forest into farmland. Trampling by cattle causes soil compaction, increasing runoff and erosion and decreasing dispersal and regeneration of vegetation. Livestock grazing also affects the composition and density of riparian areas by the preferential removal of young, native, riparian vegetation. Recreation and urban development contribute to habitat loss through destruction of native vegetation, introduction of exotic species, increased fire risk, and soil compaction. The desiccation of riparian areas through water management and the encroachment of human develop has greatly increased risk of fire. Riparian vegetation is not fire-adapted, making fires here particularly destructive. Often, nonriparian species with faster recovery and regeneration times and adaptations to increased salinity and decreased moisture in soils dominate historic riparian areas after a burn. Lastly, exotic species are replacing native riparian vegetation along waterways. These species often form monospecific stands that differ from native multistory and multispecies composition. Aggressive, exotic species often out-compete willows and cottonwoods, vegetation commonly used by willow flycatchers (Finch et al. 2000).

3.4.4.5.2 Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes

This threat was not included as a basis for warranting protection under the ESA.

3.4.4.5.3 Disease or Predation

Willow flycatcher nests are often parasitized by brown-headed cowbirds, which lay their eggs in the host's nest. Cowbird parasitism reduces reproductive success of willow flycatchers by reducing fecundity and increasing likelihood of nest or brood abandonment. Brown-headed cowbird parasitism of southwestern willow flycatcher broods has been documented throughout its range (Whitfield 1990, Sferra et al. 1995). Numerous human-related activities influence the distribution and abundance of cowbirds in riparian habitats including grazing, recreation, and urban development (Finch et al. 2000).

3.4.4.5.4 Inadequate Regulatory Mechanisms

This threat was not included as a basis for warranting protection under the ESA.

3.4.4.5.5 Other Natural or Manmade Factors Affecting the Species Continued Existence

The total number of southwestern willow flycatchers is small, with an estimated 1,100 to 1,200 territories rangewide (USFWS 2002d). These territories are distributed in a large number of very small breeding groups, and only a small number of relatively large breeding groups. These isolated breeding groups are vulnerable to local extirpation from floods, fire, severe weather, disease, and shifts in birth/death rates and sex ratios (USFWS 2002d). The southwestern willow flycatcher may also be susceptible to low genetic variation within populations and low effective population size (USFWS 2002d).

The southwestern willow flycatcher may also face threats during their migration and on the wintering ground each year (USFWS 2002d).

3.4.4.6 Conservation

A number of pro-active efforts, not driven by legal requirements, are being directed at the conservation and recovery of the southwestern willow flycatcher. Several of these are discussed below, as examples of the range of beneficial programs that can be implemented.

3.4.4.6.1 Habitat Protection and Research

As an example, Washington County, Utah, which is home to more than half of the Virgin River's length, has been ranked among the nation's ten fastest-growing counties in recent years. This growth in human community is facilitating detrimental uses of the Virgin River and its riparian resources. For example, a current proposal calls for a 60 percent reduction of the river's winter flow in the last reach where two endangered fish maintain relatively healthy populations. According to the Natural Heritage Programs in Utah, Arizona, and Nevada, the Virgin River Basin supports 32 species which are globally rare and of pressing conservation concern. The USFWS lists six (6) of these species as endangered, two more are threatened, and an additional 24 are being monitored. Many of these species rely on the Virgin River's riparian habitat, which occurs on only 1 percent of the entire basin's land base. The Grand Canyon Trust has responded by launching a two-pronged effort: first, an extensive information gathering effort to prepare for reasonable discussions regarding management decisions and, second, an effort to regularly participate in key management processes which are determining the river's future. The Trust's vision is a healthy, accessible river with self-sustaining native plant and animal populations for the children of 2097 and beyond.

3.4.4.6.2 Monitoring and Research

Prior to approximately 1990, research regarding southwestern willow flycatchers was limited, consisting primarily of one regional and one state-based status and taxonomic review and a handful of localized survey and breeding ecology efforts. Research was carried out by several independent researchers, in a few local areas, with little communication of data or regional data compilation. As the southwestern willow flycatcher drew increasing regulatory and management attention (starting with the proposed listing in 1991), survey, monitoring, and research efforts grew from minimal in 1992 to extensive by 1999. Since the early 1990s, statewide surveys have been initiated in Arizona, New Mexico, and Utah, generally as part of the Partners In Flight program. Standardized survey protocols were developed in 1994 and updated in 1997, and statewide survey data integration and reporting have been instituted in some states. In the mid-1990s, intensive breeding and migration ecology, demography, and habitat research was being conducted at several sites in Arizona, California, Nevada, and New Mexico. Range-wide population genetics work was also initiated at this time. Collaborative research is now being conducted throughout the flycatcher's range. Collectively, this body of inventory, monitoring, and research has provided sound quantitative data addressing key questions relative to the recovery and conservation of southwestern willow flycatcher. Work has recently begun on the presence and potential impacts of environmental contaminants at selected flycatcher breeding sites in Arizona. Recent research has also investigated the status, distribution, habitat use, and ecology of the willow flycatcher on its wintering grounds in Central America. Much of this valuable work is expected to continue into the future (given continued funding), and will yield valuable insights on flycatcher status, distribution, and ecology, with the overall goal of improving the design, execution, and evaluation of flycatcher conservation and management actions. As this occurs, it will be critical to continue local, statewide, and rangewide data synthesis and reporting and the collaborative sharing of research needs, ideas, and information.

3.4.4.6.3 Other Efforts of Riparian Conservation

Throughout the Southwest, there are numerous private, local, state and regional efforts aimed at improving and/or reducing the degradation of riparian and wetland habitats. Specific examples include, but are not limited to: the Santa Clara River Enhancement and Management Plan; the Cascabel Community Conservation Plan; the San Pedro Riparian and Las Cienegas National Conservation Areas; the Verde River Management Plan; riparian habitat development downstream of the Nogales International Waste Water Treatment Plant; Las Vegas Wash wetlands restoration program; willow riparian restoration at Key Pittman Wildlife Management Area; San Juan Pueblo post-fire riparian restoration program; Santa Ana Pueblo riparian restoration project; Pueblo of Zuni riparian restoration program; restoration of instream flows on the Agua Fria below Lake Pleasant; water (effluent) releases into the Gila River below Phoenix; experimental releases of beaver on the San Pedro River; and riparian fuels reduction research on the Rio Grande. These projects are at varying stages of development and implementation.

The USFWS applauds the agencies and groups involved in these and other efforts intended to increase the amount of, and improve the condition of, ecologically valuable riparian habitats. Similar projects are underway in virtually every flycatcher Recovery Unit (see Section IV.A.1. in USFWS 2002d). While all such projects are welcome, it is important to recognize that not all of these efforts will directly benefit breeding southwestern willow flycatchers. The flycatcher breeds only in dense, mesic riparian patches, a sub set of the types of riparian likely to be developed as a result of the above programs. It is quite possible, if not likely, that the basic objectives of many of these projects could be met without the development and maintenance of suitable flycatcher breeding habitat. Therefore, the USFWS encourages the groups responsible for these projects to work with flycatcher biologists to include, where possible, specific objectives and design criteria for development, enhancement, and protection of the types of habitats in which flycatchers breed. In this way, these myriad projects have the potential to contribute greatly to the recovery of the flycatcher.

3.4.4.7 Critical Habitat

In 2005 a total of 737 river miles were designated as critical habitat in Nevada, California, Arizona, Utah, and New Mexico. Critical habitat is designed to provide sufficient riparian habitat for breeding, non-breeding, territorial, dispersing, and migrating southwestern willow flycatchers throughout their range. Only areas with some or all of the habitat characteristics for life and reproductive needs (primary constituent elements) were designated as critical habitat. The primary constituent elements from USFWS (2005d) are given below.

"1) Riparian habitat in a dynamic successional riverine environment (for nesting, foraging, migration, dispersal, and shelter) that comprises:

a) Trees and shrubs that include Goddings willow (*Salix gooddingii*), coyote willow (*Salix exigua*), Geyers willow (*Salix geyerana*), arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), yewleaf willow (*Salix taxifolia*), pacific willow (*Salix lasiandra*), boxelder (*Acer negundo*), tamarisk (*Tamarix ramosissima*), Russian olive (*Eleagnus angustifolia*), buttonbush (*Cephalanthus occidentalis*), cottonwood (*Populus fremontii*), stinging nettle (*Urtica dioica*), alder (*Alnus rhombifolia, Alnus oblongifolia, Alnus tenuifolia*), velvet ash (*Fraxinus velutina*), poison hemlock (*Conium maculatum*), blackberry (*Rubus ursinus*), seep willow (*Baccharis salicifolia, Baccharis glutinosa*), oak (*Quercus agrifolia, Quercus chrysolepis*), rose (*Rosa californica, Rosa arizonica, Rosa multiflora*), sycamore (*Platinus wrightii*), false indigo (*Amorpha californica*), Pacific poison ivy (*Toxicodendron diversilobum*), grape (*Vitus arizonica*), Virginia creeper (*Parthenocissus quinquefolia*), Siberian elm (*Ulmus pumila*), and walnut (*Juglans hindsii*).

b) Dense riparian vegetation with thickets of trees and shrubs ranging in height from 2 m to 30 m (6 to 98 ft). Lower-stature thickets (2 to 4 m or 6 to 13 ft tall) are found at higher elevation riparian forests and tall-stature thickets are found at middle-and lower-elevation riparian forests;

c) Areas of dense riparian foliage at least from the ground level up to approximately 4 m (13 ft) above ground or dense foliage only at the shrub level, or as a low, dense tree canopy;

d) Sites for nesting that contain a dense tree and/or shrub canopy (the amount of cover provided by tree and shrub branches measured from the ground) (i.e., a tree or shrub canopy with densities ranging from 50 percent to 100 percent);

e) Dense patches of riparian forests that are interspersed with small openings of open water or marsh, or shorter/sparser vegetation that creates a mosaic that is not uniformly dense. Patch size may be as small as 0.1 hectare (ha) (0.25 acre [ac]) or as large as 70 ha (175 ac); and

2) A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, including: flying ants, wasps, and bees (Hymenoptera); dragonflies (Odonata), flies (Diptera); true bugs (Hemiptera); beetles (Coleoptera); butterflies/moths and caterpillars (Lepidoptera); and spittlebugs (Homoptera)."

3.4.4.8 Species Status

3.4.4.8.1 Rangewide

Southwestern willow flycatcher breeds in dense riparian habitats in southwestern North America, and winters in southern Mexico, Central America, and northern South America. The subspecies was listed as endangered effective March 29, 1995. Reasons for the determination included significant population declines due to loss, modification, and fragmentation of habitat, and brood parasitism by brown-headed cowbirds (Finch et al. 2000, Whitfield 1990, Sferra et al. 1995).

Habitat loss has occurred through water management, land use practices, fire, and introduction of exotic species. Water management reduces suitable riparian habitat with dams or reservoirs, diversions, and groundwater pumping. Agricultural development has converted much riparian forest into farmland. Livestock grazing also affects the composition and density of riparian areas by the preferential removal of young, native riparian vegetation, and trampling by cattle causes soil compaction, increasing runoff and erosion and decreasing dispersal and regeneration of vegetation. Recreation and urban development contribute to habitat loss through destruction of native vegetation, introduction of exotic species, increased fire risk, and soil compaction.

The desiccation of riparian areas through water management and encroachment of human development has also greatly increased risk of fire(s). Riparian vegetation is not fire-adapted, making fires particularly destructive. Often, nonriparian species with faster recovery and regeneration times and adaptations to increased salinity and decreased moisture in soils dominate historic riparian areas after a burn. Exotic species are also replacing native riparian vegetation along waterways. These species often form monospecific stands that differ from native multistory and multispecies composition. Willows and cottonwoods, vegetation commonly used by willow flycatchers, are often outcompeted by aggressive exotic species (Finch et al. 2000).

Additionally, willow flycatcher nests are being parasitized by brown-headed cowbirds, which lay their eggs in the host's nest. Cowbird parasitism reduces reproductive success of willow flycatchers by reducing fecundity and increasing likelihood of nest or brood abandonment. Brown-headed cowbird parasitism of southwestern willow flycatcher broods has been documented throughout its range (Whitfield 1990, Sferra et al. 1995). Numerous human-related activities influence the distribution and abundance of cowbirds in riparian habitats including grazing, recreation, and urban development (Finch et al. 2000).

On August 2002, the USFWS approved the final Southwestern Willow Flycatcher (*Empidonax traillii extimus*) Recovery Plan (USFWS 2002d). The Recovery Plan (USFWS 2002d) uses a watershed approach and divides the breeding range of southwestern willow flycatcher into 6 recovery units and further divides these units into Management Units (between 4 and 7). This provides a strategy to characterize flycatcher populations, structure recovery goals, and facilitate effective recovery actions that should closely parallel the physical, biological, and logistical realities on the ground. Furthermore, using Recovery and Management Units assures that populations will be well distributed when recovery criteria are met (USFWS 2002d).

3.4.4.8.2 Lower Colorado River Recovery Unit/Lincoln County

In 1999, NDOW completed surveys on the eastern Nevada border, at Beaver Dam State Park and just west of the park at Clover Creek. Vegetation at the Beaver Dam site varied from aspen (*Populus tremuloides*), Gooding willow, Fremont cottonwood, and coyote willow. No resident or breeding willow flycatchers were detected. Vegetation at the Clover Creek site consisted of Gooding willow, cottonwood (*Populus* spp.), alder (*Alnus* spp.), ash (*Fraximus* spp.) and coyote willow. No flycatchers were detected (NDOW 1999). In 2001, another survey was completed at Beaver Dam and again, no willow flycatchers were detected (NDOW).

NDOW studies (2000, 2001) had sites at Pahranagat North near Ash Springs, west of U.S. Highway 93 and Key Pittman State Wildlife Management Area, south of Hiko Springs and east of Highway 318. The Pahranagat North site, northwest of the Covered Area, was primarily composed of dense coyote willow patches within a meadow that was periodically inundated with water for cattle. The Key Pittman site, northeast of the Covered Area, consisted of small coyote willow patches on the west side of Nesbitt Lake. In 1999, nine nests were found at Pahranagat North and two were found at Key Pittman. In 2000, a total of 17 adult willow flycatchers were detected at Pahranagat North, 8 pairs and one unpaired. Fifteen nests were found. Nine adult willow flycatchers were detected at Key Pittman, 3 pairs and 3 unpaired. Five nests were found.

Brown (2004) surveyed an area southeast of the Covered Area along the Virgin River from the Nevada Arizona state line to a point 1 km upstream from the mouth of the Toquop Wash. One nest, six residential, two pairs, and 20 migrants were detected on this site. Birds tended to be associated with abandoned meander channels of the Virgin River. These channels have a higher water table and tend to flood periodically, promoting willow and native dominated vegetation growth. The study found 10.6 ha of "optimal" habitat that contained all territories. This optimal habitat comprised only 1 percent of total riparian habitat in the area.

Presence/absence surveys completed along the Muddy River, southeast of the Covered Area, detected four willow flycatchers (McLeod et al. 2005). Koronkiewicz et al. (2003) surveyed for willow flycatcher breeding areas around the Virgin and Lower Colorado River regions. The surveys took place near the City of Mesquite, southeast of the Covered Area. In 2003, 30 resident willow flycatchers were recorded from 19 different breeding territories, and 8 other individuals were also observed for which no residency could be established. In 2004, six flycatcher territories and nine resident birds were detected. All nest sites were located downstream of the Mesquite Bridge, south of the Covered Area.

3.4.4.8.3 Covered Area

None of the land in the Covered Area is designated as critical habitat (USFWS 2005d). The closest designated critical habitat is a 73.8-mile (118.7 km) section of the Virgin River east of and separated from the Covered Area (70 FR 60886).

No flycatcher surveys have been done within the Covered Area at this time. However, surveys have been done for the surrounding area (see Lower Colorado River Recovery Unit/Lincoln County above).

3.4.4.9 Relevant Consultations

Since listing, 53 formal consultations on the flycatcher have been completed in Arizona, 18 in California, 10 in Colorado, four in Nevada, seven in New Mexico, and one in Utah. Of these consultations, six found jeopardy to the species, three in Arizona and three in New Mexico. There are four completed HCPs that address the flycatcher:

- Clark County Multiple Species Habitat Conservation Program (RECON 2000), Nevada.
- San Diego Multiple Species Conservation Program and Multiple Habitat Conservation Plan, California.
- Riverside County Multiple Species Habitat Conservation Plan (Riverside County Integrated Project 2003), California.
- Roosevelt Lake Habitat Conservation Plan (USFWS 2003), Arizona.

These HCPs minimize and mitigate to the maximum extent practicable the adverse effects to the flycatcher. They provide protection for the species and replacement of habitats lost from implementation of the covered actions for each plan.

3.4.5 Yuma Clapper Rail

Scientific Name: *Rallus longirostris yumanensis*

Source: enature.com

3.4.5.1 Protection Warranted

3.4.5.1.1 Endangered Species Act

- March 11, 1967: Listed as Endangered, without critical habitat under the Endangered Species Preservation Act of 1966 (32 FR 4001); listing carried over to the ESA of 1973.
- 1983: Final Recovery Plan approved (USFWS 1983).

3.4.5.1.2 Nevada Administrative Code

- Classified as Protected and Endangered under NAC 503.050 (Protected, Endangered and Sensitive Birds).

3.4.5.1.3 Other Protections

- Nevada State Imperiled (S2).

3.4.5.2 General Description

Yuma clapper rail is a chicken-shaped bird with a long, down-curved beak. Both sexes are slate brown above, with light cinnamon underparts and barred flanks. This subspecies is slightly lighter in color and slightly thinner than other clapper rails (Banks and Tomlinson 1974). Fully grown, the bird measures 14 to 16 inches long. The capper rail's call is sharp with a series of "kek" or "clack" notes. The Clapper Rail call is such that sometimes calls of a single bird may sound like multiple birds are present (Grinnell et al. 1918, as cited in Patten 2001).

3.4.5.3 Ecology

Yuma clapper rail occurs in marshland habitats within the basins of the lower Colorado River (Mexico, Arizona, California, Nevada, and Utah) and Salton Sea (California). The largest populations are found within the extensive marshes associated with the mainstem lower Colorado River and adjacent to the Salton Sea (USFWS 1983). Rails also are found along major tributary systems of the Colorado River including the Gila, Salt, and Verde rivers in Yuma, Maricopa, Pinal, Yavapai (possibly), and Gila counties, Arizona; the Bill Williams River in La Paz County, Arizona; and the Virgin and Muddy rivers in Clark County, Nevada, Washington County, Utah, and Mohave County, Arizona.

3.4.5.3.1 Habitat

Yuma clapper rail occurs in freshwater or brackish marshland habitats, most often with tall, dense emergent vegetation composed primarily of cattail (*Typha* spp.) and bulrush (*Scirpus* ssp.). The interface between marsh and dense riparian vegetation has been considered important, and some birds have been located in flooded saltcedar (*Tamarix* spp.) and willow (*Salix* spp.) stands adjacent to the marshes (Todd 1986, Eddleman 1989). The main factors determining habitat use according to Eddleman (1989) are the annual range of water depth and the existence of residual mats of marsh vegetation. Stable or slowly changing water levels are preferred over conditions with large and rapid water level fluctuations; openings within the wetland, especially open channels with flowing water are also important (Todd 1971, Tomlinson and Todd 1973). Yuma clapper rails will use quiet backwater ponds, flowing stream or riverside areas, irrigation canals and drainage ditches, reservoirs, and small lakes where cattail habitat is available. Natural and artificially constructed marshes can provide suitable habitat. The most productive clapper rail areas consist of a mosaic of uneven-aged marsh vegetation interspersed with open water of variable depths (Conway et al. 1993) and adjacent to dense riparian vegetation.

Yuma clapper rails occur most often in large, extensive patches of emergent marsh vegetation (hundreds of acres in size). Gould (1975), in Imperial County, California, recorded 57 percent of all rail occurrences within patches of marsh habitat greater than 20 acres in size. However, Gould (1975) also found clapper rails in marshes as small as 0.5 acre. Todd (1986) found clapper rails in marsh patches as small as 0.3 acre. Mean density of Yuma clapper rails on the lower Colorado during the breeding season was 0.1 per acre, but ranged as high as 0.32 per acre (Anderson and Ohmart 1985). These data suggest that a 10-acre patch of marsh habitat may support one or two pairs of clapper rails.

Home ranges of individuals or pairs may encompass up to 43 hectares (106 acres) and may extensively overlap with home ranges of other birds. Year-round home ranges averaged 7.5 hectares (18.5 acres) (Rosenberg et al. 1991).

3.4.5.4 Life History

3.4.5.4.1 Reproductive Biology

The breeding season for Yuma clapper rail is from February though early July (Todd 1986, USFWS 1983). Nests are constructed in dense marsh vegetation, among low growing riparian plants at the edge of the water, or on the top of dead cattails remaining from the previous year's growth. Mature cattail/bulrush stands provide materials for nest building and cover for their nests. Sometimes nests are placed in the forks of small shrubs that lie just above moist soil or above water that is up to two feet deep. There is no evidence of more than one brood per season, despite the long breeding period (Eddleman 1989). Both adults care for the eggs and young. Clutch size is usually six to eight eggs. Young are precocial and follow the adults through the marsh within 48 hours of hatching, with the first flight occurring 63 to 70 days post hatching (Terres 1980). Adults lead the young to productive feeding areas where they quickly learn to feed on their own (USFWS 1983, Todd 1986). Young clapper rails experience high mortality within their first month of life due to predation.

3.4.5.4.2 Diet

The preferred prey of Yuma clapper rail is crayfish, predominantly *Procambarus clarki* (Todd 1986), which is not native to Arizona. Crayfish comprises up to 95 percent of the rail's diet by volume (Ohmart and Tomlinson

1977). Yuma clapper rail also forages on isopods, aquatic and terrestrial beetles, damselfly and dragonfly nymphs, earwigs, grasshoppers, spiders, freshwater shrimp, freshwater clams, leeches, plant seeds, and small fish.

3.4.5.4.3 Migration

Once believed to be highly migratory (with most birds thought to spend the winter in Mexico), telemetry data showed most Yuma clapper rails (over 70 percent) do not migrate (Eddleman 1989). Very little is known about the dispersal of adult or juvenile birds, but evidence indicates that Yuma clapper rails can effectively disperse to new habitats provided that habitat corridors exist between the old and new sites (Rosenberg et al. 1991). Rosenberg et al. (1991) speculated that Yuma clapper rails are recent invaders (since 1900) to the northern portions of the Lower Colorado River Basin after extensive damming of the river in the early 1900's. The dams created relatively stable water benefiting marshland habitats suitable for rails.

3.4.5.5 Threats

Threats to Yuma clapper rail include alterations to habitat and environmental contaminants. A brief summary of threats in the context of the five listing factors used to assess species for listing as threatened or endangered under ESA are described below.

3.4.5.5.1 The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Water management projects within the Lower Colorado River Basin have both destroyed and created Yuma clapper rail habitat. Damming of the Colorado River by USBR altered natural flows regimes, inundated habitats, and created backwaters that developed extensive marshlands. Channel dredging, bank stabilization, water diversions, other channel maintenance activities, and development in the flood plain can potentially destroy large areas of marsh habitat and disturb birds, especially during nesting. Cattails and clapper rails are rather tolerant of water level fluctuations, so long as cattail habitats are not dried out completely, and that water levels do not rise rapidly during the nesting season. The birds can adjust nest height if waters rise slowly and not to a height above the tops of emergent vegetation (Eddleman 1989).

Management of the Colorado River has contributed to the expansion of marshes as well as their increased longevity. However, controlling the natural flow regime of the river has eliminated the variable physical conditions that provide for marsh regeneration. Cattail habitat that becomes too dense through the accumulation of dead, previous-year(s) vegetation is less suitable for clapper rails, because birds have difficulty accessing the interior of the stand. Under a natural hydrograph, the high and low water cycles of the river created and destroyed marshes with regularity. Controlling the Colorado River with dams, the natural river processes are constrained and marshes are stabilized. Also, many of the backwaters have trapped high sediment loads facilitating successional changes such that these backwaters no longer provide habitat for the rail.

3.4.5.5.2 Over-Utilization for Commercial, Recreational, Scientific, or Educational Purposes

This threat was not included as a basis for warranting protection under the ESA.

3.4.5.5.3 Disease or Predation

This threat was not included as a basis for warranting protection under the ESA.

3.4.5.5.4 Inadequate Regulatory Mechanisms

This threat was not included as a basis for warranting protection under the ESA.

3.4.5.5.5 Other Natural or Manmade Factors Affecting the Species Continued Existence

Recent environmental contaminant studies on the Colorado River (Roberts 1996, King et al. 2000) have indicated high levels of selenium (a trace metalloid) in tissues of the Yuma clapper rails and their eggs, and in crayfish, the rail's primary prey. Similar concentrations of selenium found in other species have resulted in metabolic problems and reduced reproductive success. No adverse impacts from selenium have been observed in the Yuma clapper rail; however, due to the rail's secretive nature, nests are difficult to find, young birds are hard to observe, and reproductive success is difficult to monitor.

3.4.5.6 Conservation

A recovery plan was approved in 1983 (USFWS 1983). A major objective of the recovery plan was to obtain a minimum breeding population of 700 to 1,000 individuals in the United States. As part of the ESA, USFWS is currently conducting a five year status review of the Yuma clapper rail (70 FR 5460).

Reasonable and prudent measures for the Yuma clapper rail contained in the 1997 BO (USFWS 1997) have been implemented by USBR in the Lower Colorado River area (USFWS 2005b). These measures have resulted in a no net loss of rail habitat due to river maintenance activities and the continuation of programs to maintain the suitability of existing marshes as habitat for the rail. The implementation of these reasonable and prudent measures, combined with active management for rail habitats now being undertaken in combination with research into the use of fire as a management tool, has contributed to an improvement in the status of the clapper rail since 1997 (USFWS 2005b).

3.4.5.7 Recovery Units

There are no recovery units proposed for the Yuma clapper rail.

3.4.5.8 Critical Habitat

No critical habitat has been designated for the Yuma clapper rail.

3.4.5.9 Species Status

3.4.5.9.1 Rangewide

Yuma clapper rail is secretive and often not seen in the dense marsh vegetation it inhabits. Its distinctive calls aid in the identification of birds in the field, and population estimates are based on call-counts taken between late April and mid-June, the period of peak responses to taped calls (Todd 1986). The percentage of breeding birds responding to taped vocalizations has been estimated at 70 to 80 percent for paired birds and 90 to 95 percent for unpaired rails (Bennett and Ohmart 1978), though the frequency of calling and responsiveness to taped calls varies seasonally. In 1987, the Yuma clapper rail population along the lower Colorado River was estimated to be between 400 and 750 individuals in the United States, with 450 to 970 in Mexico (Eddleman 1989). In 1994, the population on the Colorado River in the United States was estimated to be 1,145 individuals. The Yuma clapper rail population in Mexico was estimated to include 6,300 birds in 2000 (Hinojosa-Huerta et al. 2000). Surveys in 2003 documented 809 birds in the United States, though a population estimate had not been determined. It is believed that approximately one-quarter to one-half of all Yuma clapper rails occur in the Colorado River delta in Mexico (the unlisted population); however, the amount of movement between rail populations within Mexico and the United States is unknown. These population estimates suggest that Yuma clapper rail populations have been relatively stable within the Lower Colorado River Basin.

3.4.5.9.2 Recovery Unit/Lincoln County

The Muddy and Virgin rivers contain extensive riparian areas suitable for breeding Yuma clapper rails (Rathbun and Braden 2003). Yuma clapper rail surveys were conducted in southern Nevada (including the lower Virgin and Muddy rivers) by NDOW in 1999 (Tomlinson and Micone 2000) and 2000 (Gallagher et al. 2001). Under contract with SNWA, surveys for special status birds, including the Yuma clapper rail, were conducted in suitable habitat along the Virgin and Muddy rivers. These surveys included the Muddy River in the vicinity of Overton and Glendale, Nevada. Reports for surveys conducted in 2000 (McKernan and Braden 2001), and 2002 (Rathbun and Braden 2003) have been completed. Extensive flooding to the Muddy River during January 2005 led to habitat destruction and fragmentation throughout much of the area, resulting in reduction in suitable clapper rail habitat (BIO-WEST 2005).

Suitable habitat for the Yuma clapper rail in the Overton State Wildlife Area and Maverick Ditch in Overton were surveyed each year beginning in 2000. A third site was added in 2002, which was located west of Interstate 15 and State Route 168 junction near Glendale, Nevada. The Overton State Wildlife Area location was surveyed at one site known as the Honeybee Pond (Tomlinson and Micone 2000), which was approximately 250 meters long and 150 meters wide, providing shallow open water with small stands of cattail (McKernan and Braden 2001). The Maverick Ditch site was an earthen irrigation canal, which was approximately 400 meters in length and 30 meters at its widest point (Rathbun and Braden 2003). A portion of the site was described as having fresh emergent vegetation (*Phragmites* spp.) with a few cattail patches; tamarisk present along the edges and more prevalent at the southeastern end of the site, where a mature cattail field existed (Rathbun and Braden 2003). Rathbun and Braden (2003) speculated that habitat infringement by nearby homes and businesses just east of Cooper Street may have contributed to reduced habitat suitability. The third site was described as having a very narrow channel consisting of cattail patches sparsely spaced along the river; narrow tamarisk stands follow the river channel, except in areas where tamarisk abatement was done (Rathbun and Braden 2003). Rathbun and Braden (2003) thought that the habitat just south of Interstate 15 looked more suitable from a distance, although it could not be surveyed due to lack of permissible access. A summary of the surveys is provided in Table 3-7.

Table 3-7 Summary of Yuma Clapper Rail Surveys in the Vicinity of the Covered Area

Year	No. Detected during Survey Period	Site	Reference
1999	1	Honeybee Pond	Micone and Tomlinson 2000
2000	1	Honeybee Pond	Gallagher et al. 2001
2000	1	Honeybee Pond	McKernan and Braden 2001
2000	1	Maverick Ditch	McKernan and Braden 2001
2001	0	Honeybee Pond	McKernan and Carter 2002
2001	0	Maverick Ditch	McKernan and Carter 2002
2002	0	Honeybee Pond	Rathbun and Braden 2003
2002	4	Maverick Ditch	Rathbun and Braden 2003
2002	0	Muddy River at Glendale	Rathbun and Braden 2003

3.4.5.9.3 Covered Area

Yuma clapper rail is unlikely to occur within the Covered Area, as there are no perennial-fed marshes within the Covered Area.

3.4.5.10 Relevant Consultations

Since 1983, Arizona Ecological Services Office (AESO) has processed 35 formal Section 7 consultations involving the Yuma clapper rail. According to USFWS (2005b), of the 35 formal consultations, 15 were completed prior to 1991, and most of these involved USBR dredging, bank stabilization, dike construction projects, and general management plans by BLM along the Lower Colorado River and Lower Gila River. Habitat losses due to USBR activities were offset by the creation of mitigation areas and backwaters as part of these projects. From 1991-2004, the 20 formal consultations involved use of prescribed fire to benefit habitat and management plans for wildfire, permits under section 404 of the CWA, and largescale agency plans by USBR, BLM, and EPA. There was one jeopardy opinion issued for the rail. The Roosevelt Habitat Conservation Plan in Gila County, Arizona, is the only completed section 10(a)(1)(B) permit that includes the species (USFWS 2003, as cited in USFWS 2005b). The Yuma clapper rail is a covered species in the Lower Colorado River (LCR) MSHCP.

The USFWS-Carlsbad Fish and Wildlife Office processes informal and formal consultations concerning the Yuma clapper rail in California (USFWS 2005b). Many of these address issues with irrigation system maintenance and other projects in the Imperial Valley. A formal consultation for a geothermal plant adjacent to the Sonny Bono Salton Sea National Wildlife Refuge was recently completed. The most significant recent formal consultation addressed USBR's voluntary fish and wildlife conservation measures and associated conservation agreements with California water agencies in 2002 (USFWS 2002a, as cited in USFWS 2005b). This consultation is connected to the 400,000 afy water exchanges that was the subject of consultation between USFWS-AESO and USBR (USFWS 2001b, as cited in USFWS 2005b) and addresses effects to listed species near the Salton Sea from water conservation actions (USFWS 2005b). USBR and state partners will fund the conservation measures (USFWS 2002a, as cited in USFWS 2005b).

3.4.6 Las Vegas Buckwheat

Scientific name: *Eriogonum corymbosum* var. *nilesii*

Source: James L. Reveal

3.4.6.1 Protection Warranted

3.4.6.1.1 Endangered Species Act

- No legal protection, considered federal candidate as of 2007.

3.4.6.1.2 Nevada Administrative Code

- No legal protection.
- This species is not listed under the Endangered Species Act of 1973 as amended.

3.4.6.1.3 Other Protections

- BLM Sensitive Species in Nevada (NNHP 2004)
- Listed as threatened by Nevada Native Plant Society (NNPS 2005)
- High-priority evaluation species under the Clark County MSHCP (RECON 2000)

3.4.6.2 General Description

Las Vegas buckwheat is a member of the buckwheat family (Polygonaceae) (Morefield 2001). Las Vegas buckwheat is a long-lived shrub approximately 0.3 to 1.2 m high and 0.4 to 2.3 m across. It has leaves and flowery branches with silvery tufts of cobwebby hairs. Leaves are oval, stalked, and 1 to 4 cm long. Flowers are numerous and in masses along upper branches, 6-parted, bright to pale yellow, and 2 to 3 mm long. Seeds are triangular, light brown, and 2 to 2.5 m long (Morefield 2001).

Las Vegas buckwheat has had various scientific names in the past. The first, *Eriogonum corymbosum* var. *aureum*, was reportedly endemic to St. George, Utah. Subsequently, *Eriogonum corymbosum* var. *glutinosum* was considered a more correct name for this taxon (Niles et al. 1999). However, a field study by Reveal (2002) determined that the Nevada populations of Eriogonum corymbosum were distinct from both *E. c.* var. *aureum* and *E. c.* var. *glutinosum*. Reveal (2002) described the Nevada populations as a new variety, *E. c.* var. *nilesii*. As of 2001, molecular studies were being conducted at Utah State University to determine its genetic significance (Morefield 2001).

3.4.6.3 Distribution

Las Vegas buckwheat is known to occur in Clark County, Nevada and potentially Utah (NNHP 2001). Las Vegas buckwheat is found in Clark County, Nevada (Morefield 2001) in the Mojave Desert in the Las Vegas region and in the Muddy Mountains (Flora 1993). One collection has been recorded from the flood plain of the Paria River in Kane County, Utah; but it has only temporarily been assigned to this variety (Flora 1993).

The maximum range of Las Vegas buckwheat is approximately 60.6 km (37.6 mi). The current population consists of 5,188+ individuals scattered over a total estimated area of 420+ ha (1,038+ ac) within its range in

Nevada. As of 2001, 15 extant occurrences were mapped at 1.0 km (0.6 mi) separation. At this time, this species trend was declining rapidly.

3.4.6.3.1 Habitat

This species is found at elevations ranging from 579 to 1,170 m (1,900 to 3,839 feet). It occurs on and near gypsum soils, often forming low mounds or outcrops in washes and drainages, or in areas of generally low relief. It is associated with other gypsum-tolerant species such as Las Vegas bearpoppy (*Arctomecon californica*). This species is generally surrounded by white bursage (*Ambrosia dumosa*), desert prince's-plume (*Stanleya pinnata*), four-wing saltbush (*Atriplex canescens*), Torrey's mormon-tea (*Ephedra torreyana*), creosote bush (*Larrea tridentata*), catclaw acacia (*Acacia greggii*), shrubby seepweed (*Suaeda torreyana*), and Fremont's smokebush (*Psorothamnus fremontii*) (Morefield 2001). This species is found in sandy to gravelly soil in flats or washes in saltbush vegetation communities (Flora 1993).

3.4.6.4 Life History

3.4.6.4.1 Reproductive Biology

This species flowers from summer to fall (August through November) (Morefield 2001).

3.4.6.5 Threats

Las Vegas buckwheat is threatened by habitat conversion for residential and urban development, off-road vehicle use, dumping, flood control, road and utility corridors, and gypsum mining (Morefield 2001).

3.4.6.6 Conservation

The Las Vegas Field Office has developed conservation actions to offset potential adverse effects from activities on BLM lands. It also has developed a conservation management strategy for mesquite and acacia woodlands in Clark County, Nevada, which addresses Las Vegas buckwheat (Crampton et al. 2006).

3.4.6.7 Species Status

3.4.6.7.1 Rangewide

In Nevada, surveys for this species are ongoing and relatively complete. The most recent documented survey was in 2004 (Morefield 2001).

Extant populations include:

- North Las Vegas on both sides of Interstate Highway 15, from the vicinity of Craig Road northward and eastward into Area III of Nellis Air Force Base. Area III is a heavily disturbed area that supports a population of this species of more than 300 individuals.
- The northeast corner of Craig Road and Lamb Boulevard. This area was under development as of 1999 and supports a population of approximately 50 plants.
- Gold Butte area.
- Muddy Mountains west of Overton, Nevada.
- CSI private lands in Clark County, Nevada.
- White Basin between the Muddy Mountains and Bitter Spring Valley. Plants were sporadic in sandy or sandy-clay sites in the southeastern portion of White Basin (Niles et al. 1999).

Two occurrences (mapped at >1 kilometer separation) of Las Vegas buckwheat were found within the badlands west of the Pahranagat Wash in Clark County. The largest occurrence of Las Vegas Buckwheat (site LVB 1) contains approximately 2,380 individuals within an 18.2-acre area. It is located on a large, flat terrace within the badlands on what appeared to be gypsum soils, although soil composition was not tested. The second occurrence is located on one of two adjacent, flat outcrop areas along the western edge of the badlands (LVB 2 and LVB 3). The combined total of individuals for LVB 2 and LVB 3 is approximately 1,450 located within an area of 7.2 acres (ENTRIX et al. 2005).

3.4.6.7.2 Covered Area

Surveys for Las Vegas buckwheat were conducted on April 7 to 8, April 26 to 28, and May 23 to 26, 2005. All areas of potential range were walked using a meandering survey approach. No occurrences of Las Vegas buckwheat were observed within the Covered Area. The methodology for how the potential range was determined is included in Appendix S: Species Selection Process.

3.4.6.8 Relevant Consultation

Las Vegas buckwheat is a covered species in the Clark County MSHCP (RECON 2000). This HCP minimizes and mitigates to the maximum extent practicable the adverse effects of Covered Activities to three-corner milkvetch and provides protection for the species and replacement of habitats lost from implementation of the covered actions for each plan.

3.4.7 Three-corner Milkvetch

Scientific Name: *Astragalus gereri* var. *triquetrus*

Source: Nevada Natural Heritage Program

3.4.7.1 Protection Warranted

3.4.7.1.1 Endangered Species Act

- No legal protection, considered federal species of concern.

3.4.7.1.2 Nevada Administrative Code

- It is categorized as Critically Endangered and fully protected by the State of Nevada, pursuant to NAC 527.010 (List of fully protected species of native flora).

3.4.7.1.3 Other Protections

- BLM categorizes three-corner milkvetch as a Special Status Species in Nevada. The NNHP places three-corner milkvetch on its sensitive list.

3.4.7.2 General Description

Three-corner milkvetch is a slender, spreading, fast maturing annual herb with flexuous stems measuring 10 to 20 cm long. The leaves and stems are covered with a fine ashy pubescence. The leaves are 3 to 5 cm long, bearing nine elliptical, retuse leaflets that are 4 to 15 mm in length. Racemes are loosely 2 to 8 flowered. The calyx is white or partially fuscous-strigulose, and is 2 to 4 mm long with a tube that is 1.5 to 2.5 mm long. The petals of the flower are whitish with a faint pink veination that turns violet when dried. The 5 to 7.5 mm-long banner is moderately recurved with a 3.8 to 5 mm-long keel. The ovary is strigulose and has between 7 and 11 ovules. Three-corner milkvetch produces 1-cm pods that are oblong, curved, and triangular in cross section, with a prominent groove along the lower side (AGFD 2002b).

The genus *Astragalus* has more than 2,000 representative species worldwide. *Astragalus geyeri* is one of more than 350 North American *Astragalus* species and has two varieties: *A. g.* var. *geyerei* and *A. g.* var. *triquetrus* (AGFD 2002b).

3.4.7.3 Ecology

Three-corner milkvetch is known from Clark and Lincoln counties in Nevada and in Mojave County in Arizona. In Nevada, the range of this species covers 105 square km (NNHP 2001a). In Arizona, three-corner milkvetch has been reported from Sand Hollow Wash, Horse Thief Canyon and Beaver Dam Wash. However, its reported location in Beaver Dam Wash is now inundated (AGFD 2002b).

A population census conducted in Nevada suggests that there are 39 extant occurrences of this species with a 1-km separation. When mapped using a 0.16-km separation, there are 45 extant occurrences and one extirpated occurrence. Total estimated individuals are in excess of 4,094 plants (NNHP 2001a).

3.4.7.3.1 Habitat

Three-corner milkvetch is found within the Mojave Desert scrub and Creosote bush scrub series plant communities. This milkvetch occurs in open, deep sandy soils or dunes. The substrate is generally stabilized by vegetation or a gravel veneer. These sandy soils are formed from sedimentary formations adjacent to Lake Mead and its tributary valleys (AGFD 2002b). In Nevada, this species is dependent on sand dunes or deep sand and occurs between 1,100 and 2,400 feet (335 to 732 m) in elevation (NNHP 2001a). In Arizona, occurrences have been recorded between 2,000 and 2,395 feet (610 to 730 m) in elevation and the species is found on low-lying, open flat surfaces, generally with a southeast exposure (AGFD 2002b). This milkvetch is also found in eroded clay soils in alcoves along the edges of mesas (Niles et al. 1995).

3.4.7.4 Life History

3.4.7.4.1 Reproductive Biology

This species is an ephemeral annual and is often not seen for years. Three-corner milkvetch germinates in years with average to above-average rainfall, usually flowering between late winter and early spring. Fruit sets in at 4 to 6 weeks (AGFD 2002b).

3.4.7.5 Threats

One of the greatest threats to three-corner milkvetch is the difficulty in managing potential habitat due to the lack of knowledge regarding its general ecology and population trends. Additional threats are those sustained from human recreational activities. Off-road vehicles and off-road vehicle events cause habitat degradation, as well as, direct mortality to three-corner milkvetch. Participant vehicles, spectators, and spectator vehicles all pose possible impacts. Additional recreational activities which may result in possible impacts are equestrian trail rides, dog field trials, flying machine events (remote and piloted), skydiving, and associated parking for these events (RECON 2000).

Grazing of both domestic livestock and feral animals such as burrows may result in significant habitat destruction as well as trampling. Sand and gravel mining operations in the area directly and indirectly cause mortality. Changes in habitat result from water projects (i.e., diversions and ground water pumping) and the subsequent lowering of the water table to a point at which water is no longer biologically available. Habitat degradation, competition, and competitive exclusion from exotic species also pose a threat to three-corner milkvetch (RECON 2000). The inundation caused by the filling of Lake Mead may have resulted in the loss of individuals and habitat (AGFD 2002b).

Other threats that result in direct loss of individuals or loss or fragmentation of habitats include: urban development and sprawl, energy development, surface water development, invasive plant species, utility corridor construction and maintenance, inundation and shoreline fluctuation, Federal land disposal, commercial development, and wild horse and burro management (TNC 2007).

3.4.7.6 Conservation

Ongoing surveys for three-corner milkvetch are conducted by the University of Nevada, Las Vegas. BLM implements site-specific mitigation for this species, actively surveying for invasive plant species within known populations and addressing accordingly (C. Lund pers. comm. 2008).

Conservation efforts are undertaken by the BLM and NPS under the Clark County MSHCP (USFWS 2005b).

In the Clark County MSHCP, the NPS has the following conservation measures that may benefit three-corner milkvetch (RECON 2000):

- Coordinate the inventory of sticky buckwheat and three-cornered milkvetch with other survey efforts on federal lands;
- Manage burro populations under the NPS Burro Management Plan to ensure resources are protected; and
- Investigate the basic ecology of the obligate pollinators of target plant species listed in the Clark County MSHCP to ensure that conservation measures approved under the LCR MSHCP complement conservation recommendations and the location of protected areas and ensures the inclusion of the pollinators' full habitat and food source requirements.

3.4.7.7 Species Status

3.4.7.7.1 Rangewide

Although, the three-corner milkvetch is restricted to a relatively small range, several populations occur within that range. Most extant populations appear to be relatively small, with more than half of these populations consisting of fewer than 100 individuals (Niles et al. 1995, 1997, NPS 1999b, as cited in Jones and Stokes 2004). Many populations either do not appear on an annual basis or fluctuate in size from year to year (Jones and Stokes 2004).

Population trends have not been well documented for three-corner milkvetch (Jones and Stokes 2004). The variability in its appearance makes surveying difficult to assess long-term trends.

3.4.7.7.2 Lincoln County

Three-corner milkvetch occurs in Lincoln County. However, the current status in Lincoln County is unknown.

3.4.7.7.3 Covered Area

Surveys for three-corner milkvetch were conducted on April 7 to 8, April 26 to 28, and May 23 to 26, 2005. All areas of potential range were walked using a meandering survey approach. No occurrences of three–corner milkvetch were observed within the Covered Area. However, potential range exists in the southern half of the Covered Area, in the vicinity of the Pahranagat Wash. The methodology for how the potential range was determined is included in Appendix S: Species Selection Process.

3.4.7.8 Relevant Consultation

Three-corner milkvetch is a covered species in the Clark County MSHCP (RECON 2000) and LCR MCP (Jones and Stokes 2004). These HCPs minimize and mitigate to the maximum extent practicable the adverse effects of Covered Activities to three-corner milkvetch. These documents provide protection for the species and replacement of habitats lost from implementation of the covered actions for each plan. The subsequent BO for the LCR MSHCP (File No. 02-21-04-F-0161; USFWS 2005b) found that the action would not likely jeopardize the continued existence of the species.

3.4.8 Sticky Buckwheat

Scientific Name: *Eriogonum viscidulum*

Source: Nevada Natural Heritage Program

3.4.8.1 Protection Warranted

3.4.8.1.1 Endangered Species Act

- No legal protection, considered federal species of concern.

3.4.8.1.2 Nevada Administrative Code

- It is categorized as Critically Endangered and fully protected by the State of Nevada, pursuant to NAC 527.010 (List of fully protected species of native flora).

3.4.8.1.3 Other Protections

- BLM categorized sticky buckwheat as a Special Status Species in Nevada. The NNHP places sticky buckwheat on its sensitive list.

3.4.8.2 General Description

Sticky buckwheat is a tall, erect, and spreading annual; 0.5 to 4 m high; and minutely viscid (Reveal 2003). Leaves are basal with leaf blades being elliptic to broadly ovate, 0.5 to 3 x 0.5 to 3 cm, densely white-tomentose abaxially, thinly floccose to glabrate and greenish adaxially, margins mostly smooth and plane, petioles 0.5 to 4 cm, floccose (Reveal 2003). Flowering stems are usually one per plant, 0.2 to 1 decimeter (dm). Inflorescences are cymose, spreading and open, 0.3 to 3.5 dm high, with 3 scale-like bracts measuring 1 to 2 mm by 1 to 2 mm (Reveal 2003). The peduncles are filiform, erect or nearly erect, and 5 to 15 mm long. Involucres are narrowly turbinate measuring 1 to 1.2 mm by 0.6 to 0.8 mm. Four teeth (0.3 mm to 0.5 mm) are present (Reveal 2003). Sticky buckwheat flowers are pale yellow and 1.3 mm to 1.5 mm at anthesis. In fruit, the flowers broaden to 1.5 mm to 2 mm and tinge with red. The stamens are included and are 0.9 to 1.1 mm long with glabrous filaments. The glabrous achenes are trigonous and are light to dark brown in color. They measure 0.8 to 1.1 mm in length (Reveal 2003).

3.4.8.3 Ecology

This buckwheat is found in Clark and Lincoln counties, Nevada and northwestern Arizona (NNHP 2001g). Populations occur along the Muddy River from Weiser Wash to its confluence with the Virgin River and within the Virgin River drainage from Sand Hollow Wash to the confluence with the Colorado River at Middle Point. Sticky buckwheat is found within an area of 75.5 square km (NNHP 2001g). This species overlaps with three-corner milkvetch over much of its range.

Population census data in Nevada suggest that 29 different occurrences have been recorded using 1.0 km of separation. When using 0.16 km of separation, 37 occurrences have been mapped. Total population estimates exceed 25,000 individuals (NNHP 2001g).

3.4.8.3.1 Habitat

In Nevada, sticky buckwheat is found in deep loose sandy soils in washes, flats, roadsides, steep aeolian slopes, and stabilized dune areas. This species can withstand moderate temporary disturbance. It is dependent on sand dunes or deep sand in Nevada. Sticky buckwheat occurs between 1,200 to 2,200 feet (366 to 671 m) in elevation within the Mojave desert scrub community (NNHP 2001g).

3.4.8.4 Life History

The sticky buckwheat is a winter annual, with seeds germinating after winter rains, typically in late February to early March (Jones and Stokes 2004). The sticky buckwheat flowers from April to June (Reveal 2003). The presence of this species, both the number and size of individuals, can vary considerably from year to year in a particular location and appear to be correlated with winter precipitation and possibly temperature (Niles et al. 1995, NPS 1999a, as cited in Jones and Stokes 2004).

3.4.8.5 Threats

Perhaps the greatest threat to sticky buckwheat is the difficulty in managing potential habitat due to both the lack of information regarding its ecology and to unknown population trends. More tangible threats include those sustained from concentrated human recreation. Off-road vehicles and off-road vehicle events cause habitat degradation as well as direct mortality of this species. Participant vehicles, spectators, and spectator vehicles all pose possible threats. Additional recreational activities which may result in possible impacts are equestrian trail rides, dog field trials, flying machine events (remote and piloted), skydiving, and associated parking for these events (RECON 2000).

Grazing of both domestic livestock and feral animals may result in significant habitat destruction as well as trampling. Mining operations in the area directly and indirectly cause mortality. Changes in habitat can be caused by water projects (i.e., diversions) and the subsequent lowering of the water table to a point at which water is no longer biologically available. Exotic species can cause habitat degradation, competition, and competitive exclusion (RECON 2000).

Other threats that result in direct loss of individuals or loss or fragmentation of habitats include: urban development and sprawl, energy development, surface water development, invasive plant species, utility corridor construction and maintenance, inundation and shoreline fluctuation, Federal land disposal, commercial development, and wild horse and burro management (TNC 2007).

3.4.8.6 Conservation

According to Jones and Stokes (2004), no specific management actions have been implemented for the sticky buckwheat. Ongoing surveys for the sticky buckwheat are conducted by the University of Nevada, Las Vegas.

Conservation efforts are undertaken by the BLM and NPS under the Clark County MSHCP (USFWS 2005b).

In the Clark County MSHCP, the NPS has the following conservation measures that may benefit the sticky buckwheat (RECON 2000, as cited in Jones and Stokes 2004):

- Coordinate the inventory of sticky buckwheat and three-cornered milkvetch with other survey efforts on federal lands;
- Manage burro populations under the NPS Burro Management Plan to ensure resources are protected; and
- Investigate the basic ecology of the obligate pollinators of target plant species listed in the Clark County MSHCP to ensure that conservation measures approved under the LCR MSHCP complement conservation recommendations and the location of protected areas and ensures the inclusion of the pollinators' full habitat and food source requirements.

3.4.8.7 Species Status

3.4.8.7.1 Rangewide

Although sticky buckwheat is restricted to a relatively small range (northwestern corner of Arizona and eastern Nevada), it is found in several discrete populations within that range. Many of these populations were reported as "robust" during 1995 surveys (Niles et al. 1995, as cited in Jones and Stokes 2004). However, these local populations occur within relatively small areas, are quite variable in size, and are vulnerable to extirpation (NPS 1999a, as cited in Jones and Stokes 2004). Some of the largest populations occur along the shoreline of Lake Mead, where receding waters in previous years created ideal habitat for sticky buckwheat (Niles et al. 1995, NPS 1999a, as cited in Jones and Stokes 2004). Apparently, high water levels at Lake Mead during 1998 to 2000 decimated these larger populations (NPS 1999a, Powell pers. comm., as cited in Jones and Stokes 2004), although new sites have since been recolonized in the drawdown zone (Powell pers. comm., as cited in Jones and Stokes 2004).

3.4.8.7.2 Lincoln County

Sticky buckwheat occurs in Lincoln County, Nevada. However, the current status in Lincoln County is not known. This species was not observed during 2006 surveys conducted by RCI in the Development Area.

3.4.8.7.3 Covered Area

Surveys for sticky buckwheat were conducted on April 7-8, April 26-28, and May 23-26, 2005. All areas of potential range were walked using a meandering survey approach. No occurrences of sticky buckwheat were observed within the Covered Area. However, potential range exists in the southwest portion of the CSMRA in Clark County. The methodology for how the potential range was determined is included in Appendix S: Species Selection Process.

3.4.8.8 Relevant Consultations

The sticky buckwheat is a covered species in the Clark County MSHCP (RECON 2000) and LCR MCP (Jones and Stokes 2004). These HCPs minimize and mitigate to the maximum extent practicable the adverse effects of covered activities to sticky buckwheat. These documents provide protection for the species and replacement of habitats lost from implementation of the covered actions for each plan. The subsequent Biological Opinion for the LCR MCP (File No. 02-21-04-F-0161; USFWS 2005b) found that the action would not likely jeopardize the continued existence of the species.

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CHAPTER 4

Covered Activities

Chapter 4: Covered Activities

CSI proposes to develop a new town, consisting of a planned, environmentally sensitive community, in southern Lincoln County, Nevada. Components of the planned development include: 1) community development and construction activities, 2) recreational facilities and open space, 3) utility infrastructure, 4) water supply infrastructure and management, 5) flood control structures development and maintenance, and 6) resource management features.

Proposed community development activities would include residential housing, mixed-use urban villages, public buildings, and other public facilities. Commercial and light industrial development would occur to support the local community and hotels/resorts/casinos are planned. Roads and bridges would be constructed. Recreational facilities (golf courses, amusement parks, parks, playfields, trails, and open space areas) would serve residents and visitors. It is anticipated that one or more heli-ports will be constructed and operated. Utilities and other infrastructure would be developed to serve the master planned community and will include power facilities, renewable energy production facilities, sanitary sewer and wastewater treatment facilities, stormwater facilities, solid waste disposal transfer stations, and telecommunications facilities. Water supply use, treatment and production facilities, monitoring wells, production wells, storage facilities, and transmission and distribution facilities are also proposed Covered Activities. Treated effluent storage, distribution, and discharge facilities would also be constructed. Flood control structures would be developed and operated. Resource management features are an important component of the proposed town development. These features include conservation of additional land in the CSICL.

CSI currently owns approximately 21,454 acres of private land available for development in Lincoln County. Additionally, CSI has a 99-year lease (with an automatic renewal for 99 years unless terminated by CSI) from the BLM on approximately an additional 7,548 acres (see Chapter 2, Covered Area). Total build-out of the proposed development would cover up to approximately 21,454 acres (Development Area), but would be less, as portions of this land would be conserved to protect WOUS (see Chapter 6, Conservation Measures).

Full build-out may occur over a period of up to 40 years. Resource management features would be implemented within the Covered Area under this CSI MSHCP. CSI has agreed with USFWS to reconfigure the layout of the leased and private lands from the existing configuration, subject to BLM consent. Under the existing configuration, CSI leased land is an island within the CSI private land as shown on Figure 1-3. This configuration presents cumbersome management for both the BLM and CSI. Furthermore, development of private land in this configuration could isolate desert tortoise within the leased area and adversely impact a migration pathway along the east side of the project. The reconfigured layout would consolidate the private land to the west and the leased land adjacent to BLM property along the east side of the property as shown on Figure 1-4. Additionally, the consolidation of private CSI lands under this configuration would minimize adverse impact to WOUS, habitat, and the species dependent upon such habitat.

CSI has designated a total of approximately 13,767 acres of property (primarily lease land) to be set aside to preserve natural resource values within the CSICL. This land includes approximately 7,548 acres in Lincoln County and 6,219 acres in Clark County. In good faith, CSI commenced creation of the CSICL.

Before development could occur, a Tentative PUD Plan will be prepared and submitted to Lincoln County for approval. This plan will meet the requirements set forth in the CSPUDC, as well as provide more detailed information prior to each phase of development. Components of project permitting would be coordinated and implemented in a programmatic way, with permits issued as development features are finalized and implemented over time. In this way, implementation of the planned community, as well as specific conservation measures can occur within an adaptive management framework.

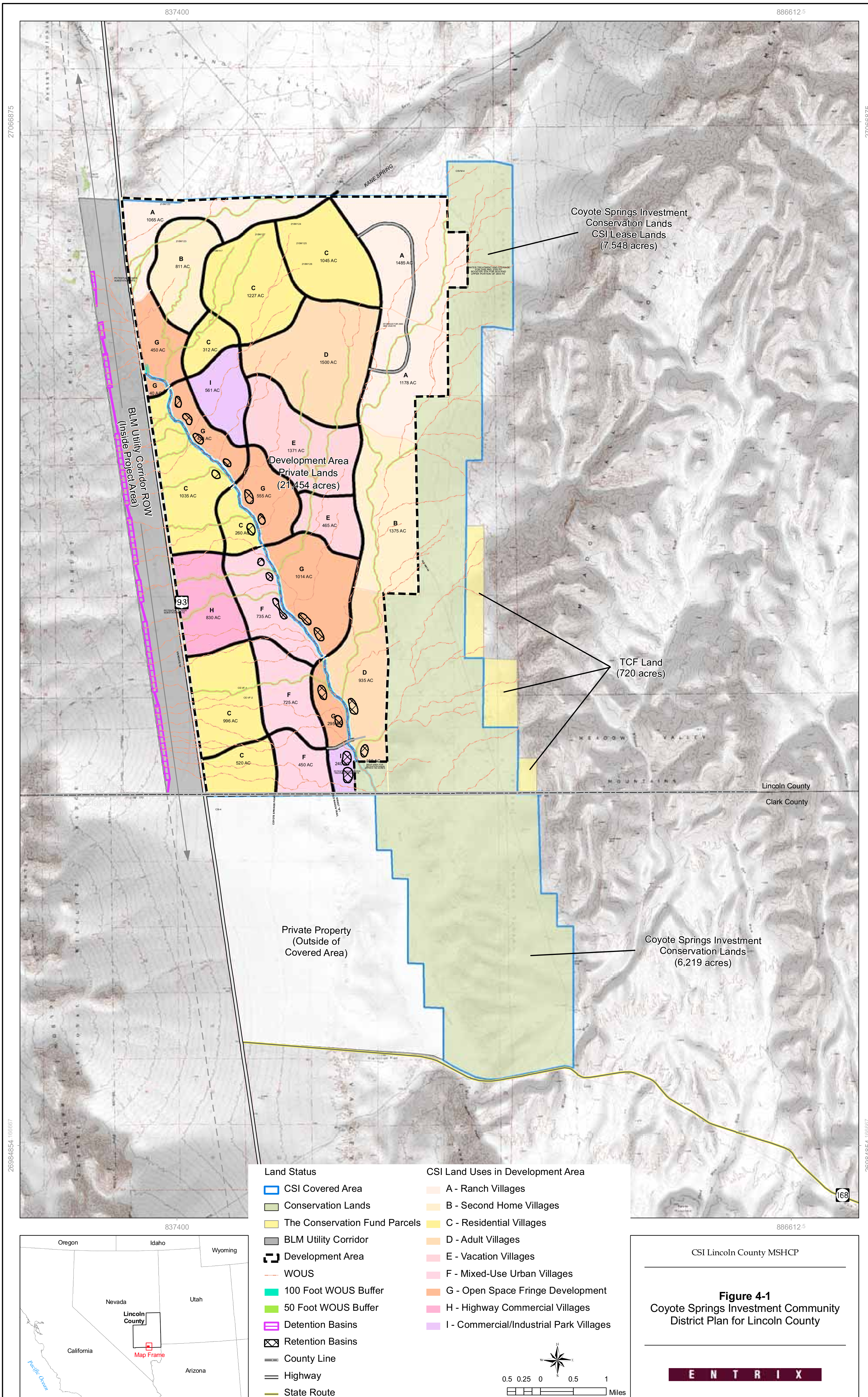
4.1 ACTIVITIES TO BE COVERED BY THE PERMIT

Six general categories of Covered Activities are associated with establishment, maintenance, and operational features of the proposed CSI Development (Table 4-1). These activities are briefly described in this MSHCP, but are described in full detail in Section 3.2.2: Preferred Alternative in Volume I: CSI Planned Development Project EIS.

The Development Area is generally located on the east side of U.S. Highway 93 and will straddle the Pahranagat Wash and Kane Springs Wash in Lincoln County. CSI land extends 9 miles north of the Lincoln County-Clark County line. The land surrounding CSI lands is primarily land managed by the BLM or USFWS. The CSI community district plan is shown on Figure 4-1.

Table 4-1 Summary of Covered Activities for the CSI MSHCP

Covered Activity	Associated Actions
Community development and construction activities	Residential land use Public building land use Hotels and resorts land use Commercial and light industrial land use Roadway construction and maintenance Bridge construction and maintenance Horticultural land use Heli-ports
Recreational facilities and open space	Golf courses Parks Sports fields Wash corridors/preserves Pedestrian and equestrian trails
Utility infrastructure	Power (electric and gas) Solar energy Wastewater collection, treatment, and disposal Reclaimed water facilities and operations Stormwater facilities Solid waste disposal Telecommunication (including cellular towers)
Water supply infrastructure and management	Water treatment Monitoring wells Production wells – facilities for production of permitted water rights pursuant to the Muddy River MOA and other future Section 7 compliance Injection wells Storage facilities Distribution facilities Effluent supply use and management On-site and off-site disposal of excess treated effluent
Flood control structures development and maintenance (including stormwater management)	Alteration of WOUS Detention and retention basins Stormwater conveyance and treatment (open ditch, pipe) Culvert placement
Resource management features	Resource management area



CSI Lincoln County MSHCP

Figure 4-1
Coyote Springs Investment Community District Plan for Lincoln County

4.1.1 Community Development and Construction Activities

Community development and construction activities could ultimately result in the conversion of up to 20,716 acres of land within the Development Area from desert habitat to residential homes and villages, mixed-use urban villages, public buildings, hotel and resorts, recreational, as well as transportation, commercial and light industrial areas. Table 4-2 summarizes the different types of development and estimates of the corresponding acreage, in addition to the percent of total development each land use category is anticipated to comprise. Community development activities include land clearing, structure construction, and landscaping activities required for the new town. The acreages associated with the development type may vary during the course of development as a result of changes in product demand during the next 40 years.

Table 4-2 Land Use Category and Estimated Percentage Breakdown

Land Use Category	Percentage of Development	Acreage (acres)	Mid-Range Percentage	Acreage (acres)
Residential – Single Family	65 to 80%[a]	13,945 to 17,163	72.5%	15,554
Residential - Multifamily	5 to 10%[a]	1,072 to 2,145	7.5%	1,609
Business Commercial and Light Industrial	5 to 10%[a]	1,072 to 2,145	7.5%	1,609
Resort Commercial	2 to 6%[a]	429 to 1,287	4%	858
Open Space, Common Area, Public Facilities	5 to 12%[a]	1,072 to 2,700	8.5%	1,824
Reserve Designation	25% of Total Acreage[b]	7,548		7,548
Total			100%	29,002

[a]Percentage of total Development Area 21,454
[b]Total Lincoln County private and leased acreage 29,002

Development would be phased over a number of years, which would include up to 2,000 acres of disturbance per year for the first eight years. CSI is requesting a 40-year permit because that is the length of time anticipated to reach the full build-out of the CSI private lands. Table 4-3 identifies the approximate areas and acreage to be developed within the 40-year timeframe of the permit. These acreages are based upon the fiscal analysis developed for the CSI Development, but this scenario is an approximation of the general development of the area (Meridian Business Advisors 2007). Construction activities would generally begin in the southwestern corner of the Development Area, along the Clark County border, and expand north and eastward over the 40-year period. The eastern portion of the Development Area would be disturbed last.

Table 4-3 Estimated Location and Amount of Land Disturbance Associated with Community Development Activities

Year	Types of Land Uses	Location	Estimated Acres
0-5 years	Residential Villages (C), Mixed-Use Urban Villages (F)	southwest portion of Development Area	1,257
6-10 years	Mixed-Use Urban Villages (F), Highway Commercial Villages (H)	along U.S. Hwy 93 and in southwestern portion of Development Area west of Pahranagat Wash	2,858
11-15 years	Residential Villages (C), Open Space Fringe Development (G), Commercial/Industrial Park Villages (I)	east and west of Pahranagat Wash in Development Area	4,118
16 -20 years	Vacation Villages (E), Commercial/Industrial Park Villages (I)	center of Development Area	4,850
21-25 years	Residential Villages [C], Adult Villages (D), Open Space Fringe Development (G)	north-center of Development Area, along the eastern edge of Pahranagat Wash	3,650
26-30 years	Ranch Villages (A), Second Home Villages (B), Open Space Fringe Development (G)	along U.S. Hwy 93 and along east side of Pahranagat Wash	3,023
31-35 years	Ranch Villages (A), Second Home Villages (B), Adult Villages (D)	eastern and northern edge of Development Area	802
36-40 years	Unspecified	Unspecified	158
Total	All	All	20,716

4.1.2 Recreation Facilities and Open Space

Recreational facilities (that may include amusement parks) and open space such as golf courses, parks, sports fields, wash corridors, and trails (i.e., hiking, horseback riding, walking, biking, etc.) would be constructed and maintained to serve future residents and visitors.

4.1.3 Utility Infrastructure

Utilities and other infrastructure would be developed to serve the master planned community. The following utilities and infrastructure would be developed: electric power; natural gas; propane gas; on-site distributed energy production; renewable energy resources; wastewater treatment; reclaimed water storage, distribution, and disposal facilities; stormwater facilities; solid waste disposal; and telecommunications.

4.1.4 Water Supply Infrastructure and Management

The following aspects of water supply infrastructure and management would be developed: water treatment, well locations, storage facilities, local transmission and distribution facilities, and water conservation.

4.1.5 Flood Control Structures Development and Maintenance (Including Stormwater Management)

The existing desert dry washes on the alluvial fans do not have the capacity to adequately convey floodwaters through the Development Area and could endanger the health, safety, and welfare of residents within the Development Area during a flood event. Some of the desert dry washes would need to be relocated and enlarged to meet acceptable flood conditions and comply with EPA and State of Nevada stormwater regulations and with Lincoln County Code requirements for flood control structures and their maintenance. Additional WOUS would be restored in the Development Area. Detention and retention basins would also be constructed.

4.1.6 Resource Management Features

Resource Management Features include designation of conservation lands.

4.1.6.1 Coyote Springs Investment Conservation Lands

Subsequent to the land adjustment described in Section 4.1.6.1 above, CSI would create the CSICL, and the BLM would manage it in accordance with the Land Lease Agreement (Appendix J), pursuant to the Nevada-Florida Land Exchange Act of 1988, and the CSI MSHCP to protect and minimize any threat to federally listed endangered or threatened species. The CSICL would be designated as a natural reserve area subject to limited use authorized in accordance with “The Lease”. These 13,767 acres that would be conserved under the CSI MSHCP include 7,548 acres of lands in Lincoln County and 6,219 acres of lands in Clark County. The 6,219 acres of land in Clark County are being conserved for the protection of desert tortoise in this CSI MSHCP; in an earlier environmental assessment and Section 404 permit for development activities on CSI lands in Clark County, Nevada, these lands served as a component of the mitigation measures for effects to WOUS.

A management plan would be developed for the CSICL. Development and implementation of the plan would be with BLM in consultation with USFWS. Issues to be addressed by this plan include, but not limited to: recreation trails, weed and fire management, law enforcement, and litter management. Separate Section 7 consultations on these activities would be required.

4.2 REFERENCES

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CHAPTER 5

Potential Effects

Chapter 5: Potential Effects

5.1 INTRODUCTION

The granting of an incidental take permit requires an analysis of direct and indirect potential effects of Covered Activities on Covered Species. This chapter evaluates the potential effects on Covered Species, as well as Evaluation Species. As defined in Chapter 3, Covered Species and Habitats, Covered Species include those for which sufficient information exists and for which adequate management prescriptions exist or can be easily defined and implemented. Evaluation Species are those requiring additional information or for which sufficient management prescriptions are unlikely to be developed and implemented sufficiently to support an application for an incidental take permit to be filed in 2007. Because Watch List Species would have a low potential for incidental take and coverage under the CSI MSHCP is not anticipated to be sought during the duration of the 40-year permit, no analysis of potential effects for these species is presented in this chapter.

Potential effects are evaluated for each Covered and Evaluation Species separately by the following Covered Activities:

- Community development and construction,
- Recreational facilities and open space,
- Utility infrastructure,
- Water supply infrastructure and management,
- Flood control structures development and maintenance (including stormwater management), and
- Resource management features.

5.1.1 Type of Effect

Evaluation of effects is based on both the context (e.g., type of activity) and intensity (e.g., duration) of the action. Effects can be either "direct" or "indirect." Both types of effects on Covered and Evaluation Species are analyzed in this chapter.

5.1.1.1 Direct Effects

Direct effects encompass the immediate, often obvious effect of the project activity on a species or its habitat (typically direct harm or harassment to individuals and/or habitat). Examples of potential direct effects are disturbance, injury, or mortality that may occur during construction or maintenance activities, including alterations to habitat.

5.1.1.2 Indirect Effects

Indirect effects are caused by or result from the project activity. They can occur later in time, but are still reasonably certain to occur. In contrast to direct effects, indirect effects can often be more subtle, and may affect species' populations and habitat quality over an extended period of time, long after project activities have been completed. Indirect effects are of particular concern for long-lived species like the desert tortoise, because project-related effects may not become evident in individuals or populations until years later.

According to the HCP Handbook, indirect effects would result from "activities expected to affect species outside the HCP plan area or species inside the plan area but not otherwise directly covered by the terms of the HCP" (USFWS and NMFS 1996). Indirect effects also "must be reasonably foreseeable and a proximate consequence of the activities proposed under the HCP" (USFWS and NMFS 1996).

5.1.2 Critical Habitat

Effects to critical habitat have also been analyzed. In order to approve an incidental take permit, the "Services must ensure constituent elements of critical habitat will not be altered or destroyed by proposed activities to the extent that the survival and recovery of affected species would be appreciably reduced" (USFWS and NMFS 1996). In this analysis, potential effects to critical habitat were assessed for three species with designated critical habitat (desert tortoise, Virgin River chub, and southwestern willow flycatcher). However, no potential effect from the Covered Activities is anticipated for critical habitat of Virgin River chub or southwestern willow flycatcher. Critical habitat for these species is located outside the Muddy River basin.

5.1.3 Covered and Evaluation Species

Species with the potential to be affected directly or indirectly by the Covered Activities are listed in Table 5-1 below. These species were designated as Covered and Evaluation Species for this MSHCP through a prioritization process described in Appendix S: Species Selection Process.

Table 5-1 Covered and Evaluation Species Potentially Affected by Covered Activities

Common Name	Scientific Name	Species Designation
Moapa dace	*Moapa coriacea*	Covered
Virgin River chub (Muddy River population)	*Gila seminuda*	Covered
Desert tortoise	*Gopherus agassizii*	Covered
Banded Gila monster	*Heloderma suspectum cinctum*	Covered
Western burrowing owl	*Athene cunicularia hypugaea*	Covered
Relict leopard frog	*Rana onca*	Evaluation
Southwestern willow flycatcher	*Empidonax traillii extimus*	Evaluation
Yuma clapper rail	*Rallus longirostris yumanensis*	Evaluation
Three corner milkvetch	*Astragalus geyeri var triquetrus*	Evaluation
Sticky buckwheat	*Erigonum viscidulum*	Evaluation
Las Vegas buckwheat	*Eriogonum corymbosum* var. *nilesii*	Evaluation

5.2 POTENTIAL EFFECTS BY ACTIVITY TO THE COVERED AND EVALUATION SPECIES

This section presents the analysis of potential effects for each Covered and Evaluation Species, organized by Covered Activity. Potential direct and indirect effects and effects to critical habitat are included in the analysis. In this evaluation of potential effects, the level of potential incidental take and related impacts expected to result from proposed project activities are presented for each of the Covered Species. These potential effects are then compared with proposed conservation measures (Chapter 6, Conservation Measures) to determine the level of incidental take for each of the Covered Species to be covered by the incidental take permit. This information is presented in Chapter 7, Expected Outcomes.

To aid in the analysis of potential effects, the use of surrogate distribution information on some of the species was useful. Based on information obtained from the SWReGAP habitat model, the range of several species would include the Covered Area. Because of the coarse level of these models, the exact location of suitable habitat for each species cannot be precisely identified. Instead, these models serve as a tool to estimate the potential areas appropriate for monitoring surveys. More information on the usefulness of this type of information can be found in Appendix S: Species Selection Process. As a result of the limitation associated with the existing information, the potential effects analysis for Evaluation Species is qualitative in nature. For banded Gila monster, a Covered Species, acres of potential habitat affected by the Covered Activities were assumed to be similar to the desert tortoise. Recent clearance surveys for desert tortoise in Clark County support this assumption (Chapter 3, Covered Species and Habitat). Table 5-2 summarizes the potential effects by all the Covered Activities on the Covered Species.

Table 5-2 Summary of Potential Effects of All Covered Activities on the Covered Species

Activity	Species				
	Moapa dace	Virgin River chub	Desert tortoise	Banded Gila monster	Western burrowing owl
Community Development	No direct effects; possible indirect effects to downstream habitat 17 miles*	No direct effects; possible indirect effects to downstream habitat 17 miles*	Direct effects to 20,716 acres of critical habitat; also indirect effects	Direct effects and indirect effects consistent with desert tortoise	Direct effects and indirect effects consistent with desert tortoise
Recreational Facilities	No direct/indirect effects	No direct/indirect effects	Direct and indirect effects accounted for in Community Development	Direct effects consistent with desert tortoise	Direct effects consistent with desert tortoise
Utility & Infrastructure	No direct effects; possible indirect effects to downstream habitat 17 miles*	No direct effects; possible indirect effects to downstream habitat 17 miles*	Direct and indirect effects accounted for in Community Development	Direct effects consistent with desert tortoise	Direct effects consistent with desert tortoise
Water Use & Mgmt.	No direct/indirect effects	No direct/indirect effects	Direct and indirect effects accounted for in Community Development	Direct effects consistent with desert tortoise	Direct effects consistent with desert tortoise
Flood Control & Stormwater Mgmt	No direct/indirect effects	No direct/indirect effects	Direct effects accounted for in Community Development	Direct effects consistent with desert tortoise	Direct effects consistent with desert tortoise
Resource Mgmt. Features	Possible benefit	Possible benefit	Benefit – 13,767 acres of Critical Habitat permanently protected	Direct effects consistent with desert tortoise	Direct effects consistent with desert tortoise
*Habitat located approximately 17 miles downstream of the Development Area. Continuous flow in the ephemeral Pahranagat Wash between the Development Area and the Muddy River occurs only during very large storm events (100-year or greater).					

5.2.1 Community Development and Construction

5.2.1.1 Covered Species

5.2.1.1.1 Moapa Dace

DIRECT EFFECTS

No habitat for the Moapa dace occurs in ephemeral washes of the Covered Area; therefore, no direct effects would occur as a result of land development activities within the Development Area.

INDIRECT EFFECTS

Perennial aquatic habitat that would support Moapa dace is found approximately 17 miles downstream of the Development Area, where the Muddy and Warm Springs contribute to the perennial flow of the Muddy River. This habitat could potentially be indirectly affected by development and construction activities. Increases in impervious surfaces could result in changes in flood frequencies and intensities through reduced infiltration in the area surrounding the Pahranagat Wash, which could adversely affect Moapa dace habitat downstream. However, flood control measures, a separate Covered Activity, would address this concern through increased channel conveyance and retention basins. Therefore, no increase in flow intensities and/or frequencies would be expected from construction and development activities.

Sedimentation of Moapa dace habitat downstream could also occur if sediment enters Pahranagat Wash via land clearing, deposit of fill in some ephemeral washes, and other ground disturbing activities. This could result in the low potential for indirect effects to the Muddy River during large storm events (100-year or greater), where Moapa dace habitat occurs. Because the Development Area is located approximately 17 miles from Moapa dace habitat, these potential indirect effects would be limited in scale. Continuous flow in the Pahranagat Wash incised ephemeral channel occurs only during very large storm events (100-year or greater), and the additional sediment load may not be detectable in comparison with the sediment load from the entire Muddy River watershed.

5.2.1.1.2 Virgin River Chub

DIRECT EFFECTS

No habitat for the Virgin River chub occurs in ephemeral washes of the Covered Area; therefore, no direct effects would occur as a result of land development activities within the Development Area.

INDIRECT EFFECTS

The nearest habitat that would support the Virgin River chub is in the Muddy River,[5] approximately 17 miles downstream of the Development Area. Increases in impervious surfaces could result in changes in flood frequencies and intensities through reduced infiltration in the area surrounding the Pahranagat Wash, which could adversely affect Virgin River chub habitat downstream. However, flood control measures, a separate Covered Activity, would address this concern through increased channel conveyance and retention basins. Therefore, no increase in flow intensities and/or frequencies would be expected from construction and development activities.

Sedimentation of the Muddy River population of Virgin River chub habitat could occur from sediment entering Pahranagat Wash via land clearing, deposit of fill in some ephemeral washes, and other ground disturbing activities. However, the additional sediment load may not be detectable in comparison with the sediment load from the entire Muddy River watershed. Because of the distance from the Development Area to Virgin River chub habitat, these potential indirect effects would be limited in scale.

While the Muddy River provides habitat for the Virgin River chub, it has not been designated as critical habitat for the species. The nearest critical habitat is in the Virgin River, which is not affected by the Muddy River system, as they both separately flow into Lake Mead and the Colorado River. Therefore, no direct or indirect effects to critical habitat of the ESA-listed population of the Virgin River chub would occur.

5.2.1.1.3 Desert Tortoise

DIRECT EFFECTS

As described previously in Chapter 3, Covered Species and Habitat, we estimate tortoise density for the CSI project area in Lincoln County at based on the 2006-2007 clearance surveys density estimate. Extrapolation over 20,716 acres can be used to estimate that approximately 426 tortoises occur on CSI private lands in Lincoln County. This estimate provide an indication of the number of desert tortoises that could be directly affected by Community Development and Construction activities.

During construction activities, the potential for direct mortality of desert tortoises exists, either through hitting them aboveground or running over desert tortoises with heavy equipment. This could occur on up to 20,716 acres comprising the Development Area, which are designated critical habitat. The loss of up to 20,716 acres of critical habitat within the 427,900 acre Mormon Mesa CHU represents approximately 5 percent of the existing CHU. Large blocks of protected federal land make up most of the CHU, with several key areas (e.g., ACECs) managed specifically for desert tortoise.

[5] Critical habitat has been designated for the Virgin River chub in the parts of the Virgin River mainstem and floodplain from the confluence of Ash and La Verkin Creeks to Halfway Wash (above Lake Mead). No critical habitat has been designated in the Muddy River.

Land development activities would eliminate up to approximately 20,716 acres of suitable desert tortoise habitat within the Development Area. This loss would be the result of conversion of land from desert scrub to human residential, commercial, recreational and light industrial use; buildings, roads, and landscaping would replace desert tortoise habitat.

Roads constructed in the Development Area could increase tortoise mortality in the Covered Area from increased vehicular traffic on roads and highways (i.e., U.S. Highway 93, State Route 168) as residents move into the CSI Development in Lincoln County. Roads have the effect of increasing tortoise mortality rates due to vehicle collisions. Tortoises are frequently killed or collected on freeways, paved highways and roads, and dirt roads, resulting in depletion of adjacent populations (e.g., Boarman et al. 1992). This may be more pronounced for juveniles, as they can be difficult to detect. Indeed, numbers of juvenile desert tortoises on permanent study plots in California were significantly lower adjacent to well-used dirt and paved roads (Berry and Turner 1984). Additionally, tortoise population densities are often depressed near paved roads/highways potentially due to road-related mortality. This effect has been observed at least within 0.5 mile of paved highways (Boarman et al. 1997).

Thus, it would be expected that desert tortoise population densities in the CSICL, which is located within the Covered Area to the east of the Development Area, would be depressed in numbers by the use of local roads created within the Development Area. Up to 111,000 residential dwelling units in the Development Area would result in a large number of vehicles traveling along these local roads on a daily basis. The total land to be included in the CSICL (approximately 13,767 acres) includes critical habitat for the desert tortoise. A portion of this habitat would also be affected by edge effects related to the addition of nearby paved roads and increased traffic.

INDIRECT EFFECTS

Due to indirect effects arising from increased human presence, conversion of the land to human uses in the Development Area could adversely impact desert tortoise and reduce the quality of critical habitat adjacent to the Development Area. The extent of critical habitat surrounding the Development Area that may be affected by indirect effects is not readily quantifiable.

Roads may result in indirect impacts to tortoise populations by increasing opportunities for human access, such as the collection (poaching) of tortoises for pets, food, or sport; release of diseased, captive tortoises into wild populations and the subsequent spread of disease; littering and illegal dumping; increased chance and incidence of human-caused fire in tortoise habitat; and the spread of non-native, invasive weeds (Boarman 2002).

It should be noted that the adjacent lands are managed by BLM as ACECs and USFWS as refuges, ACECs, and wilderness areas and, therefore, are subject to activity restrictions. However, outside of these more rigidly protected lands are areas that have little to no restrictions in place, indirect effects from the community may be more widely observed. Within 65 miles (approximately a one hour drive) of the project area, there exist large expanses of BLM and USFS lands that are available for OHV use. If desert tortoises were to occur in these areas, which do not include critical habitat, the potential for direct mortality or injury would exist.

Noise from traffic may also negatively affect tortoise populations due to disruption of communication, change in behavior, and damage to the auditory system. Background noise has been shown to mask vocal signals essential for individual survival and reproductive success in other animals (e.g., Bailey and Morris 1986, Ehret and Gerhardt 1980). Desert tortoises are known to have hierarchical social interactions (Brattstrom 1974), are capable of hearing (Adrian et al. 1938, Patterson 1971, 1976), and communicate vocally (Campbell and Evans 1967, Patterson 1971, 1976). The masking effect of these sounds may significantly alter an individual's ability to effectively communicate or respond in appropriate ways. The same holds true for incidental sounds made by approaching predators; masking of these sounds may reduce a desert tortoise's ability to avoid capture by a predator.

Habitat fragmentation from development likely would impede movement of desert tortoise through the Development Area. Habitat fragmentation is a major contributor to population declines of the desert tortoise (Berry 1984, Berry and Burge 1984, Berry and Nicholson 1984). Individual desert tortoise may require more than 1.5 square miles of habitat and may make forays of more than 7 miles at a time (Berry 1986). In drought years, desert tortoise forage over even larger areas. Roads and urban areas form barriers to movement and tend to create small, local populations which are more susceptible to extinction than large, connected ones (Wilcox and Murphy 1985). Habitat fragmentation from development likely would impede movement of desert tortoise through the Development Area. However, habitat fragmentation would be minimized through the proposed land configuration for reconfiguration process, as the Development Area maximizes habitat connectivity within nearby, federally controlled lands and the ACECs established for desert tortoise conservation would remain adjacent to undeveloped lands (the CSICL). The development area as it is proposed to be located in both the preferred alternative and Alternative 1 is along the only two paved roads in the Coyote Spring Valley: U.S. Highway 93 and State Route 168, which already fragment desert tortoise habitat. By locating the development area adjacent to the existing sources of habitat fragmentation, instead of being surrounded by undeveloped lands on all sides, both of the action alternatives would minimize the overall effect of habitat fragmentation from the project.

Trash disposal in the Development Area could adversely affect nearby desert tortoises. Unauthorized and authorized deposition of refuse occurs close to towns, cities, and settlements in remote, inaccessible areas. Turtles and tortoises are known to eat foreign objects, such as rocks, balloons, plastic, and other garbage (John Behler, Chairman of the Freshwater Turtle and Tortoise Group, Species Survival Commission, International Union for the Conservation of Nature, and New York Zoological Society, pers. comm; Karen Bjorndabl, pers. comm. – as cited in the Desert Tortoise Recovery Plan, USFWS 1994). Such objects can become lodged in the gastrointestinal tract or entangle heads and legs, causing death. Objects such as metal foil and glass chips have been found in wild desert tortoise scat and tortoise entanglement with rubber bands and string has been observed Burge (1989).

The number of dogs could increase with an increase in human presence; thus, the incidence of unrestrained domestic and/or feral dogs in tortoise habitat in and adjacent to the Development Area may subsequently increase. Dog attacks or predation on tortoises has been identified by the USFWS as an emerging problem that warrants attention (59 FR 5820, Boarman 2002). Preliminary results from a study in the Mojave Desert of California indicate a significantly higher percentage of tortoises with moderate to severe canid-like shell trauma within approximately two miles of settlements than tortoises at more remote sites (Demmon and Berry 2005). Others have also reported a higher incidence of canid-like shell damage at sites with feral dogs and dog packs (Bjurlin and Bissonette 2001, cited in Boarman 2002).

Anticipated increases in human use and habitation of the Development Area may attract and concentrate predators such as ravens, coyotes, and kit fox, resulting in increased predation of desert tortoises. Predators are more likely to be attracted to the area if trash or other anthropogenic resources are present. Natural predation in undisturbed, healthy ecosystems is generally not a threat to the continued existence of the desert tortoise. However, predation rates may be altered when natural habitats are disturbed or modified.

The most important predators of desert tortoises at this time are the common raven and the coyote. The best-documented predator is the raven. Raven population increases seem to be due to increased food supplies, (e.g., road kills, landfills, trash, garbage dumps, agricultural developments). Because ravens make frequent use of food, water, and nest-site subsidies provided by humans, their population increases have been tied to an increase in food and water sources, such as landfills and septic ponds (Boarman and Berry 1995, USFWS 1994). Additionally, new sites for perches and nests (e.g., fence posts, power poles and towers, signs, buildings, bridges) may increase potential mortality of tortoises due to increased foraging advantages.

The collection of desert tortoise for pets, food, or use in cultural observances may increase on lands adjacent to and within the Development Area. Illegal collection is a major factor in the decline of the desert tortoise. People illegally collect desert tortoise for pets, food, and commercial trade. Some collect for medicinal or other cultural purposes (USFWS 1994). Almost one-half of tortoise with radio transmitters have been documented as poached or suspected of being poached from research sites (Berry 1990 as amended, Stewart 1991).

Well-meaning citizens may capture, transport, and release tortoises they find and perceive to be in harm's way. In addition to loss through capture, increased handling could contribute to the loss of unique, local characteristics through interbreeding and genetic mixing.

Upper respiratory diseases (URTD) in tortoises living in and near the Development Area could increase. Capture and release of tortoise could contribute to the spread of diseases such as URTD. By the early 1990's, NDOW had documented several cases of URTD in tortoises inhabiting the areas proposed for inclusion in the Coyote Spring and Mormon Mesa ACECs (USFWS 1994); and URTD has been documented in both the Coyote Springs and Mormon Mesa permanent study plots (BLM 1998). URTD appears to be spreading and may have been introduced to wild tortoise populations through the release or escape of diseased, captive tortoises (Jacobson 1994, cited in USFWS 1994), something that is more likely to occur near an urban area (Boarman 2002). A high or increased prevalence of URTD in tortoise populations adjacent to urbanized areas or within suburban areas has been documented in several regions (Brown et al. 2005, Jones et al. 2005), although a direct cause-effect relationship has not been established (Boarman 2002). Pet desert tortoises would not be allowed in the Development Area and this may help to minimize this potential effect.

Evidence is mounting that desert tortoises are experiencing toxic effects and higher rates of mortality from one or more elements or compounds, such as selenium, heavy metals, chlorinated hydrocarbons, organophosphates, as well as nitro compounds and alkaloids in plants. In some cases, such chemicals occur naturally or result from distribution or concentration through human-induced activities (USFWS 1994). While research on the aforementioned subjects in desert tortoises is in preliminary stages, existing data are sufficient to suggest that these sources of mortality may be important, especially when coupled with drought.

Levels of mercury in the livers of desert tortoises ill with URTD at the Desert Tortoise Natural Area were significantly higher than in desert tortoises from the Ivanpah Valley (eastern Mojave Desert) (Jacobson et al. 1991). The mercury levels in livers of Desert Tortoise Natural Area desert tortoises could be higher for natural reasons (e.g., naturally higher levels in soils and plants, or perhaps higher levels as a result of mining). Many attribute mercury levels to emissions from industrial activity in the area.

The Covered Activities include plans for future industrial development in specified areas of the Development Area. Toxic chemicals and substances could potentially be involved in construction practices (e.g., solvents used in painting). Use of toxic chemicals and substances could result in these substances entering the local environment and affecting nearby desert tortoise. Toxic chemicals and substances could also enter the local environment through run-off from roads, chemically-treated landscapes, and other sources typically found in urban environments.

Development activities within the 21,454-acre Development Area that create ground disturbance could cause increases in non-native plants both inside and outside the Development Area. Non- native plant species such as red brome (*Bromus rubens*), filaree (*Erodium cicutarium*), and split grass (*Schismus arabicus*) have been introduced as a result of grazing, increased due to disturbance by OHV, and ground disturbance associated with development. These species have become widely established in the Mojave Desert. Land managers and field scientists identified 116 species of alien plants in the Mojave and Colorado deserts (Brooks and Esque 2002). Desert tortoises have been found to prefer native vegetation over non-natives (Jennings 1993). Non-native annual plants in desert tortoise critical habitat in the western Mojave Desert were found to compose greater than 60 percent of the annual biomass (Brooks 1998). The reduction in quantity and quality of forage may stress tortoises and make them more susceptible to drought- and disease-related mortality (Jacobson et al. 1991, Brown et al. 1994).

In the Mojave Desert, the proliferation of non-native plant species has also contributed to an increase in fire frequency in desert tortoise habitat by providing sufficient fuel to carry fires, especially in the intershrub spaces that are mostly devoid of native vegetation (USFWS 1994, Brooks 1998, Brown and Minnich 1986). Indeed, over 500,000 acres of desert lands burned in the Mojave Desert in the 1980s. Thus, the potential for increases in non-native plants through ground disturbance within the Development Area could also result in increases in fire frequency in surrounding desert tortoise habitat.

Changes in plant communities caused by recurrent fire may negatively impact tortoises and tortoise populations through direct mortality and injury (e.g., Woodbury and Hardy 1948), as well as loss of forage species and shrubs that provide shelter and fragmentation of habitat (Brooks and Esque 2002, Esque et al. 2003).

Creosote bush is slow to re-sprout and germinate following intense fire (Brown and Minnich 1986). Loss of these shrubs and other vegetation, even temporarily, may change the thermal environment and increase exposure of tortoises to temperature extremes (Esque and Schwalbe 2002). Loss of forage, water, or shelter sites can result in nutritional deficiencies and decreased reproductive rates.

Shooting and vandalism play a major role in the loss of desert tortoises in many areas, particularly where human visitation is high (measured in visitor-use days/unit area per year). This loss could occur within the Development Area, and in nearby areas (CSICL or surrounding federal land) where desert tortoise densities would be expected to be higher. Deliberate shooting of desert tortoises or crushing them with vehicles has been documented (Berry and Nicholson 1984, Michael Coffeen, BLM, Glenallen, Alaska, pers. comm., as cited in USFWS 1994). Acts of vandalism have also included beheading, severing of body parts, and overturning.

5.2.1.1.4 Banded Gila Monster

DIRECT EFFECTS

Land development activities, including modification of ephemeral wash habitats, would result in the loss or alteration of up to 20,716 acres of potential banded Gila monster habitat within the Development Area.

INDIRECT EFFECTS

Indirect effects to the banded Gila monster from land development activities are similar to those described in detail for desert tortoise and include the following: habitat fragmentation following increases in housing-associated structures and roads, increased mortality following road construction and increases in traffic, increased mortality and disease from illegal collection, increased mortality and harm from pets (e.g., dogs), increases in non-native plant species, and subsequent increases in fire frequency as a result of ground disturbance.

5.2.1.1.5 Western Burrowing Owl

DIRECT EFFECTS

Land development activities would result in the conversion of up to 20,716 acres of potential western burrowing owl habitat within the Development Area. Loss of habitat is one of the main threats to the persistence of western burrowing owl, as native habitats are converted to agriculture and development (Klute et al. 2003). However, burrowing owls are known to use urban and semi-urban areas (CEC 2005, Klute et al. 2003), so they could potentially use some of the resulting habitat, after construction is completed and vegetation has regenerated.

INDIRECT EFFECTS

With residential and recreational development, altered habitat in the Development Area may provide benefits and risks for western burrowing owl. Nesting and fledgling successes were greater in urban than rural environments in a New Mexico Study, due to greater food availability and reduced predation (Botelho and Arrowood 1996 and Millsap and Bear 2000, as cited in Chase and Walsh 2004). However, burrowing owls associated with human habitation may also suffer higher mortality rates (Haug 1985, Millsap and Bear 1988, and Haug et al. 1993, as cited in McDonald et al. 2004). Adverse effects associated with urban and suburban environments can result from habitat loss, vehicular traffic, increased road densities, and negative edge effects from fragmentation (McDonald et al. 2004). Domestic cats and dogs can also predate upon burrowing owls. Predation by domestic cats in a Florida burrowing owl population accounted for 30 percent of known predation in this population (Millsap and Bear 1988, as cited in McDonald et al. 2004). Dogs have also been observed feeding on eggs and young (Haug 1985, as cited in McDonald et al. 2004). Habitat loss from urban and agricultural development is considered a dominant factor in burrowing owl population declines (DeSante and Ruhlen 1995, Trulio 1995, 1997, as cited in McDonald et al. 2004). These indirect effects, arising from increased human presence, may also negatively affect habitat adjacent to the Development Area.

5.2.1.2 Evaluation Species

5.2.1.2.1 Moapa White River Springfish

DIRECT EFFECTS

No habitat for the Moapa White River springfish occurs in ephemeral washes of the Development Area; therefore, no direct effects would occur as a result of land development activities within the Development Area.

INDIRECT EFFECTS

Perennial aquatic habitat that would support Moapa White River springfish is found approximately 17 miles downstream of the Development Area, where the Warm and Muddy Springs contribute to the perennial flow of the Muddy River. This habitat would not be indirectly affected by land development activities, as flood control measures would prevent an increase in flow frequencies and intensities. However, during major storm events (100-year event or greater), sedimentation of this Moapa White River springfish habitat could occur from sediment entering Pahranagat Wash and downstream waters via land clearing, deposit of fill in some ephemeral washes, and other ground disturbing activities. Because of the distance from the Development Area to Moapa White River springfish habitat, these potential indirect effects would be limited in scale.

5.2.1.2.2 Moapa Speckled Dace

DIRECT EFFECTS

No habitat for the Moapa speckled dace occurs in ephemeral washes of the Development Area; therefore, no direct effects would occur as a result of land development activities within the Development Area.

INDIRECT EFFECTS

Perennial aquatic habitat that would support Moapa speckled dace is found approximately 17 miles downstream of the Development Area, where the Warm and Muddy Springs contribute to the perennial flow of the Muddy River. This habitat would not be indirectly affected by land development activities, as flood control measures would prevent an increase in flow frequencies and intensities. Sedimentation of this Moapa speckled dace habitat could occur from sediment entering Pahranagat Wash and downstream waters during major storm events (100-year event or greater) via land clearing, deposit of fill in some ephemeral washes, and other ground disturbing activities. Because of the distance from the Development Area to Moapa speckled dace habitat, these potential indirect effects would be limited in scale.

5.2.1.2.3 Relict Leopard Frog

DIRECT EFFECTS

No habitat for the relict leopard frog occurs in ephemeral washes of the Development Area; therefore, no direct effects would occur as a result of development and construction activities within the Development Area.

INDIRECT EFFECTS

Perennial aquatic habitat that would support relict leopard frog is found approximately 17 miles downstream of the Development Area, in the springs, streams, and wetlands associated with the Muddy River. This habitat would not be indirectly affected by land development activities, as flood control measures would prevent an increase in flow frequencies and intensities. Any ground disturbance and increases in impervious surface that occur in the Development Area would not be detectable 17 miles away, because of the associated flood control measures and the large distance span.

5.2.1.2.4 Southwestern Willow Flycatcher

DIRECT EFFECTS

No habitat for the southwestern willow flycatcher occurs within the Development Area, as the ephemeral nature of the washes precludes establishment of viable populations of riparian species requiring permanent water. Development and construction activities in this area would not directly affect southwestern willow flycatcher, its habitat, or critical habitat.

INDIRECT EFFECTS

Perennial aquatic habitat that would support a riparian community is found approximately 17 miles downstream of the Development Area, where the Muddy and Warm springs contribute to the perennial flow of the Muddy River. This habitat would not be indirectly affected by land development activities, as flood control measures would prevent an increase in flow frequencies and intensities. Any ground disturbance and increases in impervious surface that occur in the Development Area would be unlikely to alter riparian habitats of the southwestern flycatcher 17 miles away, because of the large distance involved. In comparison to the sediment load for the Muddy River, the small sediment load would be unlikely to alter hydrologic processes that maintain riparian habitats along the Muddy River.

No indirect effects would occur to critical habitat for the southwestern willow flycatcher. The nearest critical habitat is located along the Virgin River in Clark County.

5.2.1.2.5 Yuma Clapper Rail

DIRECT EFFECTS

No marsh habitats for the Yuma clapper rail occur within the Development Area; therefore, development and construction activities would not directly affect the Yuma clapper rail or its habitat.

INDIRECT EFFECTS

Marsh habitats are found near perennial waters 17 miles downstream of the Development Area, where the Muddy and Warm springs contribute to the Muddy River. These marshes could be potentially affected by development and construction activities. However, flood control measures would prevent an increase in flow frequencies and intensities. Sediment and flow changes that would occur as a result of ground disturbance and increases in impervious surfaces would be limited in scope because of the 17-mile distance between the source of sediments and marsh habitats where the Yuma clapper rail occurs.

5.2.1.2.6 Las Vegas Buckwheat

DIRECT EFFECTS

Las Vegas buckwheat occurs in Mojave desert and Creosote bush scrub communities on gypsum soils. Surveys completed in 2005 in the limited suitable soils within the Covered Area did not locate any Las Vegas buckwheat individuals or populations.

INDIRECT EFFECTS

Alteration of plant communities within the Development Area has the potential to indirectly affect plant communities in the CSICL and federal land adjacent to the development. These effects are not directly quantifiable but would likely decrease with increasing distance from edges of disturbed or altered habitats.

The proposed land configuration for the Development Area results in consolidation of developed and reserve lands that minimize potential edge effects. Conserved land as part of the CSICL in both Lincoln and Clark counties is included in the potential range for this species, potentially offering protection for individual plants. However, during 2005 and 2006 surveys conducted by RCI, no three-corner milkvetch plants were detected. Furthermore, conserved land would be located to the eastern side of the CSI property, at a higher elevation than three-corner milkvetch has been documented to occur (Figure 3-5, NNHP 2001a). Therefore the benefits for habitat for this species may be limited.

5.2.1.2.7 Three-corner Milkvetch

DIRECT EFFECTS

Three-corner milkvetch occurs in Mojave desert and Creosote bush scrub communities on deep sand or sand dunes. Surveys completed in 2005 in suitable soils within the Covered Area did not locate any three-corner milkvetch individuals or populations. However, there is potential for three-corner milkvetch to occur in the southern half of the Covered Area, in the vicinity of the Pahranagat Wash.

INDIRECT EFFECTS

Alteration of plant communities within the Development Area has the potential to indirectly affect plant communities in the CSICL and federal land adjacent to the development. These effects are not directly quantifiable but would likely decrease with increasing distance from edges of disturbed or altered habitats.

The proposed land configuration for the Development Area results in consolidation of developed and reserve lands that minimize potential edge effects. Conserved land as part of the CSICL in both Lincoln and Clark counties is included in the potential range for this species, potentially offering protection for individual plants. However, during 2005 and 2006 surveys conducted by RCI, no three-corner milkvetch plants were detected. Furthermore, conserved land would be located to the eastern side of the CSI property, at a higher elevation than three-corner milkvetch has been documented to occur (Figure 3-5, NNHP 2001a). Therefore the benefits for habitat for this species may be limited.

Alteration of habitat within the Development Area has the potential to indirectly affect three-corner milkvetch, if they are present, from an increased potential of the spread of non-native and invasive weeds from the Development Area to adjacent land, and an increased potential for wildfires as a result of increased weedy species and/or increased potential ignition sources due to human activities.

5.2.1.2.8 Sticky Buckwheat

DIRECT EFFECTS

Sticky buckwheat is found in deep loose sandy soils in washes, flats, roadsides, steep aeolian slopes, and stabilized dune areas. Based upon elevation constraints (NNHP 2001b), the potential range of the species does not overlap with the Development Area; therefore, direct effects to sticky buckwheat would not occur.

INDIRECT EFFECTS

Alteration of habitat within the Development Area has the potential to indirectly affect sticky buckwheat, if they are present. These effects include: 1) an increased potential for the spread of non-native and invasive weeds from the Development Area to adjacent land, such as the CSICL, where sticky buckwheat's potential range may occur, and 2) an increased potential for wildfires as a result of increased weedy species and/or increased potential ignition sources due to human activities.

Potential effects to potential sticky buckwheat populations occurring along the Muddy River and washes downstream of the Development Area would be unlikely as those populations occur a large distance from the Development Area. If populations do occur near the Development Area, changes in flows and sedimentation because of ground disturbance and impervious surfaces could affect habitat characteristics of this species. Conserved land as part of the CSICL in Clark County would include potential range for this species, offering protection for individual sticky buckwheat plants. However, during 2005 and 2006 surveys conducted by RCI, no plants were detected in the Covered Area.

5.2.2 Recreational Facilities and Open Space

5.2.2.1 Covered Species

5.2.2.1.1 Moapa Dace

DIRECT EFFECTS

No habitat for the Moapa dace occurs in ephemeral washes of the Development Area; therefore, no direct effects would occur as a result of recreational facilities and open space activities within the Development Area.

INDIRECT EFFECTS

No habitat for the Moapa dace occurs in ephemeral washes of the Development Area; therefore, no indirect effects would occur as a result of recreational facilities and open space activities within the Development Area. Recreational facilities would not result in detectable effects to downstream habitat.

5.2.2.1.2 Virgin River Chub

DIRECT EFFECTS

No habitat or critical habitat for the Virgin River chub occurs in ephemeral washes of the Development Area; therefore, no direct effects would occur as a result of recreational facilities and open space activities within the Development Area.

INDIRECT EFFECTS

No habitat or critical habitat for the Virgin River chub occurs in ephemeral washes of the Development Area; therefore, no indirect effects would occur as a result of recreational facilities and open space activities within the Development Area. Recreational facilities would not result in detectable effects to downstream habitat.

5.2.2.1.3 Desert Tortoise

DIRECT EFFECTS

Direct effects to desert tortoise habitat and critical habitat through the development of golf courses, parks and ball fields in the Development Area have already been addressed in the loss of 20,716 acres of critical habitat described under the Community Development and Construction section above.

INDIRECT EFFECTS

As described in the Community Development and Construction section, indirect effects to desert tortoise and its critical habitat from development of recreational facilities and increases in human presence could include habitat fragmentation, increased diseases, illegal collection, increased mortality from pets, and increased natural predators. Additionally, the potential for direct mortality outside of the Development Area could increase through increased demand for OHVs and other recreational activities in surrounding lands.

Recreational activity on surrounding lands would undoubtedly increase with the greatest and most frequent impacts likely occurring close to the development. Illegal routes (social trails) would likely proliferate as more people begin using the land.

OHV use may occur through organized events or casual family activities. These activities are among the most destructive, widespread, and best-documented of threats to the survival of desert tortoises and the integrity of their habitat (Adams et al. 1982a and b, Berry and Nicholson 1984, Brattstrom and Bondello 1983, Bury 1987, Bury and Luckenbach 1983, 1986, Bury et al. 1977, Busack and Bury 1974, Luckenbach 1975, Sheridan 1979, Stebbins 1974, 1975, Webb and Wilshire 1983).

OHV use in the desert has greatly increased over the years and is the single greatest recreational use of public lands in southern Nevada (RECON 2000). It can result in a substantial cumulative loss of tortoise habitat and have a severe impact on tortoise abundance and distribution (50 FR 5820). OHV use destroys, degrades, and fragments considerable areas of desert tortoise habitat, and facilitates the invasion of exotic plants and increased incidence of fire.

The list of impacts from OHV use is extensive, including mortality of desert tortoises on the surface and below ground; collapsing of desert tortoise burrows; damage or destruction of plants used for food, water, and thermoregulation; damage or destruction of the mosaic of cover provided by vegetation; adverse effects to the general well-being of desert tortoises through water balance, thermoregulation, and energy requirements; noise pollution; impact, damage or destruction of soil crusts; soil erosion; proliferation of weeds; and increases in numbers and locations of wild fires.

Tortoise burrows may be destroyed by foot or vehicular travel. Tortoises may be crushed or trapped inside burrows, or the shelters may be rendered unusable, consequently exposing tortoises to the elements and predators. Off-road vehicles may also compact soils (e.g., sandy loams), rendering it difficult for tortoises to construct burrows or nests. Compacted sediments are not easily penetrated by rain, thus increasing runoff and erosion potential.

Passive or non-motorized recreation such as hiking, camping, wildlife viewing, rock climbing, mountain biking, and horseback riding may also have some level of adverse impact on tortoises. Little information is available on impacts of human recreation on desert tortoises. However, negative impacts on other taxonomic groups have been documented (e.g., ungulates, birds), and it is likely that similar impacts to tortoises may occur (USFWS 2001).

Additionally, tortoises may be inadvertently affected by human recreation through accidental trampling. The primary impact of human recreation on tortoises would likely be temporary disruption of activity and modification of behavior resulting from human-tortoise encounters, whether intentional or unintentional and increased disturbance or harassment by dogs (USFWS 2001).

5.2.2.1.4 Banded Gila Monster

DIRECT EFFECTS

Direct effects to banded Gila monster habitat through the development of golf courses, parks and ball fields in the Development Area have already been addressed in the loss of 20,716 acres of potential habitat described under the Community Development and Construction section above.

INDIRECT EFFECTS

As described in the Community Development and Construction section, indirect effects to the banded Gila monster from development and increases in human presence could include habitat fragmentation, illegal collection, increased mortality from pets, and increased natural predators. OHVs and non-motorized recreation is likely to have similar indirect effects on banded Gila monster to those documented for desert tortoise.

5.2.2.1.5 Western Burrowing Owl

DIRECT EFFECTS

Development of recreational facilities would result in no additional direct effects to western burrowing owl than already described in the Community Development and Construction section above. Use of OHVs, horses, pedestrian activities, and other such activities has the potential to result in disturbance of burrowing owls that may make use of these altered habitats. Additionally, direct mortality through crushing of burrows with owls inside or mortality from collisions with OHVs is possible.

INDIRECT EFFECTS

As described in the Community Development and Construction section, altered habitat due to residential and recreational development may provide benefits and risks for native terrestrial species such as western burrowing owl. Nest and fledgling success is higher in urban habitats, but so are mortality and predation rates. Habitat loss in urban areas is another adverse effect. These effects would be the same as those described in further detail in the Community Development and Construction section.

5.2.2.2 Evaluation Species

5.2.2.2.1 Moapa White River Springfish

DIRECT EFFECTS

No habitat for the Moapa White River springfish occurs in ephemeral washes of the Development Area; therefore, no direct effects would occur because of recreational facilities and open space activities within the Development Area.

INDIRECT EFFECTS

No habitat for the Moapa White River springfish occurs in ephemeral washes of the Development Area; therefore, no indirect effects would occur as a result of recreational facilities and open space activities within the Development Area. Recreational facilities would not result in detectable effects to downstream habitat.

5.2.2.2.2 Moapa Speckled Dace

DIRECT EFFECTS

No habitat for the Moapa speckled dace occurs in ephemeral washes of the Development Area; therefore, no direct effects would occur as a result of recreation activities within the Development Area.

INDIRECT EFFECTS

No habitat for the Moapa speckled dace occurs in ephemeral washes of the Development Area; therefore, no indirect effects would occur as a result of recreational facilities and open space activities within the Development Area. Recreational facilities and activities would not result in detectable effects to downstream habitat.

5.2.2.2.3 Relict Leopard Frog

DIRECT EFFECTS

No habitat for the relict leopard frog occurs in ephemeral washes of the Development Area; therefore, no direct effects would occur as a result of recreation activities within the Development Area.

INDIRECT EFFECTS

No habitat for the relict leopard frog occurs in ephemeral washes of the Development Area; therefore, no indirect effects would occur as a result of recreational facilities and open space development within the Development Area. Recreational facilities and activities would not result in detectable effects to downstream habitat.

5.2.2.2.4 Southwestern Willow Flycatcher

DIRECT EFFECTS

No habitat for the southwestern willow flycatcher occurs within the Development Area, as the ephemeral nature of the washes precludes the establishment of viable populations of riparian species that require permanent water. Land development activities associated with recreational facilities in this area would not directly affect southwestern willow flycatcher, its habitat, or critical habitat.

INDIRECT EFFECTS

Because no habitat for southwestern willow flycatcher exists in the Development Area, no indirect effects would occur to southwestern willow flycatcher because of recreational facilities and activities in the Development Area. Thus, no indirect effects to southwestern willow flycatcher habitat or critical habitat downstream of the recreational facilities would occur.

5.2.2.2.5 Yuma Clapper Rail

DIRECT EFFECTS

No marsh habitats for the Yuma clapper rail occur within the Development Area; therefore, land development activities associated with recreational facilities would not directly affect the Yuma clapper rail or its habitat.

INDIRECT EFFECTS

Because no habitat for Yuma clapper rail exists in the Development Area, no indirect effects would occur to Yuma clapper rail as a result of recreational facilities and activities in the Development Area. Thus, no indirect effects to Yuma clapper rail habitat downstream of the recreational facilities would occur.

5.2.2.2.6 Las Vegas Buckwheat

DIRECT EFFECTS

No additional effects to the Las Vegas buckwheat would occur than have already been discussed under the Community Development and Construction section.

INDIRECT EFFECTS

No additional effects from development activities associated with recreational facilities would occur beyond those discussed under the Community Development and Construction section. Indirect effects to the Las Vegas buckwheat from use of recreational lands could include increases in non-native plants and trampling of individual plants.

5.2.2.2.7 Three-corner Milkvetch

DIRECT EFFECTS

No additional effects to the three-corner milkvetch would occur than have already been discussed under the Community Development and Construction section.

INDIRECT EFFECTS

No additional effects from development activities associated with recreational facilities would occur beyond those discussed under the Community Development and Construction section. Indirect effects to the three-corner milkvetch from use of recreational lands could include increases in non-native plants and trampling of individual plants.

5.2.2.2.8 Sticky Buckwheat

DIRECT EFFECTS

No effects to the sticky buckwheat would occur, as the potential range of sticky buckwheat habitat does not exist within the Development Area.

INDIRECT EFFECTS

No additional effects from development activities associated with recreational facilities would occur beyond those discussed under the Community Development and Construction section. Indirect effects to the sticky buckwheat from use of recreational lands could include increases in non-native plants and trampling of individual plants.

5.2.3 Utility Infrastructure

Direct and indirect effects of construction activities associated with utility infrastructure within the Development Area on Covered and Evaluation Species has been addressed in the Community Development and Construction Activities section. Utility infrastructure outside of the Development Area will not be addressed in the CSI MSHCP.

5.2.4 Water Supply Infrastructure and Management

As stated previously in Section 1.2, water supply development activities to meet the estimated future demand of 70,000 afa are not covered under the CSI MSHCP. Additionally, production wells to serve the development or provide mitigation water are not covered under the CSI MSHCP. The total number of production wells that would be required over the life of the permit is unknown at this time. Thus, environmental issues associated with groundwater production will be separately addressed as specific sources are identified. The monitoring wells would be constructed, operated, and maintained throughout the Development Area and surrounding areas consistent with the terms and conditions of all applicable permits, rulings and orders of the Nevada State Engineer, and CSI's contractual obligations with third parties. Also, the reservoir and storage facilities that are constructed outside the Development Area are not covered under this MSHCP. The water supply infrastructure and management activities covered under the CSI MSHCP include monitoring wells, water treatment, reservoir and storage facilities constructed within the Development Area, and pipeline and distribution facilities constructed on CSI land.

However, production of existing permitted rights within the Coyote Spring Valley Basin may occur within the Development Area in the event the existing production wells need to be relocated, as agreed by the parties under the Muddy River MOA. This is a Covered Activity under the CSI MSHCP. The groundwater extraction associated with these water rights is covered under the Muddy River MOA and associated programmatic BO (File No. 1-5-05-FW-536).

5.2.4.1 Covered Species

5.2.4.1.1 Moapa Dace

DIRECT EFFECTS

No habitat for Moapa dace is available within the Development Area; therefore, no direct effects to Moapa dace or its habitat would occur.

INDIRECT EFFECTS

Treated effluent would not result in indirect effects to Moapa dace or its habitat, because the quality of effluent produced at the treatment plant(s) would be suitable for discharge to surface waters consistent with NDEP effluent reuse requirements (NAC 445A.274-280).

5.2.4.1.2 Virgin River Chub

DIRECT EFFECTS

No habitat for Virgin River chub is available within the Development Area; therefore, no direct effects to Virgin River chub would occur.

INDIRECT EFFECTS

Treated effluent would likely result in negligible, indirect effects to Virgin River chub, its habitat, or its critical habitat, because the quality of effluent produced at the treatment plant(s) would be suitable for discharge to surface waters consistent with NDEP effluent reuse requirements (NAC 445A.274-280).

5.2.4.1.3 Desert Tortoise

DIRECT EFFECTS

Treated effluent would likely result in negligible effects to desert tortoise, because the quality of effluent produced at the treatment plant(s) would be suitable for reuse on the surrounding landscape areas pursuant to NDEP effluent reuse requirements (NAC 445A.274-280). The monitoring wells constructed, operated, and maintained within the CSICL could result in low levels of temporary disturbance to these lands. Any other potential effects that would occur as a result of water supply management activities in the Development Area to the desert tortoise and/or its habitat have already been addressed in the Community Development and Construction section above.

INDIRECT EFFECTS

No additional indirect effects to desert tortoise, its habitat, or critical habitat would result from water supply infrastructure and management activities within the Development Area or other areas.

5.2.4.1.4 Banded Gila Monster

DIRECT EFFECTS

Treated effluent would likely result in negligible effects to banded Gila monster, because the quality of effluent produced at the treatment plant(s) would be suitable for reuse on the surrounding landscape areas pursuant to NDEP effluent reuse requirements (NAC 445A.274-280). The monitoring wells constructed, operated, and maintained within the CSICL could result in low levels of temporary disturbance to these lands. Any other potential effects that would occur as a result of water supply infrastructure and management activities within the Development Area to the banded Gila monster and/or its habitat have already been addressed in the Community Development and Construction section above.

INDIRECT EFFECTS

No additional indirect effects would result through development and management of water in the Development Area or other areas.

5.2.4.1.5 Western Burrowing Owl

DIRECT EFFECTS

Any potential effects that would occur as a result of water supply infrastructure and management activities within the Development Area to western burrowing owl and/or its habitat have already been addressed in the Community Development and Construction section above.

INDIRECT EFFECTS

No additional indirect effects would result through water supply infrastructure and management activities in the Development Area. The release of treated effluent onto golf courses would not affect burrowing owls, because the quality of effluent produced at the treatment plant(s) would be suitable for reuse on golf courses and the surrounding landscape areas pursuant to NDEP effluent reuse requirements (NAC 445A.274-280).

5.2.4.2 Evaluation Species

5.2.4.2.1 Moapa White River Springfish

DIRECT EFFECTS

No habitat for Moapa White River springfish is available within the Development Area; therefore, no direct effects would occur as a result of water management activities, including water treatment plant construction, development of on-site storage facilities, and local transmission and distribution facilities. Furthermore, environmental issues associated with groundwater production will be addressed separately outside the CSI MSHCP as specific sources are identified. Currently, CSI has been working with SNWA, LVVWD, MVWD, and Nevada Power Company under the direction of the Nevada State Engineer to conduct pump testing and monitoring activities within the Coyote Spring Basin. The results of this study will ultimately be used to assess long-term impacts to the aquifer and down-gradient flows and are subject to the trigger levels set forth in the Muddy River MOA, which may require relocation of the existing production wells to the Development Area.

INDIRECT EFFECTS

Treated effluent would not result in effects to Moapa White River springfish, because the quality of effluent produced at the treatment plant(s) would be suitable for discharge to surface waters consistent with NDEP effluent reuse requirements (NAC 445A.274-280).

5.2.4.2.2 Moapa Speckled Dace

DIRECT EFFECTS

No habitat for Moapa speckled dace is available within the Development Area; therefore, no direct effects would occur as a result of water supply infrastructure and management activities, including water treatment plant construction, monitoring wells development, development of on-site storage facilities, and local transmission and distribution facilities.

INDIRECT EFFECTS

Treated effluent would not result in effects to Moapa speckled dace, because the quality of effluent produced at the treatment plant(s) would be suitable for discharge to surface waters consistent with NDEP effluent reuse requirements (NAC 445A.274-280).

5.2.4.2.3 Relict Leopard Frog

DIRECT EFFECTS

No habitat for relict leopard frog is available within the Development Area; therefore, no direct effects would occur as a result of water supply infrastructure and management activities, including water treatment plant construction, monitoring wells development, development of on-site storage facilities, and local transmission and distribution facilities.

INDIRECT EFFECTS

Treated effluent would not result in effects to the relict leopard frog, because the quality of effluent produced at the treatment plant(s) would be suitable for discharge to surface waters consistent with NDEP effluent reuse requirements (NAC 445A.274-280).

5.2.4.2.4 Southwestern Willow Flycatcher

DIRECT EFFECTS

No direct effects would occur to southwestern willow flycatcher, its habitat, or critical habitat from water supply infrastructure and management activities within the Development Area, because habitat for the flycatcher does not occur within the Development Area.

INDIRECT EFFECTS

Treated effluent would not result in indirect effects to southwestern willow flycatcher, its habitat, or critical habitat, because the quality of effluent produced at the treatment plant(s) would be suitable for discharge to surface waters consistent with NDEP effluent reuse requirements (NAC 445A.274-280).

5.2.4.2.5 Yuma Clapper Rail

DIRECT EFFECTS

No direct effects would occur to Yuma clapper rail and its habitat from water supply infrastructure and management activities within the Development Area, because none of its habitat would be disturbed in the process.

INDIRECT EFFECTS

Treated effluent would not result in effects to Yuma clapper rail, because the quality of effluent produced at the treatment plant(s) would be suitable for discharge to surface waters consistent with NDEP effluent reuse requirements (NAC 445A.274-280).

5.2.4.2.6 Las Vegas Buckwheat

DIRECT EFFECTS

No direct effects to Las Vegas buckwheat would occur as result of water supply infrastructure and management activities beyond those already described in the Community Development and Construction section above.

INDIRECT EFFECTS

Treated effluent would not result in effects to Las Vegas buckwheat, because the quality of effluent produced at the treatment plant(s) would be suitable for reuse on the surrounding landscape areas pursuant to NDEP effluent reuse requirements (NAC 445A.274-280).

5.2.4.2.7 Three-corner Milkvetch

DIRECT EFFECTS

No direct effects to three-corner milkvetch would occur as result of water supply infrastructure and management activities beyond those already described in the Community Development and Construction section above.

INDIRECT EFFECTS

Treated effluent would not result in effects to three-corner milkvetch, because the quality of effluent produced at the treatment plant(s) would be suitable for reuse on the surrounding landscape areas pursuant to NDEP effluent reuse requirements (NAC 445A.274-280).

5.2.4.2.8 Sticky Buckwheat

DIRECT EFFECTS

No direct effects to sticky buckwheat would occur as result of water supply infrastructure and management activities.

INDIRECT EFFECTS

Treated effluent would not result in effects to sticky buckwheat, because the quality of effluent produced at the treatment plant(s) would be suitable for reuse on golf courses and the surrounding landscape areas pursuant to NDEP effluent reuse requirements (NAC 445A.274-280).

5.2.5 Flood Control and Stormwater Management

The existing desert dry washes on the alluvial fans with the Covered Area of this MSHCP do not have the current capacity to adequately convey floodwaters through the Development Area. To provide for the health, safety, and welfare of future residents within the Development Area during a flood event, CSI proposes to restore and/or expand certain, designated dry washes and construct a variety of flood control facilities including detention basins, constructed washes, and other stormwater facilities, all activities to be covered under the CSI MSHCP.

5.2.5.1 Covered Species

5.2.5.1.1 Moapa Dace

DIRECT EFFECTS

No habitat for Moapa dace is available within the Covered Area. Stormwater detention basins and other flood management activities constructed in the Development Area would not result in direct effects to Moapa dace or its habitat. Depth to groundwater beneath the Development Area is over 400 feet and there are no data that suggest surface water and groundwater interact beneath the Development Area. Therefore, there would be no direct effects to groundwater in the Carbonate Aquifer as a result of actions that alter storm flows within the Development Area. As a result, no effects to springs and headwaters of the Muddy River, which are habitat for the Moapa dace.

INDIRECT EFFECTS

Both off- and on-site ephemeral surface flows would be managed within the Development Area to minimize effects to the quality and quantity of water entering the Pahranagat Wash and downstream sites. The stormwater detention basins and other flood management activities would help minimize potential effects to the Pahranagat Wash and downstream sites from increased stormwater runoff volumes and peak flow rates that likely would accompany urban development. With these facilities in place, stormwater flows that enter the Muddy River from the Development Area would not exceed current conditions. Furthermore, continuous flow in the Pahranagat Wash incised ephemeral channel between the Development Area to the Muddy River only occurs during major storm events (100-year or greater). Thus, no change to Moapa dace habitat would occur as a result of stormwater management within the Covered Area.

5.2.5.1.2 Virgin River Chub

DIRECT EFFECTS

No habitat for Virgin River chub is available within the Covered Area. Stormwater detention basins and other flood management activities constructed in the Development Area would not result in direct effects to Virgin River chub, or its habitat. Depth to groundwater beneath the Development Area is over 400 feet, and there are no data that suggest surface water and groundwater interact beneath the Development Area. Therefore, there would be no direct effects to groundwater in the Carbonate Aquifer as a result of actions that alter surface flow within the Development Area. The surface/groundwater interaction in the Muddy River would not be affected from these activities. As a result, no direct effects to Virgin River chub habitat in the Muddy River would be affected from flood management activities.

INDIRECT EFFECTS

Both off- and on-site ephemeral surface flows would be managed within the Development Area to minimize effects to the quality and quantity of water entering the Pahranagat Wash and downstream sites. The stormwater detention basins and other flood management activities would help minimize potential effects to the Pahranagat Wash and downstream sites from increased stormwater runoff volumes and peak flow rates that likely would accompany urban development. With these facilities in place, stormwater flows that enter the Muddy River from the Development Area would not exceed current conditions. Furthermore, continuous flow in the ephemeral Pahranagat Wash between the Development Area to the Muddy River only occurs during major storm events (100-year or greater). Therefore, no change to Virgin River chub, its habitat, would occur as a result of stormwater management within the Covered Area.

5.2.5.1.3 Desert Tortoise

DIRECT EFFECTS

Flood control activities would occur within the Development Area. However, as all desert tortoise suitable and critical habitat within the Development Area would be assumed to be lost, as discussed in the Community Development and Construction section above no further direct effects would occur from construction of flood control structures within the Development Area.

INDIRECT EFFECTS

Alteration of flood flow dynamics, sediment movement, and water quantity has the potential to affect desert tortoise habitat, including critical habitat, at a low level outside of the Development Area. Changes to floodplain size and location could slightly decrease or increase desert tortoise habitat near washes. Changes in flood flow levels could affect desert tortoise dispersal during flood periods. Flood control structures would be ameliorated if they pose a trapping problem or installed to allow safe passage of the desert tortoise, if applicable.

5.2.5.1.4 Banded Gila Monster

DIRECT EFFECTS

Flood control activities would occur within the Development Area. Because much of the banded Gila monster potential habitat within the Development Area is assumed to be lost, as discussed in the Community Development and Construction section, no further direct effects would occur in the Development Area due to flood control or stormwater management activities.

INDIRECT EFFECTS

Changes to floodplain size and location could slightly decrease or increase banded Gila monster habitat near washes. Changes in flood flow levels could affect banded Gila monster dispersal during flood periods. Alteration of flood flow dynamics, sediment movement, and water quantity has the potential to affect banded Gila monster habitat but at low levels outside of the Development Area.

5.2.5.1.5 Western Burrowing Owl

DIRECT EFFECTS

Flood control activities would occur within the Development Area. Because all burrowing owl habitat within the Development Area is assumed to be lost, as discussed in the Community Development and Construction section, no further direct effects would occur in the Development Area.

INDIRECT EFFECTS

Changes to floodplain size and location could slightly decrease or increase western burrowing owl habitat near washes. Alteration of flood flow dynamics, sediment movement, and water quantity has the potential to affect western burrowing owl habitat but at low levels outside of the Development Area.

5.2.5.2 Evaluation Species

5.2.5.2.1 Moapa White River Springfish

DIRECT EFFECTS

No habitat for Moapa White River springfish is available within the Covered Area. Stormwater detention basins and other flood management activities constructed in the Development Area would not result in direct effects to Moapa White River springfish or its habitat. Depth to groundwater beneath the Development Area is over 400 feet and there are no data that suggest surface water and groundwater interact beneath the Development Area. Therefore, there would be no direct effects to groundwater in the Carbonate Aquifer as a result of actions that alter surface flow within the Development Area.

INDIRECT EFFECTS

Both off- and on-site ephemeral surface flows would be managed within the Development Area to minimize effects to the quality and quantity of water entering the Pahranagat Wash and downstream sites. The stormwater detention basins and other flood management activities would help minimize potential effects to the Pahranagat Wash and downstream sites from increased stormwater runoff volumes and peak flow rates that likely would accompany urban development. With these facilities in place, stormwater flows that enter the Muddy River from the Development Area would not exceed current conditions. Furthermore, continuous flow in the ephemeral Pahranagat Wash between the Development Area to the Muddy River only occurs during major storm events (100-year or greater). Thus, no change to Moapa White River springfish would occur as a result of stormwater management within the Covered Area.

5.2.5.2.2 Moapa Speckled Dace

DIRECT EFFECTS

No habitat for Moapa speckled dace is available within the Covered Area. Stormwater detention basins and other flood management activities constructed in the Development Area would not result in direct effects to Moapa speckled dace or its habitat. Depth to groundwater beneath the Development Area is over 400 feet and there are no data that suggest surface water and groundwater interact beneath the Development Area. Therefore, there would be no direct effects to groundwater in the Carbonate Aquifer as a result of actions that alter surface flow within the Development Area.

INDIRECT EFFECTS

Both off- and on-site ephemeral surface flows would be managed within the Development Area to minimize effects to the quality and quantity of water entering the Pahranagat Wash and downstream sites. The stormwater detention basins and other flood management activities would help minimize potential effects to the Pahranagat Wash and downstream sites from increased stormwater runoff volumes and peak flow rates that likely would accompany urban development. With these facilities in place, stormwater flows that enter the Muddy River from the Development Area would not exceed current conditions. Furthermore, continuous flow in the Pahranagat Wash incised ephemeral channel between the Development Area to the Muddy River only occurs during major storm events (100-year or greater). Thus, no change to Moapa speckled dace populations or habitat would occur as a result of stormwater management within the Covered Area.

5.2.5.2.3 Relict Leopard Frog

DIRECT EFFECTS

No habitat for relict leopard frog is available within the Covered Area. Stormwater detention basins and other flood management activities constructed in the Development Area would not result in direct effects to relict leopard frog or its habitat. Depth to groundwater beneath the Development Area is over 400 feet and there are no data that suggest surface water and groundwater interact beneath the Development Area. Therefore, there would be no direct effects to groundwater in the Carbonate Aquifer as a result of actions that alter surface flow within the Development Area.

INDIRECT EFFECTS

Both off- and on-site ephemeral surface flows would be managed within the Development Area to minimize effects to the quality and quantity of water entering the Pahranagat Wash and downstream sites. The stormwater detention basins and other flood management activities would help minimize potential effects to the Pahranagat Wash and downstream sites from increased stormwater runoff volumes and peak flow rates that likely would accompany urban development. With these facilities in place, stormwater flows that enter the Muddy River from the Development Area would not exceed current conditions. Furthermore, continuous flow in the Pahranagat Wash incised ephemeral channel between the Development Area to the Muddy River only occurs during major storm events (100-year or greater). Thus, no change to relict leopard frog populations or habitat would occur as a result of stormwater management within the Covered Area.

5.2.5.2.4 Southwestern Willow Flycatcher

DIRECT EFFECTS

No habitat for southwestern willow flycatcher is available within the Covered Area. Stormwater detention basins and other flood management activities constructed in the Development Area would not result in direct effects to southwestern willow flycatcher or its habitat, including critical habitat.

INDIRECT EFFECTS

Both off- and on-site ephemeral surface flows would be managed within the Development Area to minimize effects to the quality and quantity of water entering the Pahranagat Wash and downstream sites. The stormwater detention basins and other flood management activities would help minimize potential effects to the Pahranagat Wash and downstream sites from increased stormwater runoff volumes and peak flow rates that likely would accompany urban development. With these facilities in place, stormwater flows that enter the Muddy River from the Development Area would not exceed current conditions. Furthermore, continuous flow in the Pahranagat Wash between the Development Area to the Muddy River only occurs during major storm events (100-year or greater). Thus, no change to southwestern willow flycatcher, its habitat, or critical habitat would occur as a result of stormwater management within the Covered Area.

5.2.5.2.5 Yuma Clapper Rail

DIRECT EFFECTS

No habitat for the Yuma clapper rail is currently available in the Covered Area. Thus, stormwater detention basins and other flood management activities constructed in the Development Area would not result in direct effects to Yuma clapper rail or its habitat.

INDIRECT EFFECTS

Both off- and on-site ephemeral surface flows would be managed within the Development Area to minimize effects to the quality and quantity of water entering the Pahranagat Wash and downstream sites. The stormwater detention basins and other flood management activities would help minimize potential effects to the Pahranagat Wash and downstream sites from increased stormwater runoff volumes and peak flow rates that likely would accompany urban development. With these facilities in place, stormwater flows that enter the Muddy River from the Development Area would not exceed current conditions. Furthermore, continuous flow in the Pahranagat Wash between the Development Area to the Muddy River only occurs during major storm events (100-year or greater). Thus, no change to Yuma clapper rail or its habitat would occur because of stormwater management within the Covered Area.

5.2.5.2.6 Las Vegas Buckwheat

DIRECT EFFECTS

Flood control activities would occur within the Development Area. However, the potential range of Las Vegas buckwheat habitat within the Development Area is assumed to be lost, as discussed in the Community Development and Construction section. Therefore, no additional direct effects would occur in the Development Area.

INDIRECT EFFECTS

Stormwater basin construction could potentially alter nearby Las Vegas buckwheat potential habitat, if present, through changing localized groundwater levels.

5.2.5.2.7 Three-corner Milkvetch

DIRECT EFFECTS

Flood control activities would occur within the Development Area. However, the potential range of three-corner milkvetch habitat within the Development Area is assumed to be lost, as discussed in the Community Development and Construction section. Therefore, no additional direct effects would occur in the Development Area.

INDIRECT EFFECTS

Stormwater basin construction could potentially alter nearby three-corner milkvetch potential habitat, if present, through changing localized groundwater levels.

5.2.5.2.8 Sticky Buckwheat

DIRECT EFFECTS

Sticky buckwheat is not likely to occur within the Development Area, as no potential habitat for the sticky buckwheat occurs within the Development Area. Therefore, no direct effects would occur as a result of stormwater management activities.

INDIRECT EFFECTS

No indirect effects to sticky buckwheat would be expected to occur, as habitat for the sticky buckwheat is not present within the Development Area.

5.2.6 Resource Management Features

As stated previously in Section 4.1.6, the resource management features to be covered by the CSI MSHCP include designation of conservation lands, the CSICL.

5.2.6.1 Covered Species

5.2.6.1.1 Moapa Dace

DIRECT EFFECTS

The resource management features occur within the Covered Area, where Moapa dace does not occur; therefore, no direct effects to the Moapa dace would result from these features.

INDIRECT EFFECTS

No measurable effects to the Moapa dace would result from these features; although, the permanent protection of the CSICL within the Covered Area would limit future activities on these lands and their potential effects on Moapa dace.

5.2.6.1.2 Virgin River Chub

DIRECT EFFECTS

The resource management features occur within the Covered Area, where the Virgin River chub does not occur; therefore, no direct effects to the Virgin River chub or its habitat would result from these features.

INDIRECT EFFECTS

No measurable effects to the Virgin River chub or its critical habitat would result from these features; although, the permanent protection of the CSICL would limit future activities on these lands and their potential effects on Virgin River chub.

5.2.6.1.3 Desert Tortoise

DIRECT EFFECTS

The CSICL would result in the permanent protection of approximately 13,767 acres of desert tortoise critical habitat in Lincoln and Clark counties. With the private/lease land reconfiguration and protection of approximately 13,767 acres as part of the CSICL, areas determined to have high densities of desert tortoise (within the CSICL and easternmost portions of the Covered Area) would be protected, while areas with lower densities would become available for development (Knight & Leavitt Associates 2000). This would minimize the overall impact to desert tortoise. This protection would provide future benefits to the desert tortoise through limiting effects to habitat and direct mortality on these lands.

INDIRECT EFFECTS

The land configuration design of the Development Area and the CSICL would provide an indirect benefit to the desert tortoise, through maintaining connectivity with other surrounding BLM ACECs. This would maintain dispersal ability and limit habitat fragmentation and resulting isolation of populations.

5.2.6.1.4 Banded Gila Monster

DIRECT EFFECTS

The CSICL would result in the permanent protection of approximately 13,767 acres of banded Gila monster potential habitat. This protection would provide future benefits to the banded Gila monster through limiting effects to habitat and direct mortality on this land.

INDIRECT EFFECTS

The land configuration design of the Development Area and CSICL would provide an indirect benefit to the banded Gila monster, through maintaining connectivity with other surrounding BLM lands. This would maintain dispersal ability and limit habitat fragmentation and resulting isolation of populations.

5.2.6.1.5 Western Burrowing Owl

DIRECT EFFECTS

The creation of the CSICL would result in the permanent protection of approximately 13,767 acres of western burrowing owl potential habitat. This protection would provide future benefits to western burrowing owl through limiting effects to habitat and direct mortality on this land.

INDIRECT EFFECTS

The land configuration design of the Development Area and CSICL would provide an indirect benefit to western burrowing owl, through maintaining connectivity with other surrounding BLM lands. This would limit habitat fragmentation and resulting isolation of populations.

5.2.6.2 Evaluation Species

5.2.6.2.1 Moapa White River Springfish

DIRECT EFFECTS

The resource management features occur within the Covered Area, where the Moapa White River springfish does not occur; therefore, no direct effects to the Moapa White River springfish would result from these features.

INDIRECT EFFECTS

No measurable effects to the Moapa White River springfish would result from these features; although, the permanent protection of the CSICL would limit future activities on these lands and their potential effects on Moapa White River springfish.

5.2.6.2.2 Moapa Speckled Dace

DIRECT EFFECTS

The resource management features occur within the Covered Area, where the Moapa speckled dace does not occur; therefore, no direct effects to the Moapa speckled dace would result from these features.

INDIRECT EFFECTS

No measurable effects to the Moapa speckled dace would result from these features; although, the permanent protection of the CSICL would limit future activities on these lands and their potential effects on Moapa speckled dace.

5.2.6.2.3 Relict Leopard Frog

DIRECT EFFECTS

The resource management features occur within the Covered Area, where the relict leopard frog does not occur; therefore, no direct effects to the relict leopard frog would result from these features.

INDIRECT EFFECTS

No measurable effects to the relict leopard frog would result from these features; although, the permanent protection of the CSICL would limit future activities on these lands and their potential effects on relict leopard frog.

5.2.6.2.4 Southwestern Willow Flycatcher

DIRECT EFFECTS

The resource management features occur within the Covered Area, where the southwestern willow flycatcher does not occur; therefore, no direct effects to the southwestern willow flycatcher or its critical habitat would result from these features.

INDIRECT EFFECTS

No measurable effects to the southwestern willow flycatcher or its critical habitat would result from these features; although, the permanent protection of the CSICL would limit future activities on these lands and their potential effects on southwestern willow flycatcher.

5.2.6.2.5 Yuma Clapper Rail

DIRECT EFFECTS

The resource management features occur within the Covered Area, where the Yuma clapper rail does not occur; therefore, no direct effects to the Yuma clapper rail would result from these features.

INDIRECT EFFECTS

No measurable effects to the Yuma clapper rail would result from these features; although, the permanent protection of the CSICL would limit future activities on these lands and their potential effects on Yuma clapper rail.

5.2.6.2.6 Las Vegas Buckwheat

DIRECT EFFECTS

The creation of the CSICL would result in the permanent protection of approximately 13,767 acres, part of which is potential three-corner milkvetch habitat, although plants were not found during surveys on CSI property. This protection would provide future benefits to the Las Vegas buckwheat through limiting effects to potential habitat and direct disturbance of potential populations on this land.

INDIRECT EFFECTS

The land configuration design of the Development Area and CSICL would provide an indirect benefit to the Las Vegas buckwheat, through maintaining connectivity with other surrounding BLM lands which may provide habitat for this species. This would maintain dispersal ability and limit habitat fragmentation and resulting isolation of populations.

5.2.6.2.7 Three-corner Milkvetch

DIRECT EFFECTS

The creation of the CSICL would result in the permanent protection of approximately 13,767 acres, part of which is potential three-corner milkvetch habitat, although plants were not found during surveys on CSI property. This protection would provide future benefits to the three-corner milkvetch through limiting effects to potential habitat and direct disturbance of potential populations on this land.

INDIRECT EFFECTS

The land configuration design of the Development Area and CSICL would provide an indirect benefit to the three-corner milkvetch, through maintaining connectivity with other surrounding BLM lands which may provide habitat for this species. This would maintain dispersal ability and limit habitat fragmentation and resulting isolation of populations.

5.2.6.2.8 Sticky Buckwheat

DIRECT EFFECTS

The creation of the CSICL would result in the permanent protection of approximately 13,767 acres of potential sticky buckwheat habitat. This protection would provide future benefits to the sticky buckwheat through limiting effects to potential habitat and direct disturbance of potential populations on this land.

INDIRECT EFFECTS

The land configuration design of the Development Area and CSICL would provide an indirect benefit to the sticky buckwheat, through maintaining connectivity with other surrounding BLM lands which may provide habitat for this species. This would maintain dispersal ability and limit habitat fragmentation and resulting isolation of populations.

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CHAPTER 6

Conservation Measures

Chapter 6: Conservation Measures

Conservation measures are those actions that avoid, minimize and/or mitigate the potential impacts of the Covered Activities on the Covered Species (USFWS and NMFS 1996). To meet the statutory criteria for approval of an HCP, the conservation measures must: (1) avoid, minimize, and mitigate the impacts of authorized incidental take of Covered Species to the maximum extent practicable; and (2) ensure that any such taking will not appreciably reduce the likelihood of survival and recovery of such species in the wild. These actions will be taken to meet the biological goals of the species covered by the CSI MSHCP.

6.1 BIOLOGICAL GOALS AND OBJECTIVES

The biological goals and objectives for each of the Covered Species under the CSI MSHCP are listed below. The purpose of identifying these goals and objectives is to establish a framework for developing the conservation measures for the CSI MSHCP.

The goals and objectives for the desert tortoise, banded Gila monster and western burrowing owl are both habitat- and population-based, whereas the goals and objectives for the Moapa dace and Virgin River chub are habitat-based. Habitat-based goals result in avoidance, minimization, and mitigation measures implemented as part of the CSI MSHCP that restore or conserve certain acreage of habitat.

6.1.1 Moapa Dace and Virgin River Chub

6.1.1.1 Goal

To avoid, minimize, and mitigate for potential effects from activities associated with the CSI Development in Lincoln County.

6.1.1.2 Objectives

Offset the potential indirect effects to Moapa dace and Virgin River chub habitat located downstream of the Development Area from the potential disturbance of up to 26.6 acres of WOUS (refer to Table 4-6) from Community Development and Construction activities and other Covered Activities within the Development Area.

6.1.2 Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

6.1.2.1 Goal

To avoid, minimize, and mitigate the potential effect of disturbing approximately 20,716 acres of habitat within Lincoln County.

6.1.2.2 Objectives

- Offset the potential effects of taking up to 20,716 acres of habitat (refer to Table 1-3) within the Covered Area from Community Development and Construction activities.
- Ensure that current levels of human disturbance in adjacent ACECs do not exceed the baseline level.
- Manage roads or traffic speeds within the Development Area and CSICL adjacent to ACECs to avoid or reduce desert tortoise mortality.

Individual species biological goals and objectives specific to the Evaluation Species identified in this MSHCP were not developed. However, an overall goal for Evaluation Species is to collect additional information on their distribution and status.

6.2 CONSERVATION MEASURES

As outlined above, conservation measures are typically categorized into three groups: avoidance, minimization, and mitigation measures. Avoidance measures avoid the potential effect or impact from a given activity. Minimization measures reduce the potential effects to lesser levels over time. Mitigation measures compensate for the remaining potential effects after avoidance and minimization measures are implemented. Collectively, the purpose of these conservation measures is to offset the potential effects or impacts of an action on each of the Covered Species.

No specific conservation measures are proposed at this time for Evaluation Species. However, during clearances for desert tortoise, banded Gila monster, and western burrowing owl, surveys would be conducted for species potentially occurring in the Covered Area. Additionally, any monitoring or surveys that would be conducted as part of the effectiveness monitoring and adaptive management aspects of the CSI MSHCP would provide information on these species. If the results of monitoring and surveys indicate that Evaluation Species are adversely affected by Covered Activities, then conservation measures would be developed. The following evaluation species do not occur in the Development Area, and, therefore, would not be directly affected by Community Development and Construction Activities: Moapa White River springfish, Moapa speckled dace, relict leopard frog, southwestern willow flycatcher, Yuma clapper rail, sticky buckwheat, and Las Vegas buckwheat. Three-corner milkvetch may potentially occur in the Development Area. It is anticipated that conservation measures for desert tortoise, banded Gila monster, and western burrowing owl would also benefit three-corner milkvetch. Conservation measures are described by activity in Table 6-1 and in detail in the following sections.

6.2.1 Community Development and Construction

6.2.1.1 Moapa Dace and Virgin River Chub

Moapa dace and Virgin River chub do not occur in the Covered Area. No potential direct effects are expected to occur within the Covered Area to these species from Community Development and Construction activities. Indirect effects, however, could occur. The following conservation measures are proposed to address those potential effects. Some of these conservation measures also have potential benefits to desert tortoise, banded Gila monster, and western burrowing owl as well as other aquatic species. Measures taken to offset effects to WOUS within the Development Area and required for the CWA section 404 permit process would fully address any potential effects to Moapa dace and Virgin River chub. For this reason, the avoidance, minimization, and mitigation measures presented for these species are identical to those described in the Mitigation Plan associated with the Section 404 permit application, although the Mitigation Plan also addresses effects to WOUS within the BLM Utility Corridor to the west of the Covered Area (Appendix J). Funding for the conservation measures that would occur to meet the requirements of the Section 404 permit would be funded through a process separate from the CSI MSHCP.

Table 6-2 summarizes the conservation measures for WOUS. The avoided WOUS and upland buffer habitat would reduce the total acreage in which activities could occur to approximately 20,716 acres within the Development Area (21,454 acres less 32.1 acres of protected existing WOUS and 712.5 acres of upland buffer habitat).

6.2.1.1.1 Avoidance and Minimization Measures

Avoidance and minimization measures to protect WOUS have been developed as part of the Mitigation Plan for the Development Area (Huffman-Broadway Group 2007). These measures would also aid in the protection of Moapa dace and Virgin River chub habitat downstream of the Development Area and include the following:

- Implement a 100-foot setback from the top of the bank, Pahranagat Wash incised ephemeral channel within the Covered Area, consistent with the Section 404 permit.
- Any activity occurring adjacent to the Pahranagat Wash incised ephemeral channel would be done in compliance with Corps regulations to minimize impacts to WOUS.

Table 6-1 Summary of Conservation Measures for the CSI MSHCP

Covered Activity	Covered Species	Potential Effect	Proposed Conservation Measures: Avoidance	Proposed Conservation Measures: Minimization	Proposed Conservation Measures: Mitigation
Community Development and Construction	Moapa dace Virgin River chub Note that conservation measures for these fishes are identical to measures designed to address effects to WOUS for a section 404 permit (Appendix P)	Indirect effects to downstream aquatic habitat: ▪ Sedimentation of habitat ▪ Alteration of flow amounts and frequency ▪ Reduced water quality	Avoid construction activities: ▪ Within Development Area, except for conservation purposes, on lands extending 100 ft on either side of Pahranagat Wash incised ephemeral channel ▪ On 32.1 acres of avoided desert dry washes and 712.5 acres of upland habitat through a conservation easement along Pahranagat Wash and other washes ▪ On approximately 13,767 acres of protected land in reserve area (CSICL), including 6.9 acres of dry desert washes.	▪ Monitor constructed washes during construction ▪ Implement stormwater plan and erosion control measures. ▪ Restore 63.4 acres of desert dry washes to create a net increase. ▪ Create Perpetual Conservation Easement Grant. ▪ Ensure a 5-year monitoring and short-term maintenance period. ▪ Develop and implement Long-Term Protection Plan for the Moapa dace and Virgin River chub and secure associated funding for implementation of this plan.	Not applicable
	Desert tortoise Banded Gila monster Western burrowing owl	Direct effects: ▪ Direct mortality from construction ▪ Habitat loss ▪ Road mortality Indirect effects: ▪ Habitat fragmentation ▪ Trash disposal ▪ Pet encounters ▪ Increases in natural predators ▪ Illegal collection ▪ disease ▪ Increased mortality or harm due to toxicosis ▪ Reduction in habitat and forage quality ▪ Increase in fire frequency and intensity ▪ Increased mortality or injury due to vandalism	BMPs for Construction, Operations and Maintenance Activities: General Site Measures ▪ Confine activities to locations within areas previously cleared of tortoises ▪ Establish travel routes cleared of tortoises with speed limits ▪ Inspect area around and below vehicles for tortoise prior to starting vehicles *Ground Disturbance Activities* ▪ Provide environmental sensitivity training to all individuals involved in construction, operation, or maintenance activity before activity commences. ▪ Clearly mark and identify all vehicle access routes, equipment staging areas, and excavated material stockpile areas. ▪ Preserve natural vegetated buffers or construct temporary vegetated buffers. ▪ Practice construction site waste management ▪ Sequence construction to avoid large expanses of graded, vacant land. ▪ Travel only within Development Area ▪ *Sediment and Erosion Control* ▪ BMPs *Water Quality* ▪ Place staging areas for construction equipment away from WOUS to avoid possible leakage from equipment into water source. *Other Avoidance Measures:* ▪ Survey/clearance and translocation for desert tortoise and western burrowing owl before ground disturbing activities ▪ Opportunistic clearing and translocation of banded Gila monster subject to NDOW guidance and protocol (NDOW 2007) ▪ Avoidance measures for WOUS (Moapa dace/Virgin River chub) apply for banded Gila monster. ▪ Fire conservation measures ▪ Trash management ▪ Pet management ▪ Conservation education	▪ Permanent tortoise fencing of the Development Area boundary ▪ Follow Gila monster protocol for minimizing impacts in the construction site, developed by NDOW (2007). ▪ Follow USFWS (2007) protocol for protecting burrowing owls at construction sites in Nevada's Mojave Desert Region. ▪ Minimization measures for WOUS (Moapa dace/Virgin River chub) also apply for banded Gila monster. ▪ Weed Management Plan	▪ Mitigation fees for the development of private land would be $800 per acre and are estimated to generate more than $16.6 million over the permit period. ▪ Mitigation fees would fund: – Administration of the HCP (24 percent) – Clearance surveys and installation of fencing (7.2 percent) – Research associated with (68.8 percent): • Head Starting (at DTCC or CSCC) • Translocation (at DTCC or CSCC) • Ecological implications of fire research • Habitat restoration after fire research • Invasive species management • Other research priorities for the western burrowing owl and banded Gila monster ▪ CSI would contribute an additional fee of $750,000 to contribute to desert tortoise recovery. ▪ CSICL: – Leased lands identified in BLM lease and a private land adjustment would be considered as mitigation for development in Lincoln County. – 13,767 acres of leased lands would be permanently protected within the CSICL ▪ Perpetual Conservation Easement Grant for Preserved WOUS. Would create habitat and benefit desert tortoise, Gila monster, and western burrowing owl. Apply for Moapa dace and Virgin River chub. ▪ Mitigation measures for WOUS (Moapa dace/Virgin River chub) apply for desert tortoise and banded Gila monster.

Table 6-1 Summary of Conservation Measures for the CSI MSHCP

Covered Activity	Covered Species	Potential Effect	Proposed Conservation Measures: Avoidance	Proposed Conservation Measures: Minimization	Proposed Conservation Measures: Mitigation
Recreational Facilities and Open Space	Moapa dace Virgin River chub	No direct or indirect effects	Not applicable	Not applicable	Not applicable
	Desert tortoise Banded Gila monster Western burrowing owl	See effects for Community Development and Construction Activities Also, mortality/injury from off-highway vehicles or non-motorized recreation	Measures for Community Development and Construction Activities applicable to this activity No ATV/OHV use outside of designated areas. Existing OHV regulations occur on adjacent USFWS and BLM lands.	Measures for Community Development and Construction Activities applicable to this activity	Measures for Community Development and Construction Activities applicable to this activity
Utility Infrastructure	Moapa dace Virgin River chub	No direct or indirect effects	Not applicable	Not applicable	Not applicable
	Desert tortoise Banded Gila monster Western burrowing owl	See effects for Community Development and Construction Activities	Measures for Community Development and Construction Activities applicable to this activity	Measures for Community Development and Construction Activities applicable to this activity	Measures for Community Development and Construction Activities applicable to this activity
Water Supply Infrastructure and Management	Moapa dace Virgin River chub	See effects for Community Development and Construction Activities	Measures for Community Development and Construction Activities applicable to this activity	Measures for Community Development and Construction Activities applicable to this activity	Measures for Community Development and Construction Activities applicable to this activity
	Desert tortoise Banded Gila monster Western burrowing owl	See effects for Community Development and Construction Activities	Measures for Community Development and Construction Activities applicable to this activity	Measures for Community Development and Construction Activities applicable to this activity	Measures for Community Development and Construction Activities applicable to this activity
Flood Control Structures Development and Maintenance	Moapa dace Virgin River chub	No direct or indirect effects	Not applicable	Not applicable	Not applicable
	Desert tortoise Banded Gila monster Western burrowing owl	Effects similar to indirect effects for Community Development and Construction Activities	Measures for Community Development and Construction Activities applicable to this activity	Measures for Community Development and Construction Activities applicable to this activity	Measures for Community Development and Construction Activities applicable to this activity
Resource Management Features	Moapa dace Virgin River chub	No direct or indirect effects	Not applicable	Not applicable	Not applicable
	Desert tortoise Banded Gila monster Western burrowing owl	Potential benefits Indirect effects similar to indirect effects for Community Development and Construction Activities, although at very low level	▪ Implement the objectives of fire and weed conservation measures ▪ Biologist observer during trail building and installation of educational kiosks and signage	Erosion control measures for trails	No mitigation measures necessary to address potential effects

Table 6-2 Avoidance and Mitigation Measures for WOUS in the Covered Area

	Development Area (acres)	Lincoln County Leased Lands (CSICL)	Total (acres)
Total WOUS	51.8	6.9	58.7
Potentially disturbed WOUS	26.6	0	26.6
Restored WOUS (at 2:1 ratio)	59.8	3.6	63.4
Avoided WOUS also protected in an easement	25.2	6.9	32.1
Restored WOUS also protected in an easement	59.8	Located within areas where preserved and restored WOUS and surrounding upland habitat lands will be protected by an easement	63.4
Total existing and restored WOUS protected in an easement	85.1	10.5	95.6
Upland buffer habitat for preserved, existing WOUS (100 feet on each side)	712.5	Located within areas where preserved and restored WOUS and surrounding upland habitat lands will be protected by an easement	712.5
Upland buffer habitat for preserved, restored WOUS (40 to 80 feet on each side)	67.4	Located within areas where preserved and restored WOUS and surrounding upland habitat lands will be protected by an easement	67.4
Total upland buffer habitat	779.9	Located within areas where preserved and restored WOUS and surrounding upland habitat lands will be protected by an easement	779.9
Total preserved WOUS and upland buffer habitat	864.8	0	864.8

- Create protective upland buffer habitat on each side of a preserved desert dry wash, consistent with the Section 404 permit.
- A Storm Water Pollution Prevention Plan in accordance with Section 402 of the Federal CWA and any State/local requirements would be implemented during construction to minimize impacts to water quality. The Coyote Springs Storm Water Management Plan (SWMP) would be implemented for the Development Area, to guide implementation of elements required for Small Municipal Separate Storm Sewer Systems (SMS4s) for CWA National Pollution Discharge Elimination Systems (NPDES) coverage. A copy of the plan is provided in Appendix I.
- Contractors would be required to use standard erosion control BMPs, including silt fencing, sediment traps, vegetated buffers, sand filters, grassed filter strips, bio-retention structures, soil roughening on graded sites, and earthen perimeter dikes, near ephemeral washes and disturbed sites to control sediment generation and transport.
- Avoid construction on approximately 13,767 acres of protected land in CSICL, which includes approximately 6.9 acres of WOUS.
- Constructed washes would have natural vegetation. On-site personnel would monitor these areas during construction.

As part of the mitigation for fill impacts to the WOUS, CSI proposes to restore and/or expand the following types of desert dry washes:

- Adjacent historical washes that were cut off when U.S. Highway 93 was constructed in the 1960s
- Washes that were filled with alluvium through normal geologic processes

- These washes would be restored to a natural configuration providing desert dry washes of a size that result in stormwater conveyance that meets Lincoln County standards. These drainages would be reinforced with erosion control measures, utilizing native materials when feasible.

Implementation of a Mitigation Plan for impacts to WOUS (Appendix J) would include some or all of the following measures. These measures would also benefit the Moapa dace and Virgin River chub as minimization measures in this CSI MSHCP.

- Placing a Perpetual Conservation Easement Grant on preserved desert dry washes and upland buffer habitat for preserved desert dry washes. A Drainage and Maintenance Easement would be placed on restored desert dry washes, which would allow for maintenance of restored WOUS and adjacent facilities. These easements would include environmental restrictions related to activities authorized by the Corps and within the mitigation area such as:
  - Avoiding construction activities on 32.1 acres of desert dry washes (WOUS) within the Development Area (25.2 acres) and lease lands (6.9 acres); and
  - Preserving 779.9 acres of protective upland buffer habitat adjacent to preserved desert dry washes. The upland buffers would consist of: 1) a 100-foot-wide buffer on each side of all preserved WOUS, including the Pahranagat Wash incised ephemeral channel; and 2) a vary within a minimum range of 40 to 80 feet on each side of all other restored desert dry washes to buffer WOUS from surrounding development activities.
  - Restoring 63.4 acres of desert dry washes (WOUS) within the Development Area (59.8 acres) and lease lands (3.6 acres).
  - Once mitigation success criteria have been met, the management responsibility for this easement on preserved washes would be assumed by the grantee of the conservation easement. The grantee would be a Corps-approved entity or organization with demonstrated experience in managing lands as a conservation easement grantee. The Corps would be established as a third party beneficiary to ensure that the area remains as an open space preserve in perpetuity.

Implementation of a Mitigation Plan (Appendix J) would result in the restoration of 63.4 acres of WOUS within the Development Area (59.8 acres) and lease lands (3.6 acres), consisting of desert dry washes, as compensation for 26.6 acres of impacted WOUS within the Development Area. This would be accomplished by:

- Restoring desert dry washes so as to provide a net increase in fully functional, self-sustaining desert dry washes having habitat functions and associated values similar to those present on-site prior to the onset of project construction;
- Providing for contingency measures in case desert dry washes restoration efforts fail to meet success criteria; and
- Providing financial guarantees for an agency-required five-year monitoring period, five-year short-term maintenance program, and erosion control measures during implementation.

A total of 95.6 acres of desert dry washes would be preserved under the CSI MSHCP. The following is a summary of the lands to be preserved:

- Preserving 32.1 acres of existing desert dry washes.
- Preserving 63.4 acres of restored desert dry washes.

Other measures undertaken in the Mitigation Plan for impacts to WOUS (Appendix J), which would serve as minimization measures for the Moapa dace and Virgin River chub, include:

- A Long-Term Protection Plan, which would include “in perpetuity” management, to include periodic (annual) maintenance inspections and maintenance, if necessary; and
- Funding of the Long-Term Protection Plan with an endowment, this would be provided to the grantee of the Perpetual Conservation Easement Grant.

- Funding of Drainage and Maintenance Easement with funds from GID/Master Association fees and assessments. This easement would include long-term monitoring and maintenance of channel conditions.

6.2.1.2 Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

Desert tortoise and banded Gila monster occur in the Development Area. Western burrowing owl likely occurs in the Development Area. Desert tortoise, banded Gila monster and western burrowing owl may potentially be directly affected by construction resulting in direct mortality, loss of habitat due to land development activities, and increased mortality resulting from roads. The following conservation measures are proposed to offset those potential effects. Some of the conservation measures proposed to offset potential effects to desert tortoise, banded Gila monster and western burrowing owl may also benefit the aquatic species.

6.2.1.2.1 Avoidance and Minimization Measures

<u>LAND DEVELOPMENT AREA SURVEYS, CLEARANCE AND TRANSLOCATION</u>

All land subject to development would be surveyed and cleared of desert tortoise prior to ground disturbing activities. This would avoid the potential effect of direct mortality resulting from construction activities. It is anticipated that desert tortoise(s) removed during clearance surveys would be used in conjunction with science-based research projects funded as a mitigation measure under this MSHCP and described below. The data collected (i.e., location of all tortoises and tortoise signs, habitat characteristics, physiognomy of the cleared areas, burrows collapsed, health of individuals, record of individuals that were translocated, etc.) would help determine the status of the desert tortoise and its habitat in this area.

The tortoises cleared from this area would be kept in separate desert tortoise holding facilities, which include the Desert Tortoise Conservation Center (DTCC) or, as an option, the Coyote Springs Conservation Center (CSCC), to be located on CSI private lands. Facilities at CSCC could include structures for temporary holding of individual tortoises, longer-term holding of groups of tortoises, and part of the head-starting program. The operation of the CSCC would be addressed in separate Section 7 consultation. The responsibility of CSI would be limited to providing funds for the construction and maintenance of the facility. Funds for the construction of the CSCC would be supplied from the CSI MSHCP. ESA compliance associated with the operation of the facility would be the responsibility of the researcher operating the facility.

Only qualified and USFWS-authorized biologists or individuals trained in appropriate methods of handling desert tortoises would survey for and handle desert tortoises during pre-construction tortoise clearance surveys. The HCP Administrator (see Chapter 8, Plan Implementation) in consultation with the USFWS would choose the surveyors used for this effort.

Translocations will need to conform with BLM Manual Section 1745 “Introduction, Transplant, Augmentation, and Reestablishing of Fish, Wildlife, and Plants” prior to, and following, translocation. HCP permittees, USFWS, or their assignees, will conduct an assessment of desert tortoise habitat, densities, carrying capacity, and mortality in suitable areas proposed for translocation.

All land subject to development would be surveyed prior to ground disturbance activities and banded Gila monsters translocated to suitable areas as they are encountered, in consultation with NDOW (NDOW 2007). This would likely avoid the potential effect of direct mortality resulting from construction activities. Data from surveys (e.g., health of individuals, location of individuals, burrows collapsed, individuals moved, etc.) would be collected and recorded.

All land subject to development would be surveyed prior to tortoise clearance surveys and ground disturbance activities for western burrowing owl and their burrows, in order to accurately survey the species. Data from surveys (e.g., health of individuals, location of individuals, burrows collapsed, etc.) would be collected and recorded. Measures contained in draft USFWS Nevada Fish and Wildlife Office guidance (USFWS 2007) would be implemented as follows:

- Even though burrowing owls are often active during the day, burrows, cracks, and crevices would be checked before beginning construction. A fiber-optic scope or remote mini-camera would be used to look into a burrow to determine the presence of owls or nests. Owls and eggs would be confirmed not to be present in burrows before grading can commence, to avoid burying them. Where active nesting birds are observed and construction of the area is imminent and fiber-scopes are ineffective, a complete removal by digging back to the end of the burrow and associated intricate system of burrows may be necessary.

- In southern Nevada, owls breed from about mid-March through August. If a burrow has an active nest, the site must be avoided until the chicks have fledged. To ensure that birds would not abandon the nest, a buffer of at least a 250-foot radius would be placed around the burrow, within which no construction should occur. It takes a minimum of 74 days from when eggs are laid until chicks are able to fly (fledge). After the young have fledged, the nest burrow would be checked for any owlets before resuming construction.
- In addition, all potential owl burrows seemingly unoccupied by scope inspection would be carefully collapsed to locate any possible owls. In the event of a displacement, appropriate depositories of owls discovered should be determined beforehand.

Translocations will need to conform with BLM Manual Section 1745 "Introduction, Transplant, Augmentation and Reestablishment of Fish, Wildlife, and Plants." Prior to, and following translocation, HCP permittees, USFWS, or their assignees, will conduct an assessment of desert tortoise habitat, densities, carrying capacity, and mortality in suitable areas proposed for translocation.

BEST MANAGEMENT PRACTICES FOR CONSTRUCTION, OPERATIONS AND MAINTENANCE ACTIVITIES

BMPs are proposed for ground disturbance activities, sediment and erosion control, and water quality. These BMPs would help address the following potential effects: mortality resulting from construction; predators attracted to trash from construction activities; and increased mortality due to toxicosis.

GENERAL SITE MEASURES

- An environmental education program, including a desert tortoise education program has been developed and approved by USFWS, which would be presented to all personnel who would be on-site, including surveyors, construction engineers, proponent employees, contractors, contractors' employees, supervisors, inspectors as development commences. This program would also include a presentation of the NDOW banded Gila monster protocol (NDOW 2007). Qualified biologists or individuals trained in appropriate methods of handling desert tortoises shall act as biological monitors and be present on-site during construction and project-related activities for the protection of desert tortoise, banded Gila monster, and western burrowing owl. All biological monitors shall be approved by the USFWS to handle desert tortoises and other Covered Species. For banded Gila monster, NDOW would be contacted in the event that a banded Gila monster needed to be moved out of harm's way. Banded Gila monsters would be cleared opportunistically as encountered during tortoise and burrowing owl clearance surveys. The number of biological monitors required would be determined by the HCP Administrator in consultation with the USFWS.
- Project personnel shall be notified that they are not authorized to handle or otherwise move federally-listed species encountered on the site. Instead, project personnel shall immediately inform an on-site biological monitor or individual trained in appropriate methods of handling desert tortoises whenever a desert tortoise is observed on or near the construction site, whether or not the tortoise is in the path of construction activities. The biological monitor or trained individual would inform project personnel on how to proceed and/or would move the desert tortoise out of harm's way.
- All employees shall be instructed that their activities shall be confined to locations within areas previously cleared of tortoise and/or western burrowing owl to the maximum extent practicable.
- Travel routes within the project area should be established, cleared of desert tortoise and western burrowing owl, and clearly marked prior to construction in any particular area. In areas not cleared of desert tortoises and burrowing owls and enclosed with tortoise exclusion fencing, cross-country vehicular travel (including that of survey crews) shall only occur after the route has been cleared by a qualified biologist/biological monitor.
- Existing routes of travel shall be used whenever possible. To the extent possible, previously disturbed sites within the project area shall be used for the stockpiling of excavated materials, storage of equipment,

digging of borrow pits, parking of vehicles, and any other surface-disturbing activity. Any routes of travel on site that require construction or modification and have not been cleared of tortoise and western burrowing owl shall have a qualified biologist(s) and/or individuals trained in appropriate methods of handling desert tortoises survey the area for the species prior to modification or construction of route.

- During construction, a speed limit of 15 miles per hour (mph) shall be maintained in areas not cleared of tortoises and fenced with desert tortoise exclusion fencing. In areas cleared of tortoises and fenced, the speed limit can be increased to 25 mph. This requirement should reduce dust and allow a safe speed at which personnel can observe desert tortoises in the road. Speed limit signs and caution signs indicating the presence of desert tortoises shall be posted at the beginning of any access road within areas not cleared of tortoise and enclosed with desert tortoise exclusion fencing.
- Any time a vehicle is parked in an area not enclosed with desert tortoise exclusion fencing, whether the engine is engaged or not, the ground around and under the vehicle shall be inspected for desert tortoise, banded Gila monster, and western burrowing owl. If an individual is observed, an authorized biologist or an individual trained in appropriate methods of handling desert tortoises shall be contacted for instructions on how to proceed.
- Project activities that may endanger a desert tortoise, banded Gila monster, or western burrowing owl shall cease if these species are found in harm's way. Project personnel shall contact the on-site biological monitor for instructions on how to proceed. Project activities shall resume after a qualified biologist or an individual trained in appropriate methods of handling desert tortoises and burrowing owls removes the tortoise or burrowing owl from danger or after the tortoise or burrowing owl has moved to a safe area on its own. For banded Gila monster, NDOW would be contacted in the event that a banded Gila monster needed to be moved out of harm's way.
- Up to 2,000 acres per year may be disturbed by construction activities for the first eight years.

GROUND DISTURBANCE ACTIVITIES

Before construction commences, environmental sensitivity training regarding protected habitats and sensitive species would be conducted for all individuals who would be involved in the construction, operation, and/or maintenance activities associated with the Development Area.

For ground disturbance activities, the following BMPs would be implemented:

- Identify and clearly mark all vehicle access routes, equipment staging areas, and excavated material stockpile areas.
- Preserve natural vegetated buffers or construct temporary vegetated buffers, if needed.
- Practice construction site waste management, including: 1) cover trash containers; 2) frequent scheduled collections; 3) place oil and fuel products in a covered area with dikes in place to contain spills during refueling; 4) immediately clean up spills; and 5) place vehicle washing and maintenance areas in appropriate areas where untreated discharges can be captured.
- During construction, no storage of equipment or construction materials or refueling of equipment or vehicles within 100-feet of a wash system whose runoff has the potential to enter Pahranagat Wash incised ephemeral channel.
- Report any fuel, transmission, or brake fluid leaks or hazardous waste leaks, spills, or releases immediately to the EC, and to NDEP if greater than 25 gallons or 3 cubic yards of contaminated material and/or groundwater. All leaks and spills shall be stopped and repaired immediately and cleaned up at the time of occurrence. All heavy equipment and vehicles shall carry a bucket and pads to absorb leaks or spills. Contaminated soil shall be removed and disposed of at an appropriate off-site facility.
- Sequence construction to avoid large expanses of graded, vacant land.
- Apply additional weed management BMPs (see Weed Management Plan below).

- Confine the area of disturbance associated with the development of the CSI community to the Development Area. This includes the location of stockpiles, staging and storage areas, turnaround sites, maintenance areas, and all pre-construction activities such as surveys and flagging of work areas.
- Prohibit cross country vehicular travel (i.e., off established roads) on reserve lands and CSI lands in Lincoln County not cleared of tortoise or Gila monster.

SEDIMENT AND EROSION CONTROL

A Stormwater Pollution Prevention Plan (SWPPP) would be prepared and submitted to the Corps for approval. Contractors and subcontractors would be given a copy of the SWPPP and required to follow the BMPs to prevent sedimentation or erosion in existing desert dry washes:

- Place sterile (certified weed-free) straw on bare soil areas following construction. Certified weed-free straw bales or straw rolls, silt fences, or other suitable barrier material to prevent sediments from entering habitats adjacent to areas being graded can also be used.
- Cease work within 50 feet of area immediately if soil or sediment becomes deposited in a preserved desert dry washes, or in the event of accidental excavation or motor vehicle access through a preserved desert dry washes. If the activity was conducted in preserved desert dry washes (WOUS), CSI would immediately notify the Corps to determine what corrective action needs to be taken. Corrective actions likely would involve removal of the soil/sediment or repair of the damaged habitat using hand tools whenever possible. Such measures would be conducted under the supervision of the HCP Administrator. The land surface would be restored to original grade and erosion control measures implemented as appropriate. If the activity is conducted in desert dry wash where restoration is ongoing, CSI can proceed with corrective action as described above without notifying the Corps. Appropriate erosion control actions would also be taken, such as stabilizing the bare ground area with sterile straw mulch or other appropriate measures, as necessary.

WATER QUALITY

Staging areas for intermittent construction equipment should be located away from WOUS to avoid possible leakage from equipment into the dry wash channel. As with ground disturbance activities, place oil and fuel products in a covered area with dikes in place to contain spills during refueling; immediately clean up spills; and place vehicle washing and maintenance areas in appropriate areas where untreated discharges can be captured.

FIRE CONSERVATION MEASURES

Fire conservation measures would be coordinated and implemented for the developed areas and for the undeveloped reserve areas.

FIRE CONSERVATION MEASURES FOR THE DEVELOPED LANDS

Develop and implement fire conservation measures for the developed areas in coordination with the appropriate federal, state, and county agencies. These measures would focus on using roadways, infrastructure, and golf courses to keep fires from within the community from spreading to adjacent reserve and BLM lands and vice versa.

All development would be required to meet with National Fire Codes and adopt Lincoln County ordinances with regards to community design aspects including:

- building construction and spacing,
- road construction and design,
- water supply, and
- emergency access.

Development plans would require defensible space as per University of Nevada, Reno guidelines as land is cleared, and before homes are built.

Coordination among local, state, and federal fire suppression agencies is important in day-to-day fire prevention activities and becomes critical in the event of a wildland fire. CSI coordination would include promotion of the community forming a local chapter of the Nevada Fire Safe Council, and ensuring that residential addresses are visible from the road. Address visibility is important to the navigation of unfamiliar neighborhoods for rescue and suppression personnel during a wildfire event.

There will be an aggressive community outreach program regarding long-term community defensible space practices. These practices are the responsibility of the individual property owner and include the following:

- Maintain vegetation around homes. This area should be kept:
  - Lean: Only small amounts of flammable vegetation,
  - Clean: No accumulation of dead vegetation or other flammable debris,
  - Green: Plants are healthy and green during the fire season.
- Immediately remove cleared vegetation to an approved disposal site when implementing defensible space treatments. This material dries quickly and presents a fire hazard if left on site.
- Where red brome or other annual grasses have become dominant within the defensible space, vegetation should be mowed or treated with an application of pre-emergent herbicide prior to seed set. Mowing may need to be repeated the following year to ensure that the seed bank of unwanted grasses has been depleted.
- Clear and maintain vegetation and combustible materials for a minimum distance of 10 feet around propane tanks.
- Store firewood a minimum distance of 30 feet from structures.
- Install and maintain spark arrestors on chimneys.
- Mow or remove brush growing against wood fences.
- Maintain the area beneath unenclosed wood decks and porches free of weeds and flammable debris.
- Remove leaves and debris from roofs and rain gutters.
- For deciduous and coniferous trees within the defensible space of a home, maintain branches to be clear for a minimum of four feet from the ground to reduce ladder fuels. Remove all dead and diseased branches and duff from beneath the remaining trees.
- Prune tree branches to be clear for at least 15 feet from chimneys, walls, and roofs of structures.
- Irrigate all trees and large shrubs near structures to increase their fire resiliency. This is especially important during droughty conditions.
- The fire department would be available to provide courtesy inspections of residential defensible space measures.
- Fuels maintenance is necessary to ensure that fire fighters have access into areas to fight a fire or defend a property. Firebreaks are necessary to slow the advance of a fire and protect resources or structures from a fire. The firebreaks aid in keeping access roads open. Firebreaks would be maintained to allow fire suppression equipment into access and to provide an evacuation route if the need arises.
- Individual landowners would be required to maintain fire-resistant species for at least 10 feet from both sides of private driveways longer than 200 feet.
- Maintain areas within 10 feet of all fire hydrants for visibility and access for fire personnel.
- Maintain a defensible space clear of all vegetation a minimum 30 feet from the fencelines of all electrical transfer stations.

- Public education to make communities more fire safe is critical. Informed community members would take the initiative required to lead efforts of a scale sufficient to effectively reduce the threat that wildland fires present to the entire interface community.
- Copies of the publication "Living with Fire" would be distributed to all property owners. This publication is free of charge. Copies can be requested from the University of Nevada Cooperative Extension, (775) 784-4848.

FIRE CONSERVATION MEASURES FOR THE RESERVE LANDS

Implement an aggressive weed abatement program for Schismus and Bromus species as directed by the CSI Technical Steering Committee (see Weed Management Plan, an appendix to the Mitigation Plan in Appendix J).

To reduce the potential effects of fire to desert tortoise, banded Gila monster, and western burrowing owl habitat in the CSICL, the fire department should meet annually with the BLM to discuss their pre-attack plan for the community and surrounding area.

Develop additional conservation measures through close coordination with the federal agencies and the adaptive management program.

TRASH MANAGEMENT

Trash would be maintained at all times in covered, sanitary containers approved for such use by Lincoln County or in enclosed areas designed for such purposes. All trash would be hauled off-site for disposal. No rubbish or debris of any kind would be allowed to accumulate anywhere in the Covered Area.

During construction, trash and food items shall be disposed of properly in predator-proof containers with re-sealing lids and removed regularly to reduce attractiveness to opportunistic predators such as ravens, coyotes, and feral dogs. This trash would be disposed of properly in an approved landfill. Trash includes but is not limited to, cigarettes, cigars, gum wrappers, tissue, cans, paper, and bags. Upon completion of individual structure or activities in an area, all construction refuse, including, but not limited to, broken equipment parts, wrapping material, cords, cables, wire, rope, strapping, twine, buckets, metal or plastic containers, and boxes, shall be removed from the site and disposed of properly.

CONSERVATION EDUCATION

The Coyote Springs Charter Community Association, Inc. has the power and the duty to pay for and obtain educational materials, facilities, projects, or programs as deemed necessary or appropriate for providing education opportunities about the local desert environment, the plant and animal species residing therein, and their habitat needs.

PET MANAGEMENT

Domestic animals occurring within the Covered Area must be kept in an enclosure or an enclosed yard on or in a Lot or Condominium in the Development Area. When not on a Lot or Condominium, all animals other than horses must be kept on a leash or other restraint being held by a person capable of controlling the animal and only in designated areas, such as a fenced dog park. This measure includes cats; cats must not be allowed to freely roam. Horses can be kept and maintained in an equestrian riding and boarding facility in the Development Area, if such a facility were to be constructed, or on Ranch Estate Lots. Pet desert tortoises will not be permitted. Pet desert tortoises also would not be allowed in the Development Area.

Unauthorized desert tortoise (*Gopherus agassizii*) pets (e.g., all desert tortoise pets that have not been formally adopted through an agency administered desert tortoise conservation center) are prohibited within the Development Area. CSI or the Master Owners Association would contact the USFWS in the event they become aware of an unauthorized pet tortoise within the Development Area. The USFWS would either directly or indirectly through an agreement with NDOW pick up the unauthorized pet tortoise and cause it to be delivered to either the DTCC or the CSCC.

In the event a wild desert tortoise (*Gopherus agassizii*) (any tortoise not confined within or on private property) is found within the Development Area, CSI or the Master Owners Association would contact their approved contractor pick up service to arrange the pick up of the wild desert tortoise and its delivery to either the DTCC or the CSCC.

PERMANENT DESERT TORTOISE EXCLUSION FENCING

The north and east boundaries of the Development Area would be permanently fenced. The type of fencing would vary from stone to metal to stucco to wood materials to be architecturally compatible with the adjacent development. Permanent tortoise exclusion fencing or other tortoise-proof barriers (as approved by the USFWS and CSI) would be inspected at least quarterly and after major precipitation events. This inspection would involve checking to see that there is proper tension in the wire or fencing parts; the wire, wood, stucco or metal grill work is not broken to create gates for human passageways; and appropriate post alignment and stability is maintained. All fence damage would be repaired in a timely manner and according to guidelines in the *Recommended Specifications for Desert Tortoise Exclusion Fencing* to prevent tortoises from moving through damaged sections.

WEED MANAGEMENT PLAN

Conversion of undisturbed desert habitat to human uses has the potential to increase the incidence of non-native weed species into wildlife habitat. A Weed Management Plan (RCI 2006) would be implemented to reduce the spread of weed species to the CSICL and to land surrounding the Development Area. Implementation of the Weed Management Plan would reduce the potential effects resulting from non-native plants. In addition to the noxious weed control measures included in the Weed Management Plan, invasive grasses (e.g., fountain grass), would be excluded from landscaping. Refer to Appendix 3 of Appendix J for a detailed description of the policies and objectives that would be implemented as part of the plan.

OFF-HIGHWAY VEHICLE [OHV] USE

To further reduce potential effects of these activities on desert tortoise, banded Gila monster, and western burrowing owl, all terrain vehicle (ATV) and OHV users would not be able to access trailheads directly from the CSI development on private lands in Lincoln County. Motorized vehicles will be prohibited from being used in the CSICL, except for specific access for federal, state, and local agency needs. In the Development Area, ATVs or OHVs would only be allowed on roads designated for such use, if any. Enforcement of CCRs regarding OHV use would ensure that regulations are followed.

All lands surrounding the project area are managed by the BLM and/or USFWS and are subject to the use regulations, rules, and policies of the BLM and/or USFWS, respectively. CSI would encourage the BLM to prohibit use of ATVs or OHVs on lands adjacent to the Development Area and CSICL. The Master Association would also provide information on OHV parks and other areas and trails authorized for OHV use to residents and visitors, as encouragement for them to use these designated areas.

ENFORCEMENT OF CCRS

Covenants, conditions, and restrictions (CCRs) developed for the master planned community would be implemented through violations and fines. These CCRs were required under the Development Agreement between CSI and Lincoln County for the project. To ensure implementation of the CCRs, the Master Association (the homeowners association) would provide for CCR enforcement in the community, including through providing a sub-station for the Lincoln County sheriff’s office. Fees paid by owners within the Development Area to the Master Association would ensure that sufficient funds would exist for enforcement of the CCRs.

6.2.1.2.2 Mitigation Measures

Mitigation measures for the desert tortoise, banded Gila monster, and western burrowing owl would consist of development fees and permanent protection of desert tortoise, banded Gila monster, and western burrowing owl habitat on CSI leased and private lands. In combination, these measures would mitigate the effects of Community Development and Construction activities on these species.

MITIGATION FEES

Overall, the avoidance and minimization measures would not offset the potential impacts from land development and maintenance activities on the desert tortoise and/or their habitat, including areas designated as desert tortoise critical habitat. Thus, land developers would pay a per-acre development fee for disturbance on non-federal property throughout the Covered Area that would result in take associated with loss of desert tortoise habitat based on a fee system as defined below.

Mitigation fees for the development of private land would be $800 per acre (USFWS 2005) and are estimated to generate approximately $16.6 million ($800 x 20,716 acres, after preserved WOUS and upland buffer habitat are subtracted from the Development Area, refer to Table 1-3 over the permit period). Fees would be paid as development lands are disturbed. These fees would be used 1) to mitigate for land development activities and 2) to contribute to local research projects associated with recovery efforts for the desert tortoise and conservation of banded Gila monster and western burrowing owl. Fees would be used to administer and ensure compliance with the incidental take permit, complete clearance surveys, install fencing, and implementing desert tortoise, banded Gila monster, and western burrowing owl research activities as described below.

The fees generated would be used toward the implementation of several mitigation measures described below to compensate for the impacts of incidental take on the desert tortoise, banded Gila monster, and western burrowing owl within the Covered Area as described in the CSI MSHCP. The development, design, and implementation of these actions would be accomplished with guidance, as requested, from the USFWS lead Desert Tortoise Science Advisory Team (DTSAT) for desert tortoise, NDOW for the banded Gila monster, and USFWS for the western burrowing owl.

RESEARCH EFFORTS

Approximately 68.8 percent of the funds generated from land development activities would be used towards implementing desert tortoise research activities and restoring the CSICL, thereby improving habitat for desert tortoise, banded Gila monster, and western burrowing owl. The Weed Management Plan would be funded by these mitigation fees to improve habitat in the CSICL. Funds would be used for desert tortoise fencing. Funds would be used for research and monitoring activities primarily for the desert tortoise. While the desert tortoise is the primary focus of the research plan, research on the Gila monster and western burrowing owl may also be included in the future; however, this would be subject to approval by the Executive Committee and the Science Advisory Team. Research activities would include implementation of research priorities identified in the CSI MSHCP. Prioritization and implementation of these research activities would occur through the Adaptive Management Plan (AMP) and monitoring (Chapter 9: Adaptive Management and Monitoring). The degree, timing, and scope of implementation of the research efforts would be at the direction of the process established for implementing the CSI MSHCP.

HEAD STARTING PROGRAM FOR THE DESERT TORTOISE

Current expert opinion considers reduced population densities of tortoises to likely be caused by excess mortality resulting from many threats (e.g., poaching, mortality on roads, stress-induced immune incompetence and disease, etc.). The 1994 Desert Tortoise Recovery Plan (USFWS 1994) suggested means to reduce excess mortality, but those prescriptions have not been implemented in ways that have produced discernable benefits to tortoise populations. Almost nothing has been prescribed that would result in greater recruitment. In other sensitive species of chelonians (tortoises and turtles), recruitment enhancement has been used as a conservation tool (conspicuous examples include various sea turtles and giant tortoises). The biggest success in recruitment enhancement has been with Galapagos tortoises. Tortoise eggs are collected from natural nests and from captive tortoises at the headquarters of the Galapagos National Park and the Charles Darwin Research Station at Isla Santa Cruz, Galapagos, Ecuador. These eggs are hatched and the neonates nurtured until they reach a size of approximately 150-mm carapace length after which these juvenile tortoises are “head-started” in natural habitats on the many islands of Galapagos. At 150 mm, the juvenile tortoises are large enough to avoid excess mortality from exotic predators such as cats and some dogs. The benefit from head-starting has been great enough that it may have prevented extinctions, and in many ways, the challenges on Galapagos are similar to those with desert tortoises. For example, as with the Galapagos Islands, desert tortoises live in unique genetic populations separated by natural barriers to dispersal within the species' range. As has occurred on Galapagos, a head-starting program has been proposed for implementation for desert tortoise populations in Nevada to increase the probability that tortoise populations would remain until other threats can be effectively addressed (e.g., abating excess mortality as suggested in the recovery plan). This program would also provide animals for release in management-related experiments described later in this CSI MSHCP.

As mentioned above, a facility may be used for a head-starting program. Pens would be made to secure tortoises from mixing so that unique genotypes can be maintained. Rearing pens would be constructed of sufficient size to provide feed to enhance bodily growth rates. Proper husbandry would rear neonates to a target size of 100 mm (the size at which ravens are believed to not be effective predators) in as little as three years. Thus, rearing facilities would be large enough to house three cohorts of juveniles in equilibrium in order to have a sustained production of three-year-old tortoises.

TRANSLOCATION PROGRAM FOR THE DESERT TORTOISE

When properly implemented, translocation may provide a valuable tool that can be used to minimize direct impacts to desert tortoises, augment natural populations, or to repatriate otherwise suitable areas that have experienced local extirpations and assist in recovery (Field et al. 2007, Nussear 2004). Translocation activities also provide an opportunity for collecting monitoring data to determine if desert tortoises respond in a manner predicted by resource managers, and an opportunity to conduct research that yields new data that can be used to manage the species in a proactive manner. Recent studies on translocation in Nevada and Utah indicated that translocated tortoises had similar levels of mortality compared to resident tortoises, and that translocated females produced similar number of eggs compared to resident females (Nussear 2004). There appeared to be no adverse effects on the resident populations into which tortoises were translocated as measured by survivorship, reproductive output, and movement patterns of residents (Nussear 2004). Thus in the short period of three years, translocation was deemed by the researchers of these studies to be a successful solution for the disposition of displaced tortoises. However, there are still many aspects of the responses of tortoises to translocation that have not been addressed quantitatively, and warrant further investigation.

A tortoise drop-off service similar to that established in Clark County for CSI lands. CSI would set up a telephone number to call when a tortoise is found. Qualified biologists would transfer found tortoises to on-site quarantine holding pens. Periodically, qualified biologists would transfer tortoises from the holding area to the DTCC. This process would be funded through the CSI MSHCP.

FUND RESEARCH OF THE ECOLOGICAL IMPLICATIONS OF FIRE AND HABITAT RESTORATION AFTER FIRE

Recent wildfires have caused widespread loss of desert tortoise habitat in Nevada; particularly in Lincoln County. Funding to study: 1) the effects of fire on seed banks and subsequent forage plant communities; 2) the effects of depleted shade resources on tortoises during activity periods, and upon the temperatures in subterranean burrows; and 3) the effects of habitat fragmentation on local populations, extirpation of local populations, and the loss of landscape linkages to metapopulation persistence would be a useful tool for all private landowners in Lincoln County.

Annual vegetation and herbaceous perennial plant species comprise most of the diet of desert tortoises in the Mojave Desert (Esque 1994). Mojave Desert fires can greatly reduce woody vegetation by incineration (Brown and Minnich 1986). Seed banks of annual plants in the Mojave Desert can be reduced 40 to 60 percent by a single fire, and the plant community composition may shift from dominance by native annual plant species toward alien annual plant species such as red brome (*Bromus madritensis*), cheatgrass (*Bromus tectorum*), splitgrass (*Schismus* spp.), and filaree (*Erodium cicutarium*) after just one fire (Esque 2004). Although the nutrition found in alien annual grasses is comparable to native annual grasses (Nagy et al. 1998), it has been speculated that a diverse diet is likely to provide a better nutritional balance for tortoises.

Post-fire surveys have shown that the immediate effects of fire on desert tortoise populations can be severe when fires occur during the active season (Esque et al. 2003). Desert fires can reduce the cover, structure, and species richness of plant communities in the Mojave Desert (Duck et al. 1995, Brooks 1999, Esque 2004). However, no quantitative information is available about the effects of fire and subsequent habitat change on desert tortoise populations. For resource managers to better understand how to manage landscapes that benefit desert tortoises, it would be useful to understand the ecological implications of fire. Research to understand whether or not tortoises are stressed by fire-induced habitat changes would assist in understanding the likely outcome of fires in the landscape. To understand the ecological implications of fire, managers need to know: 1) Do tortoises occupying recently burned areas alter their movements and activities in response to the loss of perennial vegetation and the change in the annual plant community? 2) How does the health and condition of tortoises living in burned areas compare with that of tortoises in similar, but unburned, habitats nearby? Do burned habitats offer opportunities to acquire food, water, and cover from environmental extremes as well as unburned habitats? and 3) Do tortoises of all sizes respond to such habitat changes in a similar way? Restoration techniques have generally focused on desert perennial plant species with little attention to the annual plant community – until very recently. Studies designed to learn about desert seed bank dynamics would be useful for understanding desert restoration. Critical factors associated with restoration efforts are the relative ecological implications of the restoration of perennial and annual vegetation (i.e., food sources for tortoises). Ideally, tortoises require both of these resources to persist in habitat that has been burned, but the relative importance has not been investigated.

CSI would provide funding for this research study, which would be developed and implemented under the guidance of the Desert Tortoise Recovery Office. This study would also consider experimental translocation of tortoises into these areas in association with habitat restoration sites to determine responses of tortoises to burned and restored habitat. Coordination with active and future BLM efforts on reseeding and restoration would be pursued.

INVASIVE SPECIES MANAGEMENT

Nonnative plant species such as red brome (*Bromus rubens*), filaree (*Erodium cicutarium*), and split grass (*Schismus arabicus*) have been introduced as a result of grazing, increased due to disturbance by OHV and ground disturbance associated with development. These species have become widely established in the Mojave Desert. Land managers and field scientists identified 116 species of invasive plants in the Mojave and Colorado Deserts (Brooks and Esque 2002). Desert tortoises have been found to prefer native vegetation to non-native vegetation (Jennings 1993). Nonnative annual plants in desert tortoise critical habitat in the western Mojave Desert were found to compose greater than 60 percent of the annual biomass (Brooks 1998). The reduction in quantity and quality of forage may stress tortoises and make them more susceptible to drought- and disease-related mortality (Jacobson et al. 1991, Brown et al. 1994).

The proliferation of non-native plant species has also contributed to an increase in fire frequency in desert tortoise habitat by providing sufficient fuel to carry fires, especially in the intershrub spaces that are mostly devoid of native vegetation (USFWS 1994, Brooks 1998, Brown and Minnich 1986). In the 1980s, over 500,000 acres of desert lands burned in the Mojave Desert.

Recurrent fire can adversely affect tortoises and tortoise populations through direct mortality and injury (e.g., Woodbury and Hardy 1948)., Changes in plant communities caused by recurrent fire may negatively impact desert tortoise through loss of forage species and shrubs that provide shelter, and fragmentation of habitat (Brooks and Esque 2002, Esque et al. 2003). Creosote bush is slow to re-sprout and germinate following intense fire (Brown and Minnich 1986). Loss of these shrubs and other vegetation, even temporarily, may change the thermal environment and increase exposure of tortoises to extreme temperatures (Esque and Schwalbe 2002). In addition, loss of forage, water, or shelter sites can result in nutritional deficiencies and decreased reproductive rates. Invasive plant control actions would be funded through this CSI MSHCP and implemented through the Weed Management Plan (Appendix 3 of Appendix J).

ADDITIONAL FEES

CSI has agreed to contribute $750,000 to fund research and activities that would further conservation efforts for the desert tortoise. These funds would be set aside within 30 days of issuance of the incidental take permit associated with the CSI MSHCP. They would be put in the Section 10 Trust Fund, an interest-bearing account, to be used at the USFWS's direction.

COYOTE SPRINGS INVESTMENT CONSERVATION LANDS (CSICL)

Protection of desert tortoise suitable and critical habitat and banded Gila monster and western burrowing owl potential habitat in the CSICL and adjacent ACECs is another main component of the mitigation measures for these species.

Subsequent to completion of the land adjustments described herein, BLM would create the CSICL, which would be managed in accordance with the Land Lease Agreement, pursuant to the Nevada-Florida Land Exchange Act of 1988, and this CSI MSHCP, under the direction of the USFWS to protect and minimize any threat to federally listed endangered or threatened species. This protected land would be considered as partial mitigation for effects of development on CSI lands in Lincoln County to desert tortoise, banded Gila monster, and western burrowing owl habitat. The 13,767 acres that would be conserved under the CSI MSHCP include 7,548 acres of lands in Lincoln County and 6,219 acres of lands in Clark County. The 6,219 acres of land in Clark County are being conserved for the protection of desert tortoise in this CSI MSHCP; in an earlier environmental assessment and Section 404 permit for development activities on CSI lands in Clark County, Nevada, these lands served as a component of the mitigation measures for effects to WOUS.

The configuration of the CSICL, located to the east of the Development Area, would maximize habitat connectivity of the area to adjacent desert tortoise habitat and would preserve migration corridors. This reduces the amount of habitat fragmentation that could have occurred from development and preserves an area that would not be developed.

6.2.2 Recreational Facilities and Open Space

Avoidance, minimization, and mitigation measures proposed for Community Development and Construction Activities within the Development Area for desert tortoise, banded Gila monster, and Western burrowing owl also apply to recreation and open space activities (see Table 6-1 and Section 6.2.1). No direct or indirect effects to Moapa dace and the Muddy River population of the Virgin River chub would result from recreation and open space activities; therefore, no conservation measures are required for this activity. To further reduce potential effects of these activities on desert tortoise, banded Gila monster, and western burrowing owl, all terrain vehicle (ATV) and OHV users would not be able to access trailheads directly from the CSI development on private lands in Lincoln County. No ATVs or OHVs, except use by federal and/or state agency personnel under special circumstances, would be allowed in the CSICL. Ordinances related to the CSI Development would be used to enforce these avoidance measures. All lands surrounding the Covered Area are managed by the BLM and/or USFWS and are subject to the use regulations, rules, and policies of the BLM and/or USFWS, respectively. CSI will encourage the BLM to prohibit use of OHVs on those lands adjacent to the CSI Development.

6.2.3 Utility Infrastructure

The same avoidance, minimization, and mitigation measures would apply to this activity as proposed for the Community Development and Construction Activities constructed within the Development Area for desert tortoise, banded Gila monster, and western burrowing owl (see Table 6-1 and Section 6.2.1). No direct or indirect effects to Moapa dace and the Muddy River population of the Virgin River chub would result from utility infrastructure activities; therefore, no conservation measures are required for this activity.

6.2.4 Water Supply Infrastructure and Management

In general, conservation measures for water supply infrastructure and management activities would be the same as described under Community Development and Construction Activities (see Table 6-1 and Section 6.2.1). The specific measures that apply to each species are described below.

6.2.4.1 Moapa Dace and Virgin River Chub

Indirect effects such as sedimentation of downstream Moapa dace and Virgin chub habitat (located approximately 17 miles from the Development Area) could result from the construction of storage and water treatment facilities. Specific measures to avoid and minimize impacts of increased sedimentation to downstream habitat include the development and implementation of the SWPPP.

6.2.4.2 Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

The same avoidance, minimization, and mitigation measures proposed for Community Development and Construction Activities would also apply to water supply infrastructure and management-related activities, since construction would be a necessary part of this activity.

6.2.5 Flood Control Structures Development and Maintenance

The same avoidance, minimization, and mitigation measures would apply to this activity as for the Community Development and Construction Activities constructed within the Development Area for desert tortoise, banded Gila monster, and western burrowing owl (see Table 6-1 and Section 6.2.1). No direct or indirect effects to Moapa dace and the Muddy River population of the Virgin River chub would result from flood control and maintenance activities; therefore, no conservation measures for these species are required for this activity.

6.2.6 Resource Management Features

Resource management features would include the creation of the CSICL. No direct or indirect effects to Moapa dace and the Muddy River population of the Virgin River chub would result from the construction of the resource management features; therefore, no conservation measures are for these species. Desert tortoise, banded Gila monster, and western burrowing owl may potentially be directly affected by potential littering, vandalism, and illegal use of OHVs from visitors to the CSICL. The following conservation measures are proposed to offset those potential effects.

6.2.6.1 Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

The management plan developed for the CSICL would address litter management procedures for the area. Separate Section 7 consultation will occur for this management plan. Until the management plan is completed, CSI would restrict entry to the CSICL from the Development Area to prevent the potential for littering, vandalism, and access to the CSICL by OHV users.

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CHAPTER 7

Expected Outcomes

Chapter 7: Expected Outcomes

This chapter provides an analysis of the potential outcome of conducting Covered Activities (Chapter 5) and implementing Conservation Measures (Chapter 6) for each of the Covered Species (Chapter 3). Conclusions are based on the anticipated changes to habitat and information regarding species' life history, habitat use, distribution, and current habitat within the Covered Area of the CSI MSHCP. Potential benefits of implementing the proposed Conservation Measures are also provided.

Chapter 6 described a list of conservation measures that are proposed under the CSI MSHCP. The features include the establishment of the CSICL, buffer zones along desert dry washes, and restoration of WOUS. Additionally, a mitigation fund of up to approximately $16.6 million (over time) from the fees collected would be established to implement the CSI MSHCP and the associated conservation measures. CSI would also pay a one-time fee of $750,000, to be used at USFWS' discretion. An important component of the mitigation measures associated with the CSI MSHCP includes funding of research needed to provide guidance and direction for implementation of recovery actions for desert tortoise. Some of this research would be conducted on CSI property and within the CSICL. Associated ESA consultation and permitting and NEPA processes on this research funded through the CSI MSHCP will be the responsibility of the researcher. Funding these efforts should provide a significant benefit for desert tortoise and their associated critical habitat throughout southern Nevada.

Evaluation Species have not been included in this Expected Outcomes section, because conservation measures were not developed specifically for these species. However, three-corner milkvetch, the evaluation species with the potential to be directly affected by the Covered Activities, is expected to benefit from conservation measures developed for desert tortoise, banded Gila monster, and western burrowing owl.

7.1 EXPECTED OUTCOMES

7.1.1 Moapa Dace and Virgin River Chub

Activities related to community development and construction, recreational facilities and open space, utility infrastructure, water supply infrastructure and management, flood control and stormwater management, and resource management features are not anticipated to have a detectable impact on Moapa dace and Virgin River chub due to the nature or location of the activities. Habitat for both species is located approximately 17 miles downstream of the Development Area. Implementation of the avoidance and minimization measures described in Chapter 6 is expected to reduce any potential indirect effects (such as increased sedimentation) of the Covered Activities on Moapa dace and Virgin River chub habitat to undetectable levels (Table 7-1).

Therefore, the combination of all activities and conservation measures should result in no detectable effect to the Moapa dace, Virgin River chub, or their habitats. Furthermore, the funds generated from the development fees collected to mitigate for impacts to desert tortoise potential banded Gila monster and western burrowing owl habitat would be used to implement a variety of mitigation measures that could benefit the fish species as well.

7.1.1.1 Community Development and Construction

No direct effects would occur to the Moapa dace and Virgin River chub from Community Development and Construction activities. The potential indirect effects of these activities would be offset by the implementation of conservation measures for both the Moapa dace and Virgin River chub. Changes in sediment and flow because of development would likely be undetectable, but avoidance and minimization measures would reduce these potential changes even further (Table 7-1).

Table 7-1 Expected Outcomes from Implementation of the CSI Multiple-Species Habitat Conservation Plan on Moapa Dace and Virgin River Chub

Covered Activity	Potential Effects	Conservation Measures[a]			Expected Outcome
		Action	Total Habitat Affected (acres)	Expected Result	
Community Development and Construction	No Direct Effects Indirect Effects ▪ Reduce quality of downstream aquatic habitat	Avoid construction: ▪ along the Pahranagat Wash incised ephemeral channel (100 ft buffer) ▪ in approximately 32.1 acres of dry washes also protected under the Natural Wash Buffer Zone Easement (refer to Table 4-6) ▪ in approximately 6.9 acres of desert dry washes within the CSICL	26.6 acres (Development Area) (refer to Table 4-7)	Maintain natural sediment discharge within channels not impacted from construction activities	▪ The potential indirect effects of these activities would be offset by the implementation of conservation measures. ▪ Changes in sediment and/or flow patterns would likely be undetectable
		Minimization: ▪ Apply stormwater plan and erosion control measures ▪ Restore 63.4 acres of desert dry washes (refer to Table 4-6) ▪ Develop and fund a Long-Term Protection Plan	95.6 acres of existing and restored WOUS in Covered Area (refer to Table 6-2)	Reduce stormwater flow and storm-associated sediment transport, improve or maintain storm water quality, maintain and increase area and/or quality of dry wash habitat Restore desert dry washes to provide a net increase in fully functional, self-sustaining desert dry washes, with functions and associated values similar to those already present onsite prior to development construction. Results in net increase in desert dry wash habitat area	
		Mitigation: No measures required	n/a	n/a	
Recreational Facilities and Open Space	No direct effects No indirect effects	No measures required	n/a	n/a	No change in conditions would result from those associated with implementation of Recreational Facilities and Open Space
Utility Infrastructure	No direct effects No indirect effects	No measures required	n/a	n/a	No change in conditions would result from those associated with implementation of Utility Infrastructure

Table 7-1 Expected Outcomes from Implementation of the CSI Multiple-Species Habitat Conservation Plan on Moapa Dace and Virgin River Chub

Covered Activity	Potential Effects	Conservation Measures[a]			Expected Outcome
		Action	Total Habitat Affected (acres)	Expected Result	
Water Supply Infrastructure and Management	No direct effects Indirect effects ▪ Reduce quality of downstream aquatic habitat	See measures identified for Community Development and Construction Activities	n/a	The outcomes expected from conservation implemented for community development and construction would be the same for this activity	No change in conditions would result from those associated with implementation of Water Supply infrastructure and management
Flood Control Measures and Maintenance	No direct effects No indirect effects	No measures required	n/a	n/a	No change in conditions will result from those associated with implementation of Flood Control Measures and Maintenance
Resource Management Features	No direct effects No indirect effects	No measures required	n/a	n/a	No change in conditions would result from those associated with implementation of Resource Management Features

[a]For full description of conservation measures, refer to Chapter 6, Conservation Measures.

Table 7-2 Expected Outcome from Implementation of the CSI Multiple-Species Habitat Conservation Plan on Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

Covered Activity	Potential Effect	Conservation Measures[a]			Expected Outcome
		Action	Total Habitat Affected (acres)	Expected Result	
Community Development and Construction	Direct effects: ▪ direct mortality from construction ▪ habitat loss ▪ road mortality Indirect effects: ▪ habitat fragmentation ▪ trash disposal ▪ pet encounters ▪ increases in natural predators ▪ illegal collection ▪ disease ▪ increased mortality or harm due to toxicosis ▪ reduction in habitat and forage quality ▪ increase in fire frequency and intensity ▪ increased mortality or injury due to vandalism	Avoidance: ▪ construction would be avoided on approximately 737.7 acres of habitat within the Development Area ▪ BMPs for Construction, Operations, and Maintenance ▪ 100% surveys and clearance ▪ translocation ▪ implement objectives of fire conservation measures ▪ trash management ▪ pet management ▪ conservation education	13,767 acres would be protected from development activities 32.1 acres of WOUS would be avoided and protected from construction activity and development (refer to Table 4-6 or 6-2)	Avoid direct mortality through clearance and translocation of desert tortoise and banded Gila monster Avoid direct mortality through clearance and avoidance of areas of active western burrowing owl nests Avoid unnecessary disturbance of desert tortoise, banded Gila monster, and western burrowing owl habitat not directly affected by construction activities	Losses to habitat would be offset by implementing conservation measures such as permanent protection of habitat and mitigation fees Conservation measures would reduce mortality of desert tortoise, banded Gila monster, and western burrowing owl and protect remaining habitat Mitigation fees would address overall loss of habitat through implementation of conservation measures and improved funding for research critical to the recovery of desert tortoise within the Northeastern Mojave Recovery Unit
		Minimization: ▪ Permanent fencing ▪ Temporary fencing and barriers ▪ Weed Management Plan ▪ Banded Gila monster protocol by NDOW for construction activities	737.7 acres of protected WOUS and upland buffer habitat (refer to Table 6-2) [21,454 acres of the Covered Area would be affected by Weed Management Plan] Up to 20,716 acres of the Covered Area (all of Development Area except existing protected WOUS and upland buffer habitat)	Reduce mortality from roads and residential areas through fencing and other minimization measures Reduce degradation of habitat through fire and non-native plant management	

Table 7-2 Expected Outcome from Implementation of the CSI Multiple-Species Habitat Conservation Plan on Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

Covered Activity	Potential Effect	Conservation Measures[a]			Expected Outcome
		Action	Total Habitat Affected (acres)	Expected Result	
		Mitigation: ▪ Mitigation fees and associated research activities would result in a benefit to desert tortoise throughout southern Nevada of mitigation ▪ A fee of $750,000 to USFWS for activities in Lincoln County would serve as additional mitigation ▪ CSICL (13,767 acres) would be mitigation for development	20,716 acres of development in the Development Area would be mitigated through mitigation fees and protection of a combined total of 14,125 acres of protected habitat (CSICL and Perpetual Conservation Easement, Grant, and Drainage and Maintenance Easement)	Mitigation fees for desert tortoise would benefit the future recovery of the species through improved understanding of this species and its conservation needs, improved future conservation measures, and increased habitat protection from establishment and management of the CSICL, which would also benefit the banded Gila monster	
Recreational Facilities and Open Space	See effects for Community Development and Construction Also, mortality/injury from OHVs or non-motorized recreation	Avoidance: ▪ Measures for Community Development and Construction Activities applicable to this activity ▪ No ATV/OHV use outside of designated areas in Development Area. No ATV/OHV use in CSICL. Existing OHV regulations occur on adjacent USFWS and BLM lands.	See acreage for Community Development and Construction	Avoid direct mortality through translocation of desert tortoise and banded Gila monster Avoid direct mortality through clearance and avoidance of areas of active western burrowing owl nests Avoid unnecessary disturbance of desert tortoise, banded Gila monster, and western burrowing owl habitat not directly affected by construction activities	No change in conditions would result from those associated with implementation of Community Development and Construction activities Existing regulations for OHV and non-motorized use on federal lands, along with education of residents would avoid and minimize adverse effects from recreation use on adjacent federal lands
		Minimization: ▪ Measures for Community Development and Construction applicable to this activity	See acreage for Community Development and Construction	Reduce mortality from roads and residential areas through exterior boundary fencing and other minimization measures	

Table 7-2 Expected Outcome from Implementation of the CSI Multiple-Species Habitat Conservation Plan on Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

Covered Activity	Potential Effect	Conservation Measures[a]			Expected Outcome
		Action	Total Habitat Affected (acres)	Expected Result	
		Mitigation: ▪ Measures for Community Development and Construction applicable to this activity	See acreage for Community Development and Construction	Mitigation fees for desert tortoise would benefit the future recovery of the species through improved understanding of this species and its conservation needs, improved future conservation measures, and increased habitat protection from establishment and management of the CSICL, which would also benefit the banded Gila monster	
Utility Infrastructure	See effects for Community Development and Construction	Avoidance: ▪ Measures for Community Development and Construction applicable to this activity	See acreage for Community Development and Construction	Avoid direct mortality through land clearance of desert tortoise, banded Gila monster, and western burrowing owl Avoid unnecessary disturbance of desert tortoise, banded Gila monster, and western burrowing owl habitat not directly affected by construction activities	No change in conditions would result from those associated with implementation of Community Development and Construction activities
		Minimization: ▪ Measures for Community Development and Construction applicable to this activity	See acreage for Community Development and Construction	Reduce mortality from roads and residential areas through fencing, signs, education and other minimization measures	
		Mitigation: ▪ Measures for Community Development and Construction applicable to this activity	See acreage for Community Development and Construction	Require mitigation fees for desert tortoise to benefit the future recovery of the species through improved understanding, improved future conservation measures, and increased habitat protection from establishment and management of the CSICL, which would also benefit the banded Gila monster Reduce direct mortality through translocation of desert tortoise, banded Gila monster, and western burrowing owl	

Table 7-2 Expected Outcome from Implementation of the CSI Multiple-Species Habitat Conservation Plan on Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

Covered Activity	Potential Effect	Conservation Measures[a] Action	Total Habitat Affected (acres)	Expected Result	Expected Outcome
Water Supply Infrastructure and Management	See effects for Community Development and Construction	Avoidance: ▪ Measures for Community Development and Construction applicable to this activity	See acreage for Community Development and Construction	Avoid direct mortality through translocation of desert tortoise, banded Gila monster, and western burrowing owl Avoid unnecessary disturbance of desert tortoise, banded Gila monster, and western burrowing owl habitat not directly affected by construction activities	No change in conditions would result from those associated with implementation of Community Development and Construction activities
		Minimization: ▪ Measures for Community Development and Construction applicable to this activity ▪ Comply with the Muddy River MOA	See acreage for Community Development and Construction	Reduce mortality from roads and residential areas through fencing and other minimization measures	
		Mitigation: ▪ Measures for Community Development and Construction applicable to this activity	See acreage for Community Development and Construction	Mitigation fees for desert tortoise would benefit the future recovery of the species through improved understanding of this species and necessary conservation measures, improved future conservation measures, and increased habitat protection from establishment and management of the CSICL, which would also benefit the banded Gila monster and western burrowing owl	
Flood Control Structures Development and Maintenance	See effects for Community Development and Construction	Avoidance: ▪ Measures for Community Development and Construction applicable to this activity	See acreage for Community Development and Construction	Avoid direct mortality through translocation of desert tortoise and banded Gila monster Avoid direct mortality through clearance and avoidance of areas of active western burrowing owl nests Avoid unnecessary disturbance of desert tortoise, banded Gila monster, and western burrowing owl habitat not directly affected by construction activities	No change in conditions in the Development Area would result from those associated with implementation of Community Development and Construction activities

Table 7-2 Expected Outcome from Implementation of the CSI Multiple-Species Habitat Conservation Plan on Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

Covered Activity	Potential Effect	Conservation Measures[a]			Expected Outcome
		Action	Total Habitat Affected (acres)	Expected Result	
		Minimization: Measures for Community Development and Construction applicable to this activity	See acreage for Community Development and Construction	Reduce mortality from roads and residential areas through fencing and other minimization measures	
Resource Management Features	Direct Effects: ▪ Small loss of habitat ▪ Benefits to population from collection and rearing facility Indirect Effects: ▪ Benefits from maintaining connectivity with other lands ▪ Increased potential for fire frequency and weeds	Avoidance: No measures needed	Likely less than 5 acres disturbed 13,767 acres protected	Benefits of resource management features outweigh small effects from construction.	Benefits of resource management features outweigh small effects from construction
		Minimization: ▪ Qualified biologists ▪ Erosion control measures	Likely less than 5 acres disturbed 13,767 acres protected	Benefits of resource management features outweigh small effects from construction. Minimization measures would reduce potential footprint of activities and ensure protection of desert tortoise, banded Gila monster, and western burrowing owl	

[a]For full description of conservation measures, refer to Chapter 6, Conservation Measures.

7.1.1.2 Recreational Facilities and Open Space

No effect to Moapa dace or Virgin River chub would occur because of Recreational Facilities and Open Space activities. Therefore, conservation measures were not identified for these activities for these species.

7.1.1.3 Utility Infrastructure

No effect to Moapa dace or Virgin River chub would occur because of Utility Infrastructure activities. Therefore, conservation measures were not identified for these activities for these species.

7.1.1.4 Water Supply Infrastructure and Management

Potential indirect effects from the construction of water and sewer infrastructure within the Development Area would be offset by the same construction best management practices addressed for Community Development and Construction activities. As a result, expected outcomes of Water Supply Infrastructure and Management activities would be the same as those expected for Community Development and Construction activities.

7.1.1.5 Flood Control Measures and Maintenance

Flood Control Measures and Maintenance activities would not affect Moapa dace or Virgin River chub. Therefore, conservation measures were not identified for these activities for these species.

7.1.1.6 Resource Management Features

Activities on resource management features would not affect Moapa dace or Virgin River chub. As a result, conservation measures were not identified for these activities for these species.

7.1.2 Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

Covered Activities have the potential to affect approximately 21,454 acres of available desert tortoise critical habitat and potential banded Gila monster and western burrowing owl habitat within the Covered Area. Without conservation measures, all 21,454 acres of habitat have the potential to be affected by the Covered Activities. Community development and construction activities including utility infrastructure development, recreational facilities and open space activities, and water supply infrastructure and management activities have the largest potential impact, estimated at up to 20,716 acres within the Development Area. The construction of the resource management features is not anticipated to have a detectable impact on these species due to the nature of the activities (i.e., installation of monitoring wells, etc). Thus, implementation of all Covered Activities will have a potential for inadvertent take of individual desert tortoises, banded Gila monsters, and/or western burrowing owls after the prescribed avoidance and minimization measures are implemented (e.g., clearance surveys, translocation, desert tortoise-proof fencing, construction BMPs). Avoidance measures associated with WOUS are likely to reduce the potential area to be disturbed within the Development Area to 20,716 acres (25.2 acres WOUS preserved with 712.5 acres upland buffer) (Table 1-3). The total area of desert tortoise habitat likely to be disturbed totals approximately 20,716 acres.

To offset the effects on 20,716 acres of desert tortoise habitat, potential banded Gila monster, and potential western burrowing owl habitat, a combination of a one-time per-acre mitigation fee ($800) will be paid by the developers and/or CSI for disturbing that habitat as well as the permanent protection and management of approximately 13,767 acres of habitat as part of the CSICL (Table 8-2). The funds generated from the mitigation fees collected could then be used to implement the variety of mitigation measures that would be expected to offset the effects to desert tortoise, banded Gila monster, and western burrowing owl as discussed in Chapter 6, Conservation Measures. Generally, $550 of the per acre fee will be used to fund mitigation measures while approximately $250 per acre will be used to fund avoidance and minimization measures along with the HCP administration. The results of research efforts funded by this MSHCP are expected to have beneficial effects that will likely extend beyond the Covered Area and enhance constituent elements of desert tortoise critical habitat throughout Lincoln County, Nevada. An additional $750,000 fee to be paid by CSI to be used as USFWS' discretion will also allow for the conservation of the desert tortoise.

Indirect effects would be reduced to the maximum extent practicable. Conservation measures for fire and weed management, in addition to management and research actions from mitigation fees, are expected to have beneficial effects that would likely extend beyond the Covered Area and promote future recovery and conservation of these species.

Based on this analysis, implementation of the Covered Activities, in association with the Conservation Measures, are not likely to negatively affect the continued existence of the desert tortoise, and are not likely to affect designated critical habitat to the extent that the constituent elements are appreciably diminished and the habitat no longer serves its role in the survival and recovery of the species. The research proposed to be funded under the CSI MSHCP is likely to provide valuable information that would result in an enhancement of the constituent elements.

7.1.2.1 Community Development and Construction Activities

Community Development and Construction activities on desert tortoise, banded Gila monster, and western burrowing owl have the potential to result in the loss of up to 20,716 acres of desert tortoise critical habitat and of desert habitat within the potential range for banded Gila monster and western burrowing owl located in the Development Area. The potential for direct mortality through construction activities also exists.

Losses to habitat would be offset by implementing conservation measures such as permanent protection of habitat and mitigation fees. These conservation measures would reduce mortality of desert tortoises and protect remaining habitat. The protection of the CSICL by BLM in accordance with the Land Lease Agreement (Appendix G), pursuant to the Nevada-Florida Land Exchange Act of 1988, and the CSI MSHCP would result in the development of a management pan. This plan would likely address long-term habitat management concerns such as invasive species and restriction of OHVs, which would provide an additional benefit to desert tortoise, banded Gila monster, and western burrowing owl. Mitigation fees would address overall loss of habitat through implementation of conservation measures and improved funding for research critical to the recovery of desert tortoise within the Northeastern Mojave Recovery Unit.

Clearance surveys, translocation, and fencing conservation measures would avoid and minimize incidental take of desert tortoise, banded Gila monster, and western burrowing owl to the maximum extent possible. A limited potential for take would still exist through handling of species during translocation and the possibility of not detecting all individuals prior to construction activities. Because tortoise clearance surveys would be implemented to ensure that these species are fully conducted prior to ground-disturbance activities, a majority of the take of adult and juvenile tortoises would be in the form of collect, i.e., capture with subsequent removal to the DTCC or CSCC. However, some tortoises would undoubtedly be missed during clearance surveys, especially juveniles which are more difficult to detect, and/or others may wander unnoticed onto the construction site subsequent to surveys, resulting in injury or death. Thus, it is anticipated that some number of tortoises would be accidentally injured or killed as a result of project-related activities within or adjacent to the project area, but that this number is not quantifiable and depends largely on clearance survey methodology and the use of conservation measures to prevent and/or detect tortoises re-entering previously surveyed areas.

Approximately 8,200 acres or two percent of the Mormon Mesa CHU has been loss or disturbed by development (USFWS 2006 unpublished data). The additional loss of up to 20,716 acres of critical habitat within the 427,900-acre Mormon Mesa CHU represents approximately 5 percent of the critical habitat unit. Large blocks of protected. federal land make up most of the CHU, with several key areas (e.g., ACECs) managed specifically for desert tortoise. A total of 6.45 million acres of critical habitat designated for the Mojave population of the desert tortoise. The development of 20,716 acres of CSI lands would be a loss of 0.32 percent of designated critical habitat rangewide. The loss of 0.32 percent of critical habitat is not anticipated to appreciably diminish the capability of the critical habitat rangewide to satisfy essential requirements of the species.

Adaptive management and monitoring would ensure conservation measures are adequate to protect the desert tortoise, banded Gila monster, and western burrowing owl.

The phased approach to development (up to 2,000 acres of disturbance per year for the first eight years) would ensure that for the first eight years, when the majority of development would occur, there would be timely monitoring of the effectiveness of implementing the proposed avoidance, minimization, and conservation measures for the Covered Species in the CSI MSHCP. Before the next 2,000 acres would be disturbed, through the AMP, recommendations of alternative conservation actions, if any, could be made through the AMP and implemented in the subsequent year.

Indirect effects of Community Development and Construction activities (e.g., habitat fragmentation, trash disposal, pets, increased natural predators, illegal collection, disease, toxicosis, non-native plants, increased fire frequency, vandalism) on desert tortoise, banded Gila monster, and western burrowing owl would be offset by the implementation of conservation measures such as fencing and construction BMPs. Fencing would reduce the potential for road mortality for desert tortoise and banded Gila monster, although it would not minimize potential effects of increased traffic for western burrowing owl. Habitat fragmentation and resulting dispersal barriers would be avoided and minimized by the land configuration selected. Trash disposal would occur within the fenced Development Area, be contained by adequate trash receptacles, and would be removed to landfills outside of the Covered Area. Education programs, regulations preventing residents having desert tortoises as pets in the Development Area, and fencing of the Development Area would lead to reduced contact of tortoise with humans and would reduce the transfer of disease (particularly URTD) to wild populations of desert tortoise. Construction activities' footprints would be minimized and unnecessary disturbances avoided through BMPs, to reduce impacts to habitat and the potential for non-native plants to be introduced to the area and/or expand their ranges. Following BMPs to reduce the potential for pollutants to enter the environment would also reduce the potential for toxicosis in desert tortoise. The potential for increased fire frequency and non-native plants would be reduced through fire conservation measures and a weed management plan. These actions would also reduce the numbers of existing non-native plants and their potential for spreading outside of the Development Area. Illegal collection and vandalism of the covered species would be minimized through enforcement of the CCRs. Light pollution could potentially affect these species, although CCRs would minimize any potential effects. Increased short-term and long-term noise levels could adversely affect these species, but each of these species (desert tortoise, banded Gila monster, and western burrowing owl) is known to use habitats adjacent to or within modified human environments, where noise levels are elevated. The potential for toxic effects exists from accidental spills and use of toxic materials in the project area for construction and industrial activities; however, the potential for toxic materials to enter the environment would be minimized through adhering to state and federal regulations. Overall, these conservation measures would reduce indirect effects to desert tortoise, banded Gila monster, and western burrowing owl.

7.1.2.2 Recreational Facilities and Open Space

Expected outcomes from direct effects to desert tortoise, banded Gila monster, and western burrowing owl habitat would be similar as to those described in the Community Development and Construction section above.

Indirect effects to desert tortoise, banded Gila monster, and western burrowing owl (increased recreational use of adjacent federal lands) would be offset by existing regulations regarding OHV and non-motorized use on refuge and BLM lands and increased education of the Coyote Springs residents regarding effects of recreation on desert tortoise, banded Gila monster, and western burrowing owl.

Increased human presence in the CSICL from increased recreational demand could adversely impact desert tortoise and critical habitat in the CSICL. The extent of critical habitat surrounding the Development Area in BLM ACECs and USFWS refuges that may be affected by indirect effects is not quantifiable. It should be noted that the adjacent lands are managed by BLM as ACECs and USFWS as refuges and, therefore, are subject to activity restrictions. However, outside of these more rigidly protected lands are areas that have little to no restrictions in place, indirect effects from the community may be more widely observed. Within 65 miles (approximately a one hour drive) of the project area, there exist large expanses of BLM and USFS lands that are available for OHV use. If desert tortoises were to occur in these areas, which do not include critical habitat, the potential for direct mortality or injury would exist.

7.1.2.3 Utility Infrastructure

Expected outcomes from direct and indirect effects to desert tortoise, banded Gila monster, and western burrowing owl from Utility Infrastructure activities in the Development Area have already been addressed in the Community Development and Construction section above.

7.1.2.4 Water Supply Infrastructure and Management

Expected outcomes from the development of Water Supply Infrastructure and Management activities within the Development Area would be the same as described for in the Community Development and Construction section above. Monitoring wells may be constructed in the CSICL. Translocation and clearance surveys would reduce direct mortality, as described above for Community Development and Construction section above. Overall, conservation measures would reduce direct and indirect effects to desert tortoise, banded Gila monster, and western burrowing owl to the maximum extent practicable.

7.1.2.5 Flood Control Structures Development and Maintenance (Including Stormwater Maintenance)

Expected outcomes from direct effects to desert tortoise, banded Gila monster, and western burrowing owl, such as disturbance of habitat and potential for direct mortality from construction, have already been addressed in the Community Development and Construction section above. Storm detention basins would also result in barriers to dispersal and loss of habitat, which would be mitigated for through mitigation fees and protection of other habitat in conservation easements and/or conservation lands.

Indirect effects of Flood Control Structures Development and Maintenance activities (barriers to dispersal) on desert tortoise, banded Gila monster, and western burrowing owl would be offset by the implementation of conservation measures such as creation and restoration of ephemeral wash habitat.

7.1.2.6 Resource Management Features

Benefits from the designation of the CSICL and the land reconfiguration would outweigh the minor effects to desert tortoise, banded Gila monster, and western burrowing owl from the development of trails, educational kiosks, and monitoring wells, details of which will be developed as part of the management plan for the CSICL. Direct effects to desert tortoise, banded Gila monster, and western burrowing owl from these activities would be minimized through erosion control measures and the oversight of a qualified biologist during construction activities. Overall, implementation of the resource management features would provide benefits for these three species.

7.2 REFERENCES

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CHAPTER 8

Plan Implementation

Chapter 8: Plan Implementation

8.1 HCP ADMINISTRATION

Upon approval of this CSI MSHCP and issuance of an incidental take permit, CSI will be responsible for the administration and implementation of the CSI MSHCP under the conditions of the Section 10(a)(1)(B) permit (incidental take permit). CSI will utilize two committees to facilitate implementation of the CSI MSHCP. The Executive Committee (EC) will be established as the decision-making authority for implementation of the CSI MSHCP. An HCP Administrator will be engaged to assist the EC in managing the CSI MSHCP implementation process. A Technical Advisory Committee (TAC) will be established to provide specific recommendations related to on-the ground technical issues associated with implementation of the CSI MSHCP. A CSI representative will chair both of these committees. Funding sources for implementation of the CSI MSHCP is expected to come from mitigation fees and supplemental funding sources as needed.

Upon signing the IA, CSI will conduct the following:

- Appoint an HCP Administrator (role described in section 8.1.2 below),
- Create the EC (refer to section 8.1.1),
- Create the TAC (refer to section 8.1.3),
- Establish the Section 10 Trust Fund account for collected revenues (refer to section 8.8),
- Negotiate, coordinate and establish an annual and biennial schedule detailing due dates for reporting and budgeting. The schedule will consider the fiscal budget timing for the county, federal programs, and the federal and state legislative sessions including:
  - Due dates for participant reports to the EC,
  - Due dates for submitting funding requests to the EC,
  - Annual Compliance Report due to CSI and the USFWS from the EC, and
  - EC meetings.

As described further in Section 8.8.1.1 below, long-term revenues secured from desert tortoise mitigation fees paid by CSI will provide a permanent reliable source of dollars that will fund implementation of the Section 10 permit and associated conservation measures. Since these long-term revenue sources are derived directly from growth allowed under the Section 10 permit, adequate revenues will be available to implement conservation measures commensurate with the cumulative level of take for the duration of the 40-year permit.

8.1.1 Executive Committee

The EC, chaired by CSI, will oversee implementation of the CSI MSHCP with the assistance of the HCP Administrator and the TAC. The EC may review, comment, and make recommendations to CSI regarding prioritized conservation measures (minimization/mitigation) and budget proposals submitted by CSI and/or other Participants. Budgets will be reviewed annually.

8.1.1.1 Structure and Organization of the Committee

- Members of the EC will consist of CSI and Plan Participants (USFWS and BLM).
- The EC may be expanded to include other entities upon approval by CSI with the concurrence of USFWS.
- In the event the EC is unable to reach agreement on annual conservation measure prioritization and funding, the EC will forward the minutes of the meetings to CSI for further consideration and final action. The USFWS will then be asked for approval of the final action.

- Concerns of USFWS about any aspect of prioritized conservation measures; studies or budgets will be presented to the EC. The HCP Administrator with the assistance of the TAC, and any other appropriate technical input deemed necessary, will prepare a report for the EC with recommendations for addressing such concerns.
- Meetings of the EC will be held as necessary to administer and implement the CSI MSHCP. At a minimum, EC meetings will be held annually.

8.1.1.2 Duties and Responsibilities of the Committee

The EC will conduct the following:

- Evaluate and recommend for CSI and USFWS approval, denial, or modification of the proposed expenditure of funds for conservation measures.
- Perform additional duties and responsibilities as directed by the CSI from time to time.
- Establish and convene the TAC, as necessary or appropriate, to assist the EC with decisions of a technical nature required for implementation of the CSI MSHCP, including the Adaptive Management Plan. Members of the subcommittees will not be required to be members of the EC.
- Provide recommendations for developing the public information programs required by the CSI MSHCP.
- Recommend to CSI, based on recommendations from the HCP Administrator, and/or the TAC and other appropriate technical advisor(s), how to provide MSHCP funds for studies or projects that may be important for conservation of the Covered Species in the CSI MSHCP.
- Assist with the preparation of the biennial work plans and other reports, as required to address the requirements of the CSI MSHCP and the incidental take permit.

8.1.2 Role of the HCP Administrator

CSI will administer the CSI MSHCP. To accomplish this task, CSI will engage an HCP Administrator to facilitate implementation of the CSI MSHCP and to chair the proceedings of the EC. The HCP Administrator will have a sufficient scientific or technical background to accomplish these tasks and/or to consult with the TAC or species experts for specific issues as appropriate and at the direction of the EC.

8.1.2.1 Duties and Responsibilities of the HCP Administrator

Responsibilities of the HCP Administrator may include the following:

- Coordinate implementation of avoidance and minimization measures.
- Coordinate the implementation of mitigation measures associated with the CSI MSHCP. Specifically, manage the funds provided by the CSI MSHCP for desert tortoise research activities.
- Report to the EC on the CSI MSHCP funding status and the effectiveness of the conservation measures.
- Report to the EC the status and likelihood of species located within the Development Area to be listed by either the state or federal agencies.
- Recommend to the EC measures to avoid future ESA listings and courses of action to support efforts to delist species.
- Facilitate coordination of efforts between the various federal and state resource managers to avoid conflict and duplication of efforts, and maximize the effectiveness of the funds provided by the CSI MSHCP for research activities.
- Coordinate public inquiries concerning the CSI MSHCP.
- Meet and confer with county, state and federal land managers and non-federal landowners regarding specific requirements and the progress in implementing the CSI MSHCP. This includes review of Building

Department procedures for the issuance of grading or building permits and facilitating preparation of the Biennial Work Plan with the EC.

- Present to the CSI the findings and recommendations of the EC.
- Direct the AMP.
- Prepare an annual report addressing items listed above and any other reports or information requested by CSI.
- Provide CSI information needed to report to the USFWS as may be required in the incidental take permit.
- Receive the reports of each researcher receiving any funds from the CSI MSHCP.

8.1.3 Technical Advisory Committee

The TAC, chaired by CSI, will as requested make recommendations to the EC and HCP Administrator on implementation of the on the ground measures associated with the CSI MSHCP. These measures may include, but are not limited to, specific locations for permanent desert tortoise fencing, types of fencing, and/or weed management activities. The TAC may review, comment, and make recommendations to the EC regarding prioritized conservation measures (minimization/mitigation) and biennial workplans.

8.1.3.1 Structure and Organization of the Committee

- Members of the TAC will be appointed by CSI and may consist of representatives from CSI, USFWS, BLM, NDOW, and members of the scientific community.
- The TAC may be expanded to include other entities upon unanimous approval of the EC.
- In the event the TAC is unable to reach agreement on a technical issue where their recommendation has been sought, the TAC will forward the minutes of the meetings to the EC for further consideration and final action.
- Concerns of the TAC about any aspect of prioritized conservation measures, studies or budgets will be presented to the EC.
- Meetings of the TAC will be held as necessary to administer and implement the CSI MSHCP. At a minimum, TAC meetings will be held annually, but will likely occur more frequently during the first several years.

8.1.3.2 Duties and Responsibilities of the Committee

The TAC may make recommendations to the EC in connection with the following:

- Implementation of conservation measures based on recommendations from funded studies.
- Prioritization of research funded with mitigation fees.
- Expenditure of funds for conservation measures.
- Decisions of a technical nature required for implementation of the CSI MSHCP.
- Development of public information programs required by the CSI MSHCP.
- Preparation of the biennial work plans and other reports, as required to address the requirements of the CSI MSHCP and the incidental take permit.
- Any other matter requested by CSI.

8.1.4 Duties and Responsibilities of the BLM

- Maintenance, restoration, or rehabilitation of the Coyote Springs Investment (CSI) Multiple-species Habitat Conservation Plan (MSHCP) accomplished mitigation projects on Bureau of Land Management (BLM) lands (AKA Lease Lands) shall be the responsibility of the Coyote Springs Investment LLC (Permittee).

- BLM staff may participate in mitigation monitoring and adaptive management activities in a technical advisory capacity where appropriate, and only when a suitable cost recovery structure provided by CSI is available for reimbursement of related expenses.
- BLM administered lands adjacent to the Coyote Springs Investment Conservation Lands (CSICL), Lease Lands, and The Conservation Fund Parcels (TCF) will be managed in accordance with the BLM Las Vegas and Ely District, RMP's where appropriate.
- BLM will not encumber base funding to ensure the success or implementation of the CSI HCP. All costs incurred by the BLM for participation and implementation of the CSI MSHP, i.e.; Executive Committee and Technical Advisory Committee participation, will be reimbursed by the Permittee directly, or indirectly through other funding structures as may be available and appropriate.

8.1.5 Desert Tortoise Research and Recovery Advisors

As needed and/or directed by the EC, the HCP Administrator may consult with desert tortoise species experts. The USFWS has established a Science Advisory Team (SAT) for desert tortoise research needs in southern Nevada, including Coyote Spring Valley. However, SAT is not the only group of experts that may be consulted. If needed, the Desert Tortoise Science Advisory Committee (DTSAC), which identifies research needs rangewide, may be contacted.

Advice may be sought to:

- Develop the finer details of the Adaptive Monitoring Program.
- Review and provide recommendation on proposed effectiveness monitoring and experimental design of studies financed with CSI MSHCP mitigation funds.
- Coordinate with the USFWS to evaluate the design of the proposed mitigation measures.
- Evaluate the effectiveness of the implemented mitigation measures.
- Review monitoring programs.
- Provide advice on prioritization of studies funded with CSI MSHCP mitigation funds.
- Contribute to development of the monitoring methodologies.

8.1.6 Biennial Work Plan

Implementation of the CSI MSHCP will require adequate planning and budgeting by the HCP Administrator and the EC. The EC, with the assistance of the HCP Administrator, will prepare a Biennial Work Plan detailing the specific accomplishments to be achieved in order to meet the conservation measures identified in the CSI MSHCP. The work plan will identify:

- Goals and objectives,
- Various tasks to be accomplished,
- Who will conduct the work, and
- Outline a schedule of events and budgets for the year.

The Biennial Work Plan will be presented to the CSI for approval consistent with the standard fiscal year. The USFWS will also review the work plan for approval. USFWS' approval is dependent, in part, on the requirement to ensure that all avoidance, minimization and mitigation measures are commensurate with the level of impact to the Covered Species.

8.2 REPORTING

8.2.1 Annual Compliance Report

The HCP Administrator, with the assistance of the TAC, will prepare an Annual Compliance Report no more than 60 days following the end of the fiscal year detailing the accomplishments of the previous year and how well the goals and objectives of the previous year's work plan were met. The Annual Compliance Report will present the status of implemented conservation measures and the effectiveness of those measures as well as any problems encountered with the avoidance, minimization, and/or mitigation efforts implemented during that year. The report may make recommendations for changes for the following year, if warranted. If needed, the EC may request additional information or clarification.

The Annual Compliance Report will be used to track land disturbance, take, and funding levels in the Section 10 Trust Fund. The number of acres disturbed within a specific time period and the amount of remaining acres available under the incidental take permit will be included. CSI anticipates planning at least a year in advance for land disturbance activities, and therefore, compliance monitoring will be reported annually.

The Annual Compliance Report will be a compilation which would include the following:

- A description of all conservation measures initiated, continued, or completed during the previous year and a description of conservation measures projected to be implemented for the upcoming year;
- A tabulation and description of incidental take associated with habitat loss known to have occurred during the previous year and a projection of habitat disturbance for the upcoming year;
- A tabulation and description of individual tortoises, including age, sex, disease information, etc., from clearance surveys (for those years in which clearance surveys occur);
- A brief and concise summary of findings, results, and conclusions of monitoring or research (if reports are timely received from the researchers) conducted;
- A tabulation and description of funds expended during the previous year and a projection of funds to be expended during the upcoming year for the conservation and monitoring actions described in the preceding reports; and
- Other recommendations, such as minor modifications or amendments to the CSI MSHCP documents.

The Annual Compliance Report will be approved by CSI and forwarded to the USFWS. The Annual Report must provide sufficient information to prove compliance with the CSI MSHCP incidental take permit. If additional detail is needed, the USFWS must submit a request in writing to CSI within 30 days of receipt of the Annual Compliance Report. CSI shall have a reasonable amount of time to respond to the USFWS request.

In addition to the Annual Compliance Report, final reports associated with research projects funded with CSI MSHCP funds, either in whole or in part, would be made available to the HCP Administrator and each member of the EC. The responsibility for timely production and submittal of these reports will be the researcher conducting the studies.

8.3 CHANGED AND UNFORESEEN CIRCUMSTANCES

Section 10 regulations [50 CFS 17.22 (b)(2)(iii)] require that an HCP specify the procedures to be used for dealing with unforeseen circumstances that may arise during the implementation of the HCP. In addition, the Habitat Conservation Plan Assurances ("No Surprises") Rule [50 CFR 17.21 (b)(5)-(6) and 17.22 (b)(5)-(6); 63 F.R. 8859] defines "unforeseen circumstances" and "changed circumstances" and describes the obligations of the Permittee and USFWS. In addition, the HCP No Surprises Rule [50 CFR 17.22 (b)(5) and 17.32 (b)(5)] describes the obligations of the Permittee and USFWS. The purpose of the No Surprises Rule is to provide assurance to the non-federal landowner participating in the CSI MSHCP under the ESA that no additional land restrictions or financial compensation will be required for species adequately covered by a properly implemented CSI MSHCP, in light of unforeseen circumstances, without the consent of CSI.

8.3.1 Changed Circumstances

Changed circumstances are defined in 50 CFR 17.3 as changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and the USFWS and for which contingency plans can be prepared (e.g. the new listing of species, a fire, or other natural catastrophic event in areas prone to such an event). If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and these additional measures were already provided for in the plan's operating conservation program (e.g. the conservation management activities or mitigation measures expressly agreed to in the CSI MSHCP or IA), then CSI will implement those measures as specified in the plan. However, if additional conservation management and mitigation measures are deemed necessary to respond to changed circumstances and such measures were not provided for in the plan's operating conservation program, the USFWS will not require these additional measures absent the consent of CSI, provided that the CSI MSHCP is being "properly implemented" (which means the commitments and provisions of the CSI MSHCP and the IA have been or are fully implemented).

Reasonably foreseeable circumstances for which the CSI will implement remedial measures should they occur are listed in Table 8-1. The process for responding to Changed Circumstances will be initiated as soon as practicable but no later than 60 days after monitoring reveals a Changed Circumstance. The response actions will be handled through the AMP described in Chapter 9, Adaptive Management and Monitoring. Impacts and responses will be summarized in a report and submitted to the USFWS.

In the event that a non-covered species that may be affected by Covered Activities becomes listed under the ESA, CSI will implement the "no-take/no jeopardy/no adverse modification" measures identified by the USFWS until the permit is amended to include such species, or until the USFWS notifies CSI that such measures are no longer needed to avoid jeopardy to, take of, or adverse modification of the designated critical habitat, if any, of the non-covered species.

Table 8-1 Potential Changed Circumstances and Remedial Measures

Changed Circumstances	Remedial Measures
The creation of habitat for one or more of the covered species in accordance with the CSI MSHCP is unsuccessful (for instance, fails to provide essential habitat elements).	The cause of the failure will be identified through monitoring as a part of the AMP. The AMP will be used to identify and develop measures to correct or replace the failed conservation measure.
Habitat is lost as a result of floods, vandalism or fire.	CSI will notify the USFWS and replant damaged vegetation planted as mitigation pursuant to implementation of the CSI MSHCP, and replace any damaged infrastructure installed or constructed as mitigation pursuant to implementation within the burned area. Habitats will be reestablished following loss. Land management and habitat restoration measures listed in Chapter 6 will be implemented in conservation areas to ensure the reestablishment of native vegetation through active management or natural processes.
Listing of a new species.	In such a case, the incidental take permit will be reevaluated by the USFWS and the CSI MSHCP Covered Activities may be modified, as necessary, to ensure that activities covered under the CSI MSHCP are not likely to jeopardize or result in take or adverse modification of any designed critical habitat of the newly listed species. CSI will implement the modifications to the CSI MSHCP Covered Activities identified by the USFWS as necessary to avoid the likelihood of jeopardy to take or adverse modification of the designated critical habitat of the newly listed species. CSI will continue to implement such modifications until such time as CSI has applied for and the USFWS has approved an amendment of the incidental take permit, in accordance with applicable statutory and regulatory requirements to cover the newly listed species or until the USFWS notifies CSI in writing that the modifications to the CSI MSHCP Covered Activities are no longer required to avoid the likelihood of jeopardy or adverse modification of designated critical habitat of the newly listed species.

8.3.2 Unforeseen Circumstances

The policy defines unforeseen circumstances as changes in circumstances that affect a species or geographic area covered by the HCP that could not reasonably be anticipated by plan developers and USFWS at the time of the plan's negotiations and development and that result in a substantial and adverse change in status of a covered species. The purpose of the "No Surprises Rule" is to provide assurances to non-federal landowners participating in the CSI MSHCP under the ESA that no additional land restrictions or financial compensation will be required for species adequately covered by a properly implemented HCP, in light of unforeseen circumstances, without the consent of the Permittee.

In case of an unforeseen event, the USFWS shall have the burden of demonstrating that an unforeseen circumstance has occurred and that such circumstance is having or is likely to have a significant adverse impact on the covered species and/or its habitat. The findings of the USFWS must be clearly documented and be based upon the best scientific and commercial data available regarding the status and habitat requirements of the species. Based on the results of an expedited analysis of the changed or unforeseen circumstance(s) and the information provided by CSI, the USFWS shall provide the justification and approval for any reallocation of funds or resources necessary to respond to the circumstance(s) within the existing commitments of CSI under this MSHCP.

The USFWS will determine that an unforeseen circumstance has occurred by evaluating factors such as 1) the size of the current range of the affected species; 2) percentage of range conserved by the HCP; 3) percentage of range adversely affected; 4) the ecological significance of the portion of the range covered by the HCP; 5) the level of knowledge of the affected species or habitat; and 6) whether failure to adopt additional conservation measures would significantly reduce the likelihood of survival and recovery of the species in the wild. Any party to the IA may request the EC to meet to discuss appropriate amendments to the CSI MSHCP.

In implementing the "No Surprises" Rule, Congress intended that additional mitigation requirements should not be imposed on a Section 10(a)(1)(B) Permittee in the event of unforeseen circumstances. If the USFWS determines that an unforeseen circumstance has occurred and additional conservation measures subsequently are deemed necessary to provide for the conservation of a species that is otherwise adequately covered under the HCP, and the HCP is properly functioning, the obligation for such measures shall not rest with CSI. The USFWS agrees that it will consider all practical measures and alternatives, and adopt only those that will have the least effect and impact on the lifestyle and economy of Lincoln County, while at the same time addressing the unforeseen circumstance and the survival and recovery of the affected covered species and/or habitat.

8.4 AMENDMENTS

There are two types of changes that may be made to the CSI MSHCP and/or the CSI MSHCP permits and/or its associated documents:

- Minor Amendments
- Major Amendments

Amendments shall be processed in accordance with all applicable legal requirements, including ESA, NEPA, and any applicable federal regulations.

8.4.1 Minor Amendments

According to the Habitat Conservation Planning Handbook (USFWS and NMFS 1996), clarifications and minor administrative amendments may be incorporated into the CSI MSHCP administratively if:

- The amendment has the unanimous consent of CSI and the USFWS;
- The original CSI MSHCP established specific procedures for incorporating minor amendments so that the public had an opportunity to comment on the process, and such amendments are consistent with those procedures;
- The CSI MSHCP defines what types of amendments are considered minor;
- A written record of any such amendments is prepared; and

- The net effect on the species involved and level of take resulting from the amendment is not significantly different than that analyzed under the original CSI MSHCP and the USFWS decision documents.

8.4.1.1 Procedures for Incorporating Minor Amendments and Public Comment

Under this MSHCP, CSI or the USFWS may submit a request for a minor amendment. The request must be submitted to the HCP Administrator, reviewed by the EC, recommended for adoption, and followed with a written request submitted to the USFWS. The minor amendments or clarifications would be open for public comment. If the USFWS concurs with the proposed minor amendment, then they will authorize the amendment in writing within 30 days. The amendment will be effective on the date of the written authorization from the USFWS.

8.4.1.2 Types of Amendments that are Considered Minor

Minor amendments are changes to the CSI MSHCP that do not modify the scope or nature of activities or actions covered by the Section 10(a)(1)(B), result in operations under the CSI MSHCP that are significantly different from those contemplated or analyzed in connection with the CSI MSHCP as approved, result in adverse impacts on the environment that are new or significantly different from those analyzed in connection with the CSI MSHCP as approved, or result in additional take not analyzed in connection with the CSI MSHCP as approved. Clarifications or minor amendments include:

- Corrections of typographic, grammatical, and similar editing errors that do not change the intended meaning.
- Correction of any maps or exhibits to correct errors in mapping or to reflect previously approved changes in the Permit or CSI MSHCP.
- Correction of land ownership and/or land boundaries.
- Correction of the acres of suitable and potential habitat for the Covered, Evaluation, and/or Watchlist Species included in the CSI MSHCP.
- Inclusion of new non-federal lands outside of the Covered Area if they leave federal ownership through public land disposal or other means and have gone through a Section 7 consultation with the USFWS. This includes new parcels, new and expanded rights-of-ways, and the like. The inclusion of new lands under the incidental take permit must not result in changes that affect the Covered Species that were considered in the CSI MSHCP. A major amendment would be necessary if this addition resulted in increasing the acreage of land that would be disturbed during the permit term beyond what was considered in the plan.
- Minor changes to surveying, monitoring, or reporting protocols.
- Changes or adjustments to avoidance, minimization and mitigation measures recommended through the AMP and monitoring.
- Minor changes in locations for habitat disturbances previously addressed under separate ESA consultations.

8.4.2 Major Amendments

Major amendments to the CSI MSHCP include significant alterations in funding, schedule, boundary, the addition of species, or new major activity. Any Permittee under the CSI MSHCP or signatory to the IA, including the USFWS, may submit a request for a major amendment. The request must be submitted to the HCP Administrator, reviewed by the EC, and recommended to and approved by the CSI with a written request submitted to the USFWS for concurrence. Major amendments would be reviewed by the EC; formally proposed to the USFWS by CSI; and ultimately approved, modified, or rejected by the USFWS. Any major amendment should have approval by all signatories (Permittee and participants) to the IA. The EC will be charged with evaluating and recommending any potential CSI MSHCP amendment.

The permit amendment will follow the same process as the original permit application following 50 CFR Parts 13 and 17, requiring 1) an amendment to the CSI MSHCP addressing the new circumstance, 2) a Federal

Register notice, 3) NEPA compliance, and 4) and intra-Service Section 7 consultation. A Section 7 consultation results in a BO.

8.5 SUSPENSION, REVOCATION, AND TERMINATION

The USFWS may suspend, revoke, or terminate their respective permits if CSI fails to implement the CSI MSHCP in accordance with the terms and conditions of the permits or if suspension, revocation, or termination is otherwise required by law. Suspension, revocation, or termination of the incidental take permit, in whole or in part, by the USFWS shall be in accordance with 50 CFR 13.27-29, 17.32(b)(8). Prior to taking any action to suspend, revoke, or terminate an incidental take permit, the USFWS shall meet and confer with the Party subject to corrective action in order to attempt to resolve the need to suspend, revoke, or terminate the incidental take permit or only to specific Covered Species, Covered Area, or Covered Activities.

Notwithstanding the suspension or revocation of their incidental take permit, a Permittee shall remain liable under the IA to carry out all of its responsibilities under the CSI MSHCP, the permit, and the IA arising from any covered activity approved, authorized, or carried out by the permittee within the covered area between the effective date of the IA and the date the permit is suspended or revoked.

If the incidental take permit is suspended, revoked, or terminated, the permittee shall not have any authority to rely upon the permit to approve or carry out any actions, which would violate ESA in the absence of such permits. Notwithstanding the suspension, revocation, or termination, the Permittee shall remain fully liable under the permit and the IA to carry out all of their responsibilities, including mitigation requirements, under the permit and IA arising from the covered activities approved, authorized or carried out between the effective date and the date the permit is suspended, revoked, or terminated.

8.6 RENEWAL OF THE INCIDENTAL TAKE PERMIT

Upon explanation, the incidental take permit may be renewed without the issuance of a new permit, provided that the permit is renewable, and that the biological circumstances and other pertinent factors affected the Covered Species are not significantly different than those described in the original CSI MSHCP.

8.7 PERMIT TRANSFER

In the event of sale or transfer of ownership of the property, during the life of the permit, a new permit application, permit fee, and an Assumption Agreement would be submitted to the USFWS. The new owner(s) will commit to all requirements regarding the take authorization and mitigation obligations of this CSI MSHCP unless otherwise specified in the Assumption Agreement and agreed to in advance with the USFWS.

Notwithstanding any provision to the contrary, in the event the permittee elects to make a bulk sale or other bulk transfer of the remaining unsold and undeveloped portion of the CSI Development at any time during the term hereof, or any extended term, the permittee shall condition any such bulk sale or other bulk transfer upon the transferee satisfying all requirements imposed by the USFWS pursuant to the laws and regulations then in effect relating to the transfer of the Permit. At present, this would require the transferee to: (i) execute and deliver an assignment and assumption agreement in a form satisfactory to the USFWS pursuant to which the transfer assumes all of the Permittees obligations under the HCP, unless otherwise agreed to by the USFWS in writing; (ii) the submittal of a new permit application; and (iii) payment of the then current permit fee. These provisions must be satisfied at or prior to the closing of any such sale or transfer transaction.

8.8 IMPLEMENTATION AGREEMENT

Section 10(a)(2)(iv) of the ESA states that a conservation plan must specify other measures that the Secretary of the Interior may require as being necessary or appropriate for the purposes of this CSI MSHCP. The USFWS Region 1 Office (West Coast region) believes it is generally necessary and appropriate to prepare an Implementing Agreement (IA) for habitat conservation plans. The purpose of the IA is to ensure that each party understands its obligations under the CSI MSHCP and incidental take permit and to provide remedies should any party fail to fulfill its obligations. Each entity that has committed to participate in and contribute to the implementation of this CSI MSHCP will enter into an agreement with the USFWS. These entities include

BLM, CSI, Coyote Springs Land Company, LLC, and Coyote Springs Land Development Corporation. This agreement will specify the responsibilities of each agency; the avoidance, minimization and mitigation measures to be implemented; reporting and enforcement procedures; and any other permit conditions USFWS may require.

8.9 FUNDING

A demonstration that adequate funding is available for implementation of conservation measures is one of the fundamental elements that the CSI MSHCP must present before the incidental take permit can be issued. Sufficient funding is essential to demonstrate that implementation of the conservation measures is consistent with the cumulative level of take. Table 8-2 summarizes the funding sources and uses for funding within the context of the 40-year permit.

8.9.1 Funding Sources

CSI plans to fund the CSI MSHCP primarily from long-term funding sources. Long-term revenue sources are those that can be planned for, readily secured, and are available commensurate with land development within the Covered Area, such as mitigation fees for disturbance of desert tortoise habitat.

8.9.1.1 Long Term Revenue Sources

Long-term revenues will be secured from desert tortoise mitigation fees paid by CSI as presented in Chapter 6. The long-term revenues will provide a permanent reliable source of dollars that will fund implementation of the Section 10 permit and associated conservation measures. Since these long-term revenue sources are derived directly from development allowed under the Section 10 permit, adequate revenues will be available to implement conservation measures commensurate with the cumulative level of take for the duration of the 40-year permit.

8.9.1.1.1 Desert Tortoise Mitigation Fees

ACTIVITIES SUBJECT TO DESERT TORTOISE HABITAT MITIGATION FEES

The CSI MSHCP proposes the imposition of a mitigation fee of $800 for all development activities on private land in desert tortoise habitat. Development activities (described in Chapter 4, Covered Activities) on private land that require mitigation fees include the following:

- Community development and construction,
- Recreational facilities and open space,
- Utility infrastructure,
- Water supply infrastructure and management,
- Flood control structure and maintenance including stormwater management, and
- Resource management features.

CSI acknowledges that many of the above activities will additionally require various federal, state, and local permits. In particular, the majority of flood control projects will require clearances under Section 404 and 401 of the CWA, but will not require an ESA Section 7 consultation. Regardless, CSI will require that, unless exempt, any developer or landowner that conducts new land disturbances, as described above, must pay a mitigation fee as described herein.

CSI cannot impose fees on activities authorized by BLM. However, BLM could impose fees and require payment to the CSI MSHCP activities authorized on nearby federal lands.

IMPACT FEES FOR THE DESERT TORTOISE

A fee of $800 per acre will apply to any development within the Development Area of the CSI MSHCP.

Table 8-2 Summary of Anticipated Revenues and Expenditures Associated With Implementation of the CSI MSHCP

Item	Estimated Budget for Each Time Period								
	0-5	6-10	11-15	16 -20	21-25	26-30	31-35	36-40	All Years
Revenue									
Mitigation Fees	$1,005,600	$2,286,400	$3,294,400	$3,880,000	$2,920,000	$2,418,400	$640,800	$126,400	$16,572,800
Acres Disturbed	1,257	2,858	4,118	4,850	3,650	3,023	802	158	20,716
Expenditures									
HCP Management Program Coordinator	$250,000 ($50,000/year)	$500,000 ($100,000/year)	$500,000 ($100,000/year)	$500,000 ($100,000/year)	$500,000 ($100,000/year)	$500,000 ($100,000/year)	$500,000 ($100,000/year)	$500,000 ($100,000/year)	$3,750,000
Avoidance/Minimization Measures Fencing North and East Boundaries (4 miles/time period)	$118,500 ($5.50/ft)	$118,500 ($5.50/ft)	$118,500 ($5.50/ft)	$118,500 ($5.50/ft)	0	0	0	0	$474,000
Avoidance/Minimization Measures Clearance Surveys	$43,995	$100,030	$144,130	$169,750	$127,750	$105,805	$28,035	$5,530	$725,060
Mitigation Measures Research Recovery Enhancement	$591,848	$1,565,012	$2,527,652	$2,992,078	$2,193,778	$1,714,750	$17,141	$765	$11,603,024

DESERT TORTOISE HABITAT MITIGATION FEE PROJECTIONS

The mitigation fee will be imposed on all land disturbance on private lands within the Covered Area which is subject to development permits as defined by Lincoln County and will be paid at the time of issuance of the building or grading permit or prior to land disturbance.

Habitat mitigation fees will be paid for up to approximately 20,716 acres of the 21,454 gross acres of the CSI private lands projected to be developed by this CSI MSHCP. The habitat mitigation fee for the lands to be developed will generate approximately $16.6 million in fees during the term of the CSI MSHCP.

Fees will be pro-rated to the quarter-acre. Any disturbance less than one-quarter acre in size will be subject to a one-quarter acre fee assessment. The mitigation fees will be held in the Section 10 Trust Fund, an interest bearing account.

8.9.2 Fee Collection and Management

CSI would manage the collection of the fees as part of issuance of the appropriate permitting process. A Section 10 Trust Fund will be established by CSI upon issuance of the incidental take permit. The principal income and interest shall be used exclusively to fund the administration, and the minimization and mitigation measures set forth in the CSI MSHCP. This Trust Fund is a separate account from the Section 7 Fund account established for activities in a separate project on CSI private lands in Clark County.. All long-term and supplemental revenues received will be deposited into the Section 10 Trust Fund, as allowed by law, which will be an interest bearing account. All incidental take permit administration, implementation, and maintenance expenses will be paid from this fund. Each year, members of the EC will make a determination of what needs to be done with regards to implementation of the CSI MSHCP and will recommend expenditures to cover costs of specific plan implementation needs. As appropriate, bids would then be received by CSI and reviewed by EC for projects identified by the EC for implementation. The Biennial Work Plan developed by the EC and approved by CSI, with concurrence of the USFWS, will establish priorities and determine how these funds are spent on the Covered Species and other MSHCP needs.

Upon approval of the CSI MSHCP and issuance of the Section 10(a) Permit, the Section 10 Trust Fund and its income will be used exclusively to administer and implement the terms of the CSI MSHCP. Approximately 23.7 percent of fees would be used to administer and ensure compliance with the incidental take permit, 7.2 percent would be used for clearance surveys and installation of fencing, and 69.1 percent would be used for implementing research and restoration activities. The primary source of funding will be derived from the continuation of fees collected for each acre of disturbance of non-Federal lands in the Covered Area and interest from the Section 10 Trust Fund. Funds remaining in the trust fund at the conclusion of the term of the permit will be retained by CSI in an interest-bearing account and expended in cooperation with the USFWS solely and exclusively for conservation measures consistent with recommendations of the AMP.

8.10 REFERENCES

U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). 1996. Endangered Species Habitat Conservation Planning Handbook. November 1996.

CHAPTER 9

Adaptive Management and Monitoring

Chapter 9: Adaptive Management and Monitoring

This chapter identifies the overall regulatory framework of the AMP for the CSI MSHCP. This CSI MSHCP adaptive management program follows a framework recently developed by the USGS with USFWS for HCPs and similar land use planning efforts that address imperiled species and their habitats (USGS 2004). The primary components of the CSI MSHCP AMP are outlined in Table 7-3.

The primary reason for using an adaptive management approach in this CSI MSHCP is to allow for changes in the mitigation strategies that may be necessary to reach long-term goals of the HCP and to ensure the likelihood of survival and recovery of the species in the wild (USFWS and NMFS 1996). Often, gaps in the scientific literature exist with regards to biological requirements of listed species, which can result in a level of uncertainty in the effectiveness of proposed Conservation Measures. Monitoring Conservation Measures can evaluate whether they are effective in protecting species from the effects of the Covered Activities in a HCP. If monitoring indicates that Conservation Measures are inadequate for protecting the Covered Species, Conservation Measures can be adapted to provide more effective protection and/or new Conservation Measures can be implemented. For this reason, an AMP has been developed.

The AMP and Biennial Work Plan (described in Chapter 8, Plan Implementation) would be integral parts of the framework that would allow CSI, BLM and USFWS to work together over the 40-year permit term. The CSI MSHCP is a prescription-based HCP in which the biological goals and objectives have guided the development of specific conservation measures. The biological goals and objectives prescribed in Chapter 6, Conservation Measures for each of the Covered Species provide the basis for establishing enforceable prescriptions such that CSI is only required to implement the measures to comply with its permit. For instance, the CSI MSHCP is structured toward implementing a specific replacement cost for disturbance of suitable habitat which is reflected in the mitigation fees described in Chapter 6, Conservation Measures. Aside from agreed-upon adjustments, the mitigation fee would not change during the term of the permit, except under an HCP's normal triggers and/or specified herein. Furthermore, if CSI complies with the requirement to pay the set mitigation fee as a result of disturbance of suitable habitat, CSI's obligation is satisfied and therefore there would be no basis for requiring that CSI pay an additional amount.

As part of the AMP, CSI is committed to conservation actions as elements in their overall plan to avoid the "take" of the Covered Species, to minimize "take" where it cannot be avoided, and to mitigate for expected impacts. The AMP would monitor the effectiveness of such implemented conservation actions and management prescriptions in meeting these biological goals, recommend alternative actions to pursue in the event that the goals are not being met, and would incorporate any other information, including third-party scientific research, that has bearing on the how best to meet the biological goals.

9.1 OVERVIEW OF AMP

Overall steps that would be followed in the AMP are as follows:

- CSI and/or developers would pay mitigation fees,
- Funds are then placed in a Section 10 Trust Fund,
- A Biennial Work Plan is developed which identifies research and other actions to be carried out,
- A 5-Year Management Action Plan (MAP) is developed, which further identifies research and other actions to be carried out over a longer term and would revise or refine management goals, objectives, and strategies, as needed,
- Research and monitoring are carried out,

- For the development of the next Biennial Work Plan, results of research and monitoring are evaluated in an Annual Compliance Report and a Biennial Monitoring Report and such results would determine whether future actions and research would be modified, and
- Every ten years, a Comprehensive Review would address what is included in the Annual Compliance and Biennial Monitoring Reports, as well as assess whether additional conservation measures would be needed.
- Decision points related to the Biennial Work Plans, 5-Year Management Action Plans, and Comprehensive Reviews are outlined in Table 9-1.

Table 9-1 Decision Points of the Adaptive Management Plan

Review Type	Timeframe	Compliance Criteria	Assessment
Biennial Work Plan	Every two years	▪ Level of take (e.g. ground disturbance) ▪ Implementation of conservation measures ▪ Generation of HCP funds ▪ Expenditure of HCP funds	▪ Assess implementation of conservation measures in relation to schedule and level of effort outlined in this CSI MSHCP. ▪ Assess level of take in relation to amount requested in this CSI MSHCP.
Management Action Plan	Every five years	▪ Revised or refined management goals, objectives and strategies, as needed ▪ Define research and other actions ▪ Generation of HCP funds ▪ Expenditure of HCP funds	▪ Prioritization of management and monitoring activities based on funding available ▪ Selection of monitoring locations ▪ Selection of research studies to be funded
Comprehensive Review	Every ten years	▪ Level of take (e.g. ground disturbance) ▪ Implementation of conservation measures ▪ Generation of HCP funds ▪ Expenditure of HCP funds	▪ Assess implementation of conservation measures in relation to schedule and level of effort outlined in this CSI MSHCP. ▪ Assess level of take in relation to amount requested in this CSI MSHCP. ▪ Assess the expected outcome from implementing the covered activities and conservation measures. ▪ If the expected outcome associated with the potential effects and conservation measures, has a significantly greater impact on species than the level described and assessed in this CSI MSHCP, the USFWS will notify CSI of the need to implement additional conservation measures.

9.2 BACKGROUND ON ADAPTIVE MANAGEMENT

Adaptive management is an experimental and flexible approach to resource management that integrates ecological theory, modeling, hypotheses generation, field manipulations and interventions, and feedback that allows for refinement of the model(s) and hypotheses and, ultimately, improved management of the resource. As stated by Gunderson (1999), adaptive management is “adaptive because it acknowledges that managed resources will always change as a result of human intervention, that surprises are inevitable, and that new uncertainties will emerge.” A key concept of adaptive management is that the natural world in which HCPs are implemented is uncertain and flexibility in resources management is crucial (Holling 1995). The adaptive management approach requires a departure from the traditional command-and-control approach to management, which assumes that the managed system is relatively simple and predictable (Holling and Meffe 1996).

Adaptive management is designed to allow resource managers to act in the face of those diverse and dominating sources of acknowledged uncertainty, designing management actions to reduce uncertainty over time, while allowing change in response to environmental surprises. Instead of seeking precise predictions in advance, adaptive management highlights a range of possible outcomes. It treats management as a central element of a learning process, rather than as an independent step that follows learning. Management under the adaptive paradigm is an ongoing process that contributes to learning. As a consequence, decisions are always provisional and contingent upon observed responses to prior management actions.

9.2.1 USFWS' Five-Point Policy for Adaptive Management

The purpose of adaptive management within the framework of the CSI MSHCP is to help maintain and enhance populations of desert tortoise and other covered and at-risk species in dedicated open space and adjacent areas on public lands. While HCP guidance documents provide the regulatory framework and general guidance for an adaptive management approach, they only partially address specific management issues of importance to long-term conservation planning in Coyote Spring Valley. A number of those management concerns are addressed in this chapter with specific reference to the "Five-Point Policy" that was promulgated by the USFWS and the National Oceanic and Atmospheric Administration (NOAA) (2000) to provide guidance for the preparation of HCPs to landowners, wildlife agency staff, and staff at other agencies.

As part of the Five-Point Policy, the USFWS distinguishes between two types of monitoring: (1) Compliance monitoring, which monitors the permittee's implementation of the requirements of the HCP, permit, and/or IA; and (2) effects and effectiveness monitoring, which investigates the impacts of the authorized take and the operating conservation program implemented to verify progress toward the biological goals and objectives. "A monitoring program should incorporate both types in order to examine effectively all aspects of an HCP, and ensure the ultimate success of the HCP…Monitoring measures should be commensurate with the scope and duration of the project and the biological significance of its effects. The monitoring program should be flexible so that it can be modified, if necessary, based on the need for additional information" (USFWS and NOAA 2000).

Compliance Monitoring includes specific actions required by the Section 10 permit and/or the IA, such as evaluating and validating conservation of acreage, documenting water transfer actions, assessing direct actions on Covered Species (such as, translocation of individuals), and implementation of mitigation requirements. Compliance Monitoring addresses simple performance of actions and ensures that the permittee is implementing HCP according to the terms and conditions of its implementation agreement.

The "effects and effectiveness monitoring" (also called Effectiveness Monitoring), as referred to in the HCP Handbook Addendum, constitutes the focal action(s) of the AMP; it maximizes the likelihood that the overall long-term goals and objectives of the HCP are met and documented. Effectiveness Monitoring can contribute both to permit Compliance Monitoring, and long-term assessment of conditions on the CSICL. It includes the monitoring of conservation actions that have direct and indirect outcomes that meet specific management goals, may be accompanied by response lags in targeted species or resources, and may be measured using surrogate response variables.

This MSHCP is designed to address the policies and recommendations contained in the USFWS Five-Point Policy including:

- Long-term adaptive management of designated habitat areas and resources that support listed species, covered species, and other sensitive species;
- Compliance Monitoring to determine whether implementation of conservation measures and the adaptive management program is consistent with the terms of agency approvals;
- Effectiveness Monitoring of designated species and select habitat features to determine the effectiveness of specific adaptive management measures in promoting species survival and recovery;
- Funding to support the adaptive management and monitoring program; and
- Consideration of alternative conservation actions and approaches, including those that may be necessary under conditions of changed circumstances.

In addition, this MSHCP will support an ambitious research program, which is necessary to meet the goal of "resolving critical management uncertainties" as described in Designing Monitoring Programs in an Adaptive Management Context for Regional Multiple Species Conservation Plans (USGS 2004). This document was intended to "provide a step-by-step procedure for developing effective monitoring programs in an adaptive management context" (USGS 2004), and is compatible with an approach to adaptive action and learning adapted from the approach used by the CALFED Bay-Delta restoration effort, with its dual emphasis on monitoring and research activities (Figure 9-1).

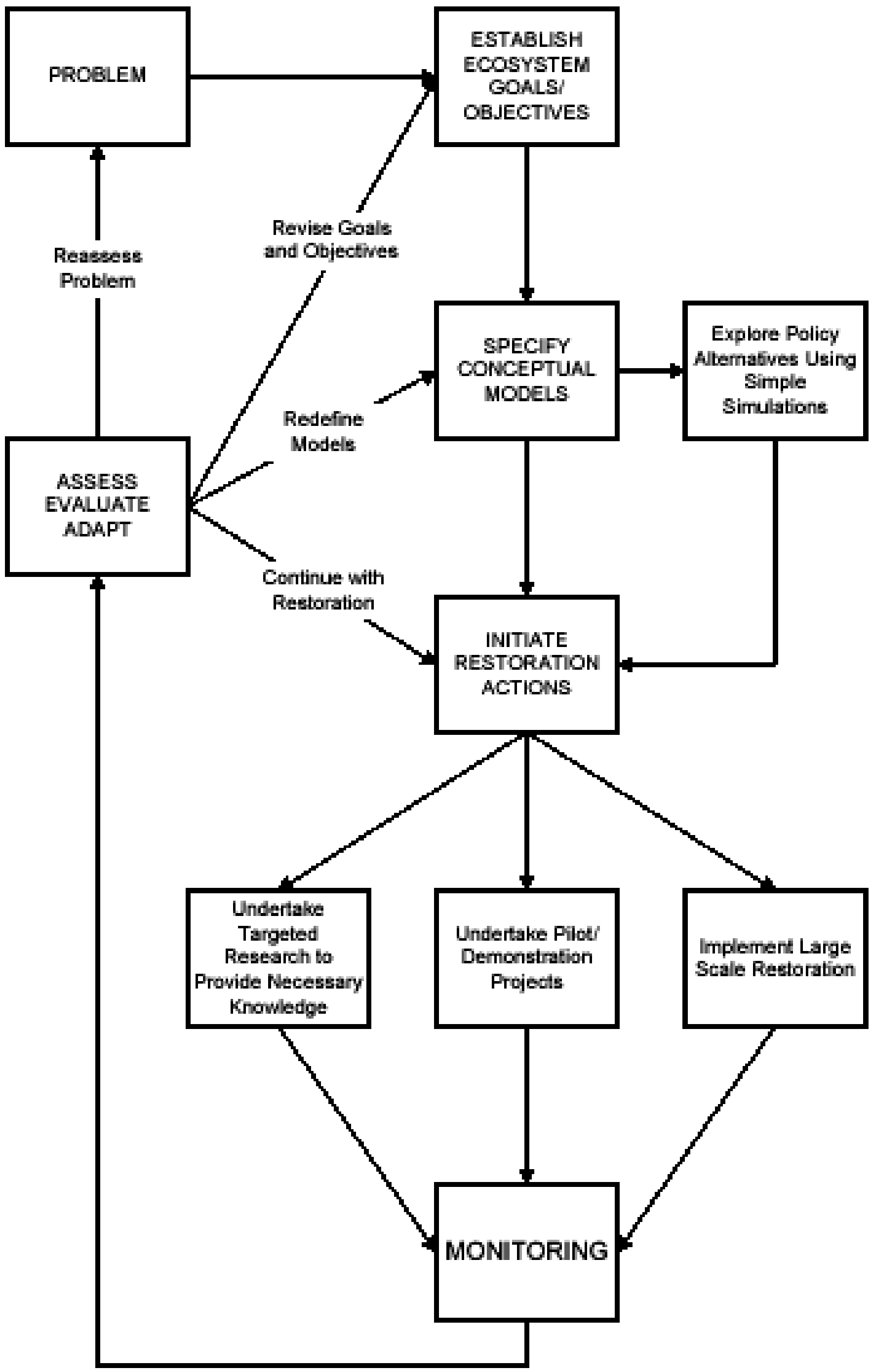

Figure 9-1 Flow Chart of Adaptive Management Activities Showing Relationships Among Management, Monitoring, and Research

9.3 STRUCTURE OF THE CSI MSHCP ADAPTIVE MANAGEMENT PLAN

9.3.1 Elements of the Adaptive Management Plan

The following presents background, justification, and anticipated areas of conservation concern that will be addressed by adaptive management. It should be expected that the TAC will identify additional issues that warrant data collection, and will recommend a prioritization scheme for monitoring and research based on degree of risk to specific species or resources, immediacy of information needs for management, and potential for producing critical information that can make management more effective and efficient. Recognizing critical uncertainties limit current management response options both monitoring and research will need to contribute to the acquisition of new knowledge. Monitoring and research elements of the AMP are described below.

The CSI MSHCP AMP will have a clear focus on desert tortoise. It is the only federally protected species found on CSI lands; it is believed that many conservation actions designed to benefit the tortoise will have concomitant value for co-occurring species. Importantly, many outstanding uncertainties exist regarding tortoise responses to known stressors, both natural and human caused, which limit conservation responses. Both available funding and opportunities for field manipulations of tortoises, habitat features and conditions, and a range of stressors operate on CSI and adjacent lands combine to allow for adaptive management options not available elsewhere. A number of activities under the AMP proposed below will have application to desert tortoise recovery efforts beyond the CSI CSICL.

The AMP will strive to gather data that can address species that co-occur with desert tortoise in efforts to assess community responses to key stressors, as well as to identify potential surrogate species (and/or ecological attributes of the system) that can facilitate future environmental monitoring efforts. Effectiveness monitoring opportunities are best addressed as an integrated data collection effort in a shared experimental frame and sampling design, as noted below.

9.3.1.1 Programmatic Goals for Recovery of the Desert Tortoise

The MSHCP will provide an opportunity to attain critically needed knowledge about the threatened desert tortoise, which should provide the basis for more effective recovery actions locally and range wide. Furthermore, the CSI MSHCP will contribute to the development of conservation tactics for other species of concern that co-occur in Coyote Spring Valley. As described elsewhere in this document, despite conservation efforts across the breadth of the multi-state distribution of the desert tortoise, the species continues to decline in nearly all of its range. Biologists contributing to tortoise conservation efforts have called for a new approach to reverse this trend, a strategy that adds population enhancement measures to current on-the-ground efforts that seek to reduce or eliminate threats to the species. Conservation measures are supplemented by a program of captive rearing and transplantation of juvenile tortoises, “head started” to sizes necessary to maximize survivorship, into suitable habitats. The MSHCP offers the first opportunity to integrate formally a tortoise head-starting program into a multifaceted approach to conserving the desert tortoise and species of concern occurring in Coyote Spring Valley. The following describes a framework for future conservation-related activities in an AMP and details a research agenda designed to reduce key uncertainties that currently limit the ability of land and resource managers to reverse tortoise population trends through directed management actions. In addition, a series of conservation management actions are presented that will require and benefit from data collection that includes species other than desert tortoise, which will draw from the focal species categories described above.

The Desert Tortoise Recovery Plan and the Desert Tortoise Recovery Plan Assessment Committee (DTRPAC) report recognized three general goals necessary for recovery of desert tortoises. The steps necessary to achieve these range-wide goals must be implemented at both local and regional levels, and should be considered in the context of impacts that will accompany development in Coyote Spring Valley and conservation measures intended to ameliorate them.

- Maintain self-sustaining populations of the desert tortoise distributed across the historical range of the species.
- Restore and maintain desert tortoise habitats in a configuration and condition necessary to meet goal 1.

- Alleviate key threats to desert tortoise populations and habitats to ensure persistence as described in goals 1 and 2 (Tracy et al. 2004).

These goals provide guidance for the CSI habitat conservation planning approach, planning considerations, and adaptive management commitments.

9.3.1.2 Key Threats to Tortoise Population Persistence and Recovery

The Desert Tortoise Recovery Plan identified many threats to tortoise populations that have caused or contributed to population declines of the species in portions of Utah, Arizona, Nevada, and California (USFWS 1994). Threats to desert tortoises include those from natural sources (e.g., drought, predation by native predators, and disease), as well as from impacts directly or indirectly associated with humans (e.g., poaching, vandalism, motor vehicles, and habitat loss, degradation, and fragmentation). The more recent DTRPAC report (Tracy et al. 2004) underscored that threats facing desert tortoise populations are not independent of one another, but that they may interact with one another synergistically and cumulatively. These potential interactions could compound negative impacts, as indicated in the detailed conceptual model of threats (stressors) and mortality factors illustrated below (Figure 9-2). Accordingly, management actions addressing threats, one at a time, without recognizing the interactions among them, are unlikely to be as effective as would be actions set in an integrated program that is designed to relieve impacts from interacting threats simultaneously. Identification of key threats that have integral interactions, sharing vertices with many other threats, can facilitate the development of potentially effective management actions. This approach allows for focused efforts with potentially far-reaching effects. The DTRPAC recommended that management actions be hypothesis driven; that is, the actions are planned to allow testing of alternative explanations for observed phenomena and that actions be assessed by effectiveness monitoring so that adaptive management strategies can be employed to improve management over time.

The DTRPAC report states clearly that tortoise populations across the range of the species are not at former densities due to a variety of factors. Some locations are much more seriously affected by threats due to urbanization. The highly managed population in southwestern Utah had been as close to stable as any in the range until the apparent recent negative effects of drought, disease, and fire. Some locations are more vulnerable to human-produced threats, especially locations adjoining urban areas and areas with limited landscapes available to host tortoise recovery efforts.

The multiplicity of natural and human-based threats coupled with tortoise life history constraints makes comprehensive implementation of recovery either too complex or too expensive in today’s environment to reverse declining population trends soon enough to ensure persistence of tortoise populations (Murphy pers. comm.). Traditional means of threat abatement must be re-evaluated in this situation. All too frequently management addresses threats by prioritizing those management actions that are easy to implement, rather than for their potential to address multiple threats simultaneously. Attempting to manage threats in this manner will likely have limited success when key threats remain unabated. In contrast ex-situ propagation of turtles and tortoises, and subsequent release of juveniles has proven effective in reversing declining population trends. At 150 mm, juvenile tortoises are large enough to avoid excess mortality from exotic predators, such as cats and dogs. Desert tortoises live in genetically unique populations separated by natural barriers to dispersal within the species’ range. A head-starting program for Nevada tortoise populations will increase the probability that populations will persist in the wild until the results of effective threats management can be manifest in naturally expanding tortoise populations. Indeed, scientists in Arizona and California are already pursuing similar approaches for desert tortoises; planning to use population augmentation as a means to offset mortality, while allowing the time necessary for reduction and management of threats to produce increased tortoise survivorship and population growth.

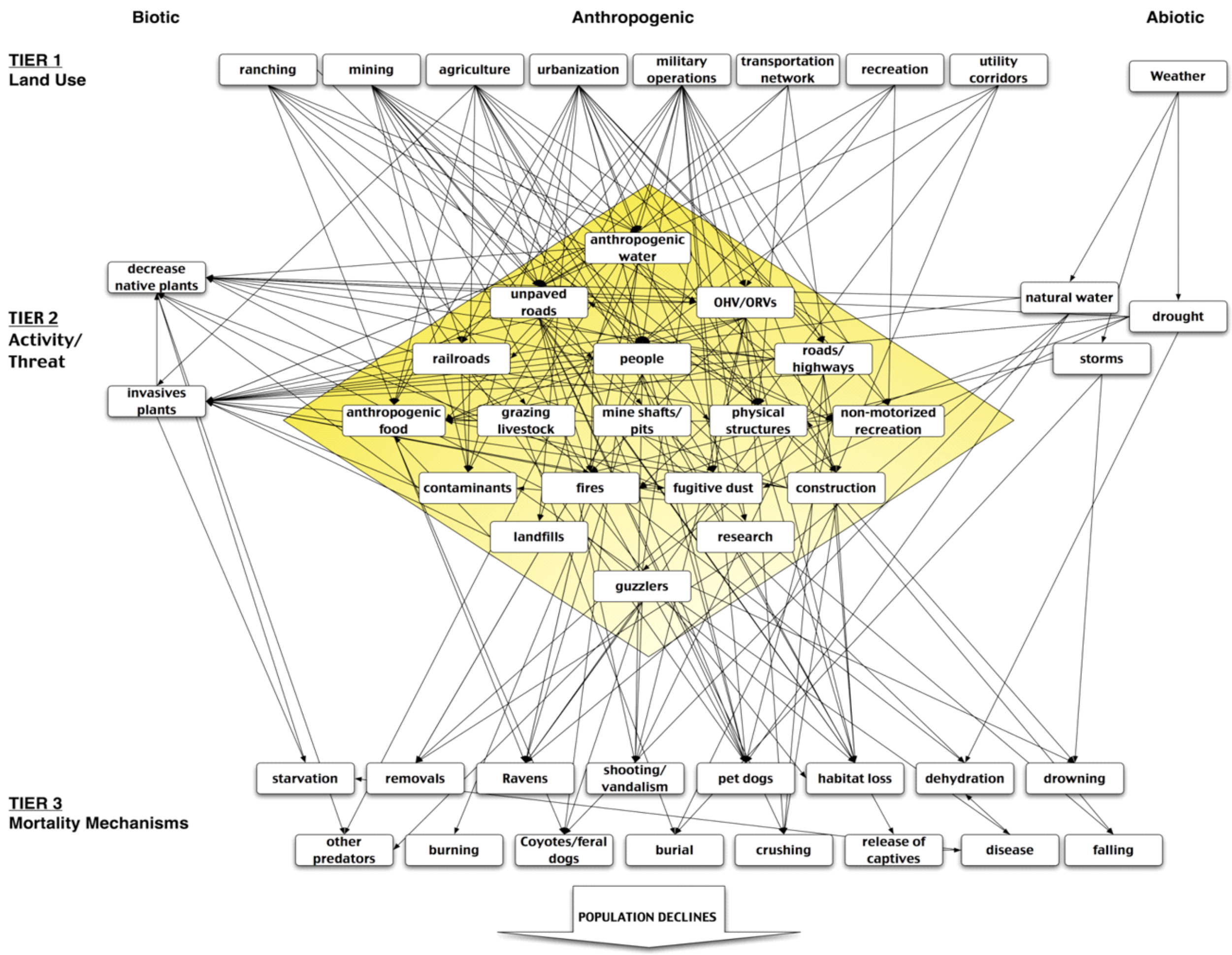

Figure 9-2 Threats Network from the DTRPAC Report (Tracy et al. 2004)

9.3.1.3 Coyote Springs MSHCP Objectives Related to Desert Tortoises

Section 10(a) of the Endangered Species Act requires that HCPs minimize and mitigate impacts to, and provide for the recovery of listed species. Minimization and mitigation measures under the MSHCP are anticipated to occur at local, regional, and range-wide scales. Minimization and mitigation should be carried out on the ground at local and regional scales, while range-wide benefits will be gained through research and adaptive management activities. Conservation of lands adjacent to development should be facilitated by setting aside, and actively protecting and managing habitat used by tortoises for forage, shelter, and other primary life-history activities, as well as providing connectivity of habitat areas.

Head starting and translocation will be integral components of the conservation and management of desert tortoises in Coyote Spring Valley. Management of tortoise populations by enhancing recruitment should be regarded as a temporary conservation strategy, which allows populations to persist until more effective management strategies can be established. A comprehensive conservation plan needs to include the plan of enhanced recruitment in the short-term and threat reduction and reduced tortoise mortality through effective management actions in the longer term (Murphy pers. comm.).

The structure of the adaptive management approach – integrating head starting efforts, and including both monitoring and research, will follow a schedule of actions, data collection, and reporting data that is widely recognized as providing accountable management for imperiled species and species of concern. Explicit steps in the adaptive management approach will be concordant with the USGS guidance document. They are presented as amended to meet the MSHCP goals and objectives, with a description of focused research activities:

- Clearly articulating the conservation challenge or management "problem," including determination of its geographic boundaries, ecological processes, habitats, species of concern in addition to the desert tortoise, and the time scale of the effects of land use changes.
- Defining management goals and objectives to articulate restoration targets and measurable objectives for management efforts and to quantify progress.
- Developing conceptual models that describe how the targeted ecosystem and species of concern are expected to function, how the system has been altered or degraded, and how management actions might improve conditions. Conceptual modeling is the process of articulating simplified mental illustrations about critical cause-and-effect pathways, making them explicit rather than implicit. Knowledge and hypotheses about ecosystem structure and function can lead directly to potential restoration and other management actions, by highlighting key areas of knowledge and uncertainty. Even very simple models can allow assessment of benefits and costs of alternative management actions, provide a basis for determining how much of a specific action may be necessary to achieve desired benefits, and provide a basis for identifying new information that could be acquired through management-generated experimentation.
- Defining restoration and other management actions that are intended to mitigate for take of the listed desert tortoise and other covered species and ameliorate disturbances directly and indirectly resulting from land development. Conceptual models clearly aid in identifying and defining actions.
- Under this AMP, three types of management actions should be recognized:
  - Full-scale implementation actions for which sufficient understanding of system response and confidence exists related to likely outcomes;
  - Pilot (or demonstration) projects that can help to determine the potential effectiveness of a proposed action; and
  - Targeted research that may be necessary to resolve critical issues relating to species responses to ecosystem structure and function, and likely responses of individual species to specific management actions that attempt to sustain or restore habitat for desert tortoises and other targeted species.
- Monitoring implementation of management actions within and adjacent to the proposed development envelope will occur. Monitoring will provide the information necessary for tracking ecosystem conditions (or health), evaluating progress toward project objectives, and reevaluating (or updating) all features of the adaptive management effort. Where and when monitoring is constrained by limited knowledge of system attributes and function, it is preceded by directed research to reduce key uncertainties.
- Where appropriate, selection of ecological indicators will accompany certain management planning efforts and monitoring and research program development. Indicators will focus on species or other ecological features, and their specific ecological attributes that can perform as response variables, thus be used to assess trends or otherwise measure progress. Indicators will be used to identify "habitat" characteristics that accurately reflect landscape conditions, as well as to assess indirectly the effects of management actions.
- Evaluation and program adjustment will result from the information acquired via monitoring and focused research. Feedback will guide future management planning, project implementation and monitoring scheme design, and will be used to amend the overreaching adaptive management program.

Projects designed to rehabilitate or sustain specific habitat conditions, or to manage individual desired species more directly, will be prioritized according to an assessment process that considers a variety of criteria. Specifically, potential management projects will be prioritized in the following order:

- Projects that will have the largest absolute benefits for the desert tortoise and other species of concern;
- Projects that will provide the most useful information to future management in the Coyote Spring Valley and adjacent lands;
- Projects that will result in the most immediate desired ecosystem and species responses;

- Projects that will be the most self-sustaining; and
- Projects with the greatest support from land and resource management agencies and the public.

Although many substantive features of the AMP remain to be developed through consultations with the applicant, the TAC, and USFWS, several explicit biological goals have been identified in the MSHCP that offer immediate opportunities to link focused monitoring to management actions in an adaptive framework.

9.3.2 Five-Year Management Action Plan

The HCP Administrator, with assistance by the TAC, will use the information presented in this chapter and other pertinent information to prepare a five-year Management Action Plan (MAP) that describes in sufficient detail the spatial and temporal aspects of the AMP in the first of sequential MAPs that will be developed for the CSICL. The MAP will provide guidance that will allow the HCP Administrator to implement the AMP on the ground by addressing issues/questions such as where and when specific management and monitoring actions will be conducted, what methods will be used, what the initial suite of focal species will be, and other relevant management and monitoring options.

The initial five-year MAP, in addition to outlining the AMP actions for the program, will need to demonstrate the ability to accomplish selected management and monitoring tasks with available funding. The following implementation milestones are proposed for the first three (3) years of the AMP:

- The TAC will be established and convened within approximately three months of execution of the IA.
- The HCP Administrator, with assistance by the TAC and in consultation with USFWS and the Corps, will prepare and submit a proposed MAP within 12 months of establishment of the TAC. The initial MAP will include, at a minimum, the following items:
  - Revised or refined conceptual stressor models for key species and resources, as needed;
  - Revised or refined management goals, objectives and strategies, as needed, including “working management thresholds” for management actions (i.e., provisional or “starting point” thresholds for species and habitat management actions);
  - Identification of key uncertainties for effective management and monitoring of the CSICL;
  - Elucidation of an initial set of adaptive management hypotheses to be applied and tested and a description of data analysis methods that will allow for inferences regarding the effectiveness of management actions, including alternative management actions;
  - Prioritization of management and monitoring activities based on the funding available to carry out management and monitoring actions;
  - Selection of the initial suite of focal species;
  - Selection of monitoring locations;
  - Description of field methods for data collection, including identification of sampling locations, variables to be measured, and frequency, timing and duration of field surveys;
  - Description of data analysis methods that will allow for inferences regarding the effectiveness of management actions, including alternative management actions;
  - The proposed method for incorporating the results of the management and monitoring actions as feedback to the conceptual models and resulting revisions to the AMP and any necessary updates to the MAP;
  - Identification, where appropriate, of the types of personnel, professional service needs, contractors, etc.; and
  - Annual budgets for management and monitoring actions.

- The HCP Administrator will submit the draft MAP to the USFWS for review and comment. The USFWS shall promptly review the MAP.
- Requests for Proposals (RFP) will be prepared within 45 days of finalization of the MAP by the HCP Administrator, with an additional 60-day period allowed for issuance of the RFP and submittal of proposals by prospective management and monitoring contractors.
- Proposals are evaluated and selected by the HCP Administrator, with appropriate input from the TAC, within 60 days of submittal date.
- In general, immediate management and monitoring actions would be initiated within 30 days following selection of management/monitoring contractors by the HCP Administrator. Other actions would be initiated per the schedule outlined in the MAP and in response to the dedication schedule.

Initiation of management and monitoring actions pursuant to the initial MAP will begin within one year following finalization of the MAP.

9.3.3 Longer-term Adaptive Management Implementation

Long-term implementation of many of the monitoring activities in the AMP on lands designated for inclusion in the CSICL will be correlated with the impacts resulting from implementation of Covered Activities.

A fundamental concept of adaptive management is that ecological systems must be managed despite crucial uncertainties regarding appropriate actions, and that much of the uncertainty is associated with incomplete information and data. Employing management objectives and conceptual models based on current information, an initial MAP is generated. Out of this initial plan, specific management actions are formulated and implemented. Importantly, uncertainties or "knowledge gaps" are also identified from the initial plan. Based on the level of uncertainties, alternative management actions or "targeted" research studies may be identified. Over time, the results of monitoring and research activities are then evaluated and used to refine the information and data and conceptual models, which then, in turn, are used to modify the adaptive management plan.

As discussed in the previous section, the HCP Administrator, with assistance by the TAC, will prepare a five-year MAP that describes the spatial and temporal aspects of the AMP and will allow direct implementation of the AMP. In the context of the adaptive management approach, the MAP also is intended to be flexible and allow for revisions and modifications to the AMP based on information collected in the field and new independent scientific information that may warrant changes in the AMP. For example, the MAP should incorporate a response action to catastrophic events, such as major floods or wildfires that can dramatically alter the management landscape. Also, the HCP Administrator may find that certain management actions or monitoring observations are providing unexpected and/or obvious results (either desired or undesired) that may require immediate modifications to the MAP. At a minimum, annual field reports will be prepared by the HCP Administrator of management and monitoring actions and associated results, and submitted to the TAC for review, synthesis and comment. In the case of an unexpected or catastrophic event, an evaluation of the event and its impact on the CSICL will be made as quickly as is feasible by the HCP Administrator and submitted to the TAC. Based on the biennial reports, or unexpected and catastrophic event reports, the TAC will evaluate whether the management and monitoring actions and results are consistent with the goals and objectives of the AMP, and, if not, reexamine aspects of the MAP that may need modification. An important feature of the MAP is enough flexibility to allow for short-term management decisions/modifications by the HCP Administrator and TAC based on clear evidence that a particular management action is, or is not, working. The field reports will be compiled into a comprehensive annual report that will be submitted to the EC and the HCP Administrator. The comprehensive biennial report prepared by the HCP Administrator in consultation with the TAC will summarize the field report information, provide a discussion of the results in the context the AMP and make necessary recommendations for modifications of the AMP. Approved modifications also will be incorporated into an updated AMP so that the HCP Administrator has specific information to implement the modified actions.

9.3.4 Data Collection, Storage and Analysis

Data collection, storage and analysis are fundamental components of the HCP adaptive management program. To the extent feasible, the methods will be compatible with those used by other conservation programs so that data sets can be combined and compared at a broader scale and allow for inferences beyond the MSHCP, including, but not limited to the Clark County MSHCP. The specific data collection, storage, and analyses methods will be developed as part of the initial five-year MAP and will involve consultation with other HCP programs.

Field data collection should be automated as much as possible. Currently the most efficient method for field data collection is the use of data loggers, field computers, and/or Global Positioning System (GPS) units, depending on the type of data being collected (e.g., population counts, species composition, spatial information, etc.). GPS units will be required for collection of spatial information that can be input directly into GIS applications for mapping and spatial analyses. The use of data dictionaries can eliminate or minimize personal biases or transcription mistakes in the data set being recorded; the specific hardware and software that will be used will be determined during the preparation of the initial MAP will depend on available funding . Because data management, analysis and reporting can be a substantial portion of the overall budget of a monitoring and management program (see USGS 2004), careful selection of field equipment is paramount for a cost efficient program.

Data storage and management will be standardized to maintain a high level of quality assurance. This includes specific protocols for naming directories, subdirectories and files; e.g., keeping raw data files separate from summary and analysis files. All data files will be accompanied by metadata that describe in detail the data set in terms of who, when, how, what, and where information in the data set. In addition, data will be stored and managed so that it can be shared, as appropriate and feasible, with other conservation programs, and with USFWS. Consequently, the data management should be compatible with the data management methods used by state and federal agencies. At the time the initial AMP is developed, the HCP Administrator will work with the USFWS to develop a data management and storage protocol that, to the extent feasible, is compatible with any system desired by those agencies.

Data analyses will be tailored to the goals and objectives of the HCP; it is anticipated that much of the field data will be analyzed using standard statistical packages. The HCP Administrator and TAC will be responsible for identifying the appropriate analytic software that is appropriate for the management and monitoring data and the questions being posed during preparation of the AMP. Data will be shared with the USFWS and other conservation programs, as appropriate; however, it is not be the responsibility of the HCP Administrator or the TAC to analyze shared data for uses beyond the scope of implementing the MSHCP.

9.4 ADAPTIVE MANAGEMENT PLAN ADMINISTRATION

9.4.1 Roles and Responsibilities for the Adaptive Management Plan

An adaptive management organizational structure that can facilitate management, information gathering, and decision support (as described in Table 9-1 and Figure 9-1) anticipates an Executive Committee, a HCP Administrator; a Technical Advisory Committee and an advisory committee of scientists and other technical experts that will assist in adaptive management by designing monitoring programs, and assisting in interpretation of resulting data. These individuals and committees and their tasks have been initially described in Chapter 8, Plan Implementation. Other required management tasks and monitoring activities may be carried out by consultants, or others practiced in the necessary task skills.

For purposes of the CSI MSHCP AMP, the specific tasks of the HCP Administrator and TAC are described below. These are in addition to other roles and responsibilities for these committees and individuals described in Chapter 8, Plan Implementation.

9.4.1.1 HCP Administrator

Implementation of the adaptive management component of the MSHCP is the primary duty of the HCP Administrator, who will manage and monitor the CSICL (and adjacent federal lands that may be subject to management actions), resources, and species pursuant to the approved MSHCP. The duties of the HCP

Administrator (which were initially described in Chapter 8, Plan Implementation) include, but are not limited to:

- Managing and monitor the CSICL pursuant to the approved CSI MSHCP.
- Preparing, in coordination with the TAC, a five-year Adaptive Management Plan (AMP), which will set forth annual management and monitoring priorities based on resource conditions and the biennial budget submitted to the executive board by the HCP Administrator.
- Consulting with the USFWS and the Corps during preparation of the five-year MAP.
- Issuing RFPs for management, monitoring, and research actions and activities as established by the five-year MAP.
- Overseeing consultant/contractor implementation, and/or self-implementation of the management, monitoring, and research priority tasks set forth in the five-year MAP.
- In coordination with the TAC, interpreting results of management actions, monitoring efforts, and research tasks performed pursuant to implementation of the five-year MAP.
- Reviewing, commenting on, and synthesizing technical studies or reports generated as a result of implementation of the five-year MAP, and incorporate them into biennial consideration of priorities.
- Preparing a public education program for the MSHCP for consideration by the EC.
- Implementing the approved public education program.
- Coordinating with the EC regarding those AMP activities that cross property boundaries (e.g., invasive species control, fire management).
- In coordination with the TAC, preparing a Biennial Report (described under Section 9.1.5: Reporting).
- In coordination with the TAC, preparing a Five-Year Monitoring Report on new information and the condition of conserved species, resources, and lands every fifth year, including an assessment of the monitoring data collected to date in terms of estimates of the status and trend of Covered Species, focal species, and other targeted resources. From the results of report, the HCP Administrator in consultation with the EC will make changes in the management and monitoring program in the preparation of a new five-year MAP.

9.4.1.2 Technical Advisory Committee

Objective review and advice from outside scientists and other technical experts is a key element of the AMP. Scientists, along with the stakeholders and resource managers, play important roles in setting the management objectives for the AMP, and scientists are a primary source of information and data for generating and refining the conceptual models that are the foundation of the AMP. The primary purpose and role of the TAC is to provide assistance in obtaining the best scientific information available so that “effectiveness monitoring” of resources, reserve land, and any federal land subject to management actions under this MSHCP is carried out in accordance with the AMP precepts set forth in this chapter.

The mission of the TAC with regards to the AMP is summarized in the following tasks:

- Assist in the development of a scientifically credible monitoring program that will provide reliable information needed to assess the status and trend of Covered Species, conserved lands, and focal species within the MSHCP area and on select adjacent lands, including consultation with the Desert Tortoise Research and Recovery Advisors regarding technical issues.
- Review the quality and relevance of the scientific and technical information gathered as part of the MSHCP monitoring and research activities, and implementation requirements.
- Contribute to the analysis and interpretation of data from monitoring and research in light of the regulatory requirements of the MSHCP.

- Advise the HCP Administrator, USFWS, and the Corps on scientific matters that reflect on the design, interpretation, or implementation of the AMP.
- Make recommendations for adjustments to the AMP based on review and analysis of data from monitoring and research.

The TAC will meet at least once a year for the AMP, and will be available for technical assistance by telephone or email on an as-needed basis consistent with the other obligations of the Committee members.

An annual AMP budget will be established by the HCP Administrator based on prior year assessment of revenues and any other assured sources of revenues, in accordance with the overall CSI MSHCP budget detailed in Table 8-2. Within the funding framework established by the annual budget, the TAC would:

- Ensure, to the extent possible, that issues relevant to the monitoring of Covered Species, focal species, and other targeted resources (i.e., design, implementation, data analysis and interpretation), as well as land and resource management actions, are scientifically sound and defensible.
- Make every effort to act in a fashion that is neutral with respect to CSI and participating agencies.
- Conduct the process of the design, interpretation, and implementation of the AMP data in a fully transparent fashion subject to the provisions of this section.
- Be responsive, to the extent practicable, to any requests from the HCP Administrator, USFWS, or the Corps, including clarification of TAC deliberations and interpretations of data from monitoring and research.
- Recommend priorities for management, monitoring, and research activities in the CSICL to the HCP Administrator, as applicable, who will make final decisions on priority actions, taking into account the TAC recommendations, USFWS comments, and other considerations.
- Recommend appropriate targets for monitoring, including Covered Species, focal species, and other resources to the HCP Administrator and the EC, where applicable, that may serve to address key environmental conditions pertinent to the goals of the MSHCP.
- Evaluate and recommend sampling approaches and experimental designs to the HCP Administrator, where applicable, to support the monitoring and research program.
- Evaluate and recommend analytical tools, including modeling approaches, for use in assessing available information.
- Assist the HCP Administrator, where applicable, in interpretation of results of monitoring, research, and other data collection activities.
- Recommend management action priorities to the HCP Administrator and/or EC, where applicable, using results from on-site monitoring and other information sources, including responding to “changed circumstances” and “unforeseen circumstances” as defined in federal law.
- Meet with the HCP Administrator and, where applicable, USFWS, and the Corps.
- Review and provide comments on, as appropriate, drafts of consultant Requests for Proposals prepared by HCP Administrator for management, monitoring, and research activities on CSICL.
- Review and prepare evaluations of consultant proposals for the HCP Administrator for carrying out management, monitoring, and research activities on CSICL and adjacent federal lands that may be subject to management actions.
- At least every other year, provide a written assessment of data from monitoring and research in terms of estimates of the status and trend of key resources on the CSICL, covered species, and focal species. From the results of this written assessment, the TAC will make recommendations to the HCP Administrator for changes in the monitoring and research program as needed.

9.5 ADAPTIVE MANAGEMENT PLAN REPORTING

The Biennial Work Plan has previously been discussed in Chapter 8, Plan Implementation, in Section 8.1.6.

9.5.1 Biennial Report

The biennial report will provide at minimum the following information:

- Identification of management and monitoring priorities for the reporting period;
- Updates to the conceptual models for the managed resources;
- The sampling sites and data collected in terms of by whom, frequency, timing and duration;
- A description of the data analysis and results;
- Synthesis/integration of the year's management and monitoring results with previous years as applicable (e.g., analyzing apparent trends, etc.);
- An evaluation of the biennial work plan in relation to achieving or progressing toward the management and monitoring goals established in the MAP;
- Identification of significant problems or successes with the program that may alter the management and monitoring program approach, such as:
  - Whether field protocols or analytic methods are satisfactorily addressing the management/monitoring objectives, and whether sampling or analysis methods need revision,
  - Whether data indicate that a species or habitat is declining at a rate that an immediate, possibly unanticipated action is required, and
  - Whether data indicate an earlier than expected positive response of a species or habitat to an active adaptive management action, such that continued testing is unnecessary or becomes a lower priority;
- An overview of the status of the CSICL and resources;
- A description of AMP activities conducted during the previous two years;
- An evaluation of any significant issues encountered in the management of CSICL and conserved resources during the previous two years (including a description of the proposed resolution strategy for each issue);
- An assessment of data from monitoring and research collected to date in terms of estimates of the status and trend of Covered Species, focal species, and other targeted resources and;
- A description of the changes to the management and monitoring program, if any, to be undertaken as a result of the assessment of the monitoring data per the above;
- Summaries of funding received;
- Expenditures made by the HCP Administrator during the previous two years in satisfaction of the obligations of CSI under the MSHCP;
- Suggested changes/revisions to the MAP based on the points listed above;
- Suggested management and monitoring priorities for the coming two-year period; and
- Suggested revisions to the next two-year budget based on the above factors, if necessary.

The Biennial Report will be prepared and submitted to the HCP Administrator on or before December 1 of each even-numbered year, and shall be transmitted by the EC to the USFWS by December 15 of that year.

9.5.2 Comprehensive Review

The EC, with input from the HCP Administrator and the TAC, will coordinate preparation of a comprehensive "State of the Habitat Reserve" every ten years. The ten-year Comprehensive Review will replace the biennial monitoring report in years of overlap, but will evaluate the effectiveness of the AMP by drawing on the full set of data collected to that point. The ten-year Comprehensive Review will examine the cumulative data collected for species or habitat trends, summarize the results of management actions, and integrate results with available information from beyond the CSICL, such as from other conservation programs in southern Nevada and southern California. It is anticipated that preparation of the Comprehensive Reviews will require substantial coordination with and input from the TAC in order to take advantage of additional scientific information and "gray" literature that may not be readily available to the HCP Administrator. The Comprehensive Review will provide the basis for updates to the MAP, including the conceptual models, management and monitoring techniques, prioritization of future management and monitoring actions, and funding needs.

The Comprehensive Review will include the following:

- An assessment of implementation of conservation measures in relation to the schedule and level of effort outlined in the CSI MSHCP.
- An assessment of the level of take in relation to the amount requested in the MSHCP.

Based upon the Comprehensive Review, if the outcome associated with the potential effects and conservation measures has a significantly greater impact on species than the level described and assessed in the CSI MSHCP, the USFWS will notify CSI of the need to implement additional conservation measures.

9.6 MONITORING EFFORTS

9.6.1 Compliance Monitoring

The adaptive management effort includes conservation measures that are called out in Chapter 6, Conservation Measures of this CSI MSHCP. Those measures are mostly of types that require assessment of compliance only. Those actions include avoidance measures related to the construction activities near the Pahranagat Wash and placement of select lands adjacent to the wash in conservation easement status; payment of per-acre mitigation fees as development is initiated; maintenance activities to reduce fuels and sustain firebreaks; best management practices to reduce establishment and spread of invasive plants and animals that might be introduced from developed to natural lands, and practices that reduce deleterious effects from ground disturbance activities, and provide sediment and erosion control; translocation actions to remove select animals from harms way; and tortoise-proof fence construction between developed and CSICL, and along U.S. Highway 93 and State Route 168.

As noted above, most actions detailed under "Conservation Measures" above require simple compliance monitoring, hence are not elements in the AMP. Compliance Monitoring will be coordinated by the HCP Administrator and will include the following:

- Assisting in coordinating the operations and AMP elements of the overall HCP;
- Soliciting and summarizing the receipt, expenditure, and transfer of funds;
- Accounting for the location and amount of impacts on Covered Species, focal species, and other targeted resources;
- Accounting for use of NDOW protocols for banded Gila monster and USFWS protocols for western burrowing owl;
- Accounting for lands added to the CSICL; and
- Summarizing actions related to assembly, management, and monitoring of the CSICL.

9.6.2 Effectiveness Monitoring

A variety of other Conservation Measures will be assessed in an adaptive management program using effectiveness monitoring in a valid experimental approach. In certain cases, pilot studies will need to precede monitoring to allow identification of appropriate response variables, selection of effective surrogate species or resource parameters, and to validate sampling design. Pertinent data on desert tortoise population dynamics are limited, such as the species' response to environmental stressors. The CSI MSHCP will fund focused research as a component of adaptive learning (see below). Four categories of monitoring and research will support the

AMP – (1) effectiveness monitoring of conservation measures where direct measures will allow assessment of implementation, (2) effectiveness monitoring where surrogate species or other environmental parameters can provide valid indirect measures of implementation success, (3) focused monitoring of individual target species, including those identified as covered, or those for which responses to environmental stressors are well documented, and (4) research related to species or ecological community responses to identified environmental stressors, which can be applied to future land management and mitigation actions on or adjacent to CSI lands.

These tools will be applied in an adaptive framework to inform conservation measures and other actions under the MSHCP to address management actions to conserve covered species, other targeted species, and key resources that support and provide suitable habitat conditions for those species. Specifically, monitoring and research efforts will be designed to assess responses of desert tortoise and co-occurring species to the creation of new urban edges in previously natural landscape areas; responses by individual tortoises and the Coyote Spring Valley population to fenced construction along highway corridors, and to newly available free-access culverts under roadways; responses of natural vegetation and animal communities to wildfire, and pre and post-fire treatments; responses of vegetation and wildlife to expansion of already-present and newly introduced invasive plants; changed dynamics of tortoises in areas subject to introduction of juveniles in efforts to supplement the population; assessment of habitat use, development of habitat models, and assessment of population status and trend for desert tortoise, banded Gila monster, western burrowing owl, and other select species; identify effects of recreational use of open space areas associated with increased natural predators, pets, construction, roadway mortality, and other human uses of the landscape.

9.6.2.1 Near-Term Baseline Monitoring

Priority actions concerning the vegetation database for CSICL within the first two years following execution of the IA will include developing a vegetation map for CSICL and appropriate adjacent lands, and an evaluation of the completed map. The CSICL vegetation map will be evaluated no earlier than the end of year 2008 using color infrared aerial photography (digital orthophotos, 1-meter resolution), or an available equivalent imagery. As additional lands are transferred into the CSICL, the accuracy of the vegetation map for these areas will be evaluated and incorporated at the next five-year interval for updating the vegetation map.

Focused research activities will be initiated within one year of the issuance of the 10(a) permit. These activities will in part be carried out within the experimental framework of species and resource monitoring that will inform the release of the final lands for development after year eight (see the Implementation Agreement). The TAC will recommend to the HCP Administrator a set of priority (including surrogate) species for monitoring during the first year of the AMP program. Selected initial monitoring activities will involve consideration of (1) impacts resulting from Covered Activities, (2) other data needs that can facilitate the conservation of targeted species, and (3) projected generation of funding for the AMP.

During the first three years following execution of the IA of the MSHCP, two actions will be initiated to commence implementation of the AMP -- preparation of the first five-year Management Action Plan and initiation of resource management on a limited basis within portions of the CSICL. Among those initial actions will be an invasive species control program involving reconnaissance surveys to verify (or identify) the most important areas for initial invasive species control efforts; with limited invasive controls implemented on an as-needed basis. This planning period also will allow the HCP Administrator and TAC to assess the invasive species issues and incorporate well-informed control strategies into the first five-year MAP.

Effectiveness Monitoring and supporting research evaluates the environmental effects of permitted management actions to determine whether the HCP is achieving the biological goals and objectives established consistent with Five-Point policy, thus it serves as the information-gathering tool in support of adaptive management.

The key elements for Effectiveness Monitoring of the MSHCP will include:

- Management and monitoring of resources, including assessment of the extent to which goals and objectives detailed in the conservation measures chapter are met, at three fundamental scales: (1) natural landscape mosaic; (2) specific vegetation community (including subcommunities and "habitats"; and (3) species and species assemblages, with emphasis on desert tortoise and other covered species;

- Use of a stressors-based adaptive management concept, including the use of focal species and habitat conditions monitoring to identify stressors that must be addressed in order to maintain the effectiveness of the long-term management program;
- Preparation of implementation plans, including the biennial work plan and five-year MAP;
- Biennial reports prepared by the HCP Administrator, with assistance by the TAC;
- Public review of the biennial reports prepared by the Administrator; and
- A comprehensive report from the HCP Administrator and the TAC every ten years.

9.6.3 Management Categories and Effectiveness Monitoring Needs

Six categories of actions have been identified as elements in the overall plan to avoid the take of covered species, to minimize take where it cannot be avoided, and to mitigate for expected impacts:

- Fencing
- Culverts
- Rehabilitation of severely disturbed lands (e.g., restored washes)
- Invasive species control and management
- Addition of banded Gila monster and western burrowing owl as Covered Species
- Actions related to pre-construction clearance surveys, development of a captive-breeding and translocation program, and recovery-related research

Below, each of these actions is identified with goals and objectives of those actions, impacts are briefly described, minimization and/or mitigation measures are proposed, and a monitoring program is described in general terms. The local and regional objectives of the MSHCP related to the desert tortoise are indicated parenthetically, although benefits to other target species are also intended.

First, CSI will directly mitigate its take of tortoises and habitat by contributing to a program to build tortoise fencing along U.S. Highway 93, State Route 168, and the Kane Springs Road.

The goal is to reduce vehicle-caused mortality in all age classes of desert tortoises. The objective of the action is to implement a fencing construction program.

In order to quantify the effectiveness of this fencing program, monitoring efforts at multiple locations will be required before fences are constructed as well as subsequent to fencing. Monitoring should be conducted in an experimental framework as described below. The experimental design will be enhanced or adjusted as necessary throughout the project. Results of this project will feed into the adaptive management framework, such that techniques in fence construction, damage patrol, repair, and tortoise population enhancement along fenced roads will reflect the best available information.

Second, CSI will develop a culvert system that will encourage dispersal of wildlife species under roadways between open spaces in the vicinity of the CSI development, and on other designated offsite areas of impact that otherwise serve as barriers to movement.

The goal of this effort is to eliminate to the extent practical barriers to wildlife movement posed by major roads in the Covered Area. It is considered to be important to maintain connectivity between habitats supporting existing tortoise populations, as well as habitats that support other species. An objective is replacement of existing culverts on select portions of State Route 93 and, when required by the Nevada Department of Transportation, construction of new culverts that provide day-lighted passages at sizes adequate to accommodate various mammals (such as coyotes) and encourage movement by desert tortoises and other reptile species, small mammals, and invertebrates.

The effectiveness of culvert replacement efforts will be monitored using trip photography, track plates, or other technologies appropriate to species expected to use such passages. Sample design will focus on culverts subject to replacement using extensive before and post-action data collection to assess effectiveness. Surveys will be taken for at least three months before culvert replacement (up to a year where possible.) Post-construction surveys will be carried out during appropriate seasons for a minimum of three years.

Third, CSI will rehabilitate severely disturbed lands in the development area (i.e., reconstructed washes) that will not be developed.

The goal of rehabilitation efforts is to restore currently degraded areas of low-elevation desert scrub within the CSICL and all adjacent ACECs. The objective of restoration actions is to establish and sustain dominant woody vegetation in currently disturbed areas with species composition and densities similar to those found on adjacent less-disturbed and undisturbed land.

Certain disturbed areas within the CSICL and on adjacent ACECs will be rehabilitated, including the “southeast corner” (the degraded State Route 168 turnout, where old U.S. Highway 93 is accessed) and portions of old U.S. Highway 93, which will be included in CSICL; other select tracks and traces; and select open space areas that may be temporarily disturbed during construction activities. Techniques will include those used by the BLM to restore landscape areas disturbed during access and construction activities within power-line right-of-ways, which emphasize rehabilitation of dominant scrub vegetation. Where possible, topsoil with mycorrizal innocula and cryptogrammic crust elements will be imported from adjacent developed areas. Vegetation sampling and assessment techniques should be compatible with those used on surrounding public lands, but enhanced to record subdominant vegetation, including native annual and non-native invasive species. Where suitable, an experimental framework will vary restoration treatments, including scrub community composition, plant density, plant sizes at planting and/or seed mixes, soil conditioning, and post-outplanting treatments, including water application and weed removal.

A monitoring design will track vegetation response in select rehabilitated areas and focus on areas with varied treatments. Rates of mortality and growth of dominant vegetation will be assessed at select sites. More detailed data will be gathered from multifactorial treatment plots, including data on dominant woody vegetation, and on subdominant native and non-native plant species that are out-planted or invade from adjacent wildland areas. Measurements will be taken at least every other year, over a period of at least a decade, and should include measurements after significant seasonal and monsoonal events to assure germination and the subsequent fates of all plants are recorded.

Fourth, CSI will contribute to controlling non-native species and prevent the spread of non-native plants and animals onto adjacent lands.

The goal is to suppress non-native animals and plants that might establish within the development envelope, keep those species from spreading into undeveloped natural areas of Coyote Spring Valley, and reduce the possibility of native species that currently inhabit the valley from spreading into or otherwise “naturalizing” within the development envelope. Objectives include installing barriers such as fences, and substrate barriers and boundaries to enclose the footprint of the CSI Development. CSI will implement a weed control and monitoring program for the development boundary areas.

Fence, and substrate barriers and boundaries will enclose the footprint of the CSI Development, where feasible. Monitoring for invasive (and normalizing) species will be carried out over the life of the plan. Assessments will include, but not limited to, small mammals, select invertebrates (with attention to argentine ants, sowbugs, earwigs, and other invasive insects), and weedy plants (including red brome, cheat grass, splitgrass, Sahara mustard, and species recognized as noxious by the state). Baseline conditions will be assessed on both sides of proposed development boundaries before barrier construction and at select locations on open space and developed land boundaries within the development envelope. Monitoring will use techniques appropriate to those taxonomic groups at the geographical (spatial) scales at which undesired species are likely to impact natural lands, with samples taken at predetermined distances both inside and outside development boundaries. Sampling will be more intensive around physical features that are likely to serve as corridors for egress or ingress of species, including roadways and wash situations.

Fifth, CSI includes two additional species, beyond the desert tortoise, on the MSHCP covered species list – banded Gila monster and western burrowing owl – and also intends to consider additional species that are present in significant numbers on the CSICL and adjacent lands, that are likely to be impacted by land development, and might potentially benefit from mitigation actions in the Development Area, the CSICL, or adjacent public lands.

CSI will develop GIS-compatible distribution maps of select members of plant and animal taxonomic groups that meet the criteria listed above. Species to be evaluated include the Evaluation Species identified in Chapter 3, Covered Species and Habitat. The objective is to inventory and survey for sensitive plant and animal species to assess their distributions and relative abundances on the CSI CSICL and on adjacent ACECs.

Surveys on CSI lands, including CSICL, and surrounding public lands will use well-established techniques. All records will be transferred to the Clark County MSHCP and Nevada Program databases, and data collected on public lands managed by BLM will be provided to the appropriate BLM office. All surveys will record presence as well as absence records. Sampling will be done using stratified random sampling techniques that recognize soil type, vegetation community subtypes, topographic and elevational diversity, and other appropriate physical and biotic predictor variables. For confirmed occurrences, data will be gathered to satisfy established database needs, and where appropriate will include a broader array of taxon-specific environmental correlates of habitat occupancy.

Sixth, actions related to pre-construction clearance surveys, development of a captive-breeding and translocation program, and recovery-related research are described under the research opportunities for desert tortoises in the sections below.

9.7 CONSERVATION AND RESEARCH OPPORTUNITIES FOR DESERT TORTOISES ON CSI AND ADJACENT LANDS

The AMP depends on the input of information gathered by research and monitoring to evaluate whether the goals of the program are being met and to identify where management needs to be adjusted to better meet those goals. Given a primary focus of the MSHCP on desert tortoise conservation, the remainder of this chapter outlines areas of research critically necessary 1) to address key uncertainties related to those threats that are believed to be most relevant to tortoises in Coyote Spring Valley, 2) to fill fundamental gaps in knowledge of tortoise ecology necessary to mitigate threats and enhance population sizes, and 3) to achieve the range-wide objective of increasing knowledge and an ability to advance species recovery.

9.7.1 Head-starting and Translocation Program

Reduced population densities of tortoises in many areas of the species' range appear to be caused by excess mortality from many sources, including poaching, mortality on roads, and stress-induced immune disease. The 1994 Desert Tortoise (Mojave Population) Recovery Plan suggested a number of means to reduce excess mortality, but those prescriptions have not been implemented in ways that have produced discernable benefits to tortoise populations. To date management efforts to relieve threats have not resulted in greater recruitment. A head-starting program can serve to by-pass high mortality associated with the vulnerable hatchling stage, thereby augmenting populations. This program will also provide animals for release in management-based experiments described later.

A head-starting program requires a "hatchery" and rearing facilities. A portion of the DTCC and/or CSCC can be used as a hatchery/rearing facility. Pens must be made to secure tortoises from mixing so that unique genotypes from source populations can be maintained. Rearing efforts should provide food in excess, so that growth rates are enhanced. Proper husbandry would allow neonates to grow to 100 mm (the size at which ravens are believed to not be effective predators) in as little as three years. Thus, rearing facilities need to be large enough to house three cohorts of juveniles in order to sustain production of three-year-old tortoises.

9.7.2 The Importance of Roads on Tortoise Populations

In addition to indirect impacts of paved roads on tortoise populations, such as fragmentation, paved roads impose a direct threat of mortality by motor vehicle. The construction of tortoise-proof fencing along paved roads is often recommended as a way to abate this threat. Boarman and Sazaki (1996) found fewer tortoise carcasses along fenced sections of highway than they found along unfenced sections. Hoff and Marlow (2002) inferred negative effects of roads from a paucity of tortoise sign near roads; however, unequal sampling at different distances from the road could have biased the results of their analysis. A meta-analysis of Hoff and Marlow's data and those from an unpublished dataset (Baepler et al. 1994) focused on data that include only those from equal sampling in relation to distance from roads. This meta-analysis confirmed that amounts of tortoise sign are consistently lower near nine paved roads and highways, but that there was no reduction in sign near Interstate 15. Nussear (pers. comm. 2005) has indicated that his research group also found high densities of tortoises in one location adjacent to Interstate 15 near Barstow, California.

The hypothesis that habitat adjacent to a road becomes more suitable for occupancy by desert tortoises following fencing remains untested. The assumption that fencing roads will increase local tortoise densities and eventually positively affect recruitment and population size has not been investigated. It is possible that roadside habitat could be a population sink due to factors such as pollution from motor vehicles, increased densities of predators, spread of nonnative plants, increased fire risk, or easy access to poachers. In addition, simply fencing a road may not be the only action needed to affect tortoise populations that have been depleted for years. Fencing in combination with actions such as translocations of tortoises or habitat restoration may be needed to achieve the desired conservation effect.

Because the CSI property will be cleared of tortoises, this clearance will be coupled with mapping all tortoises, tortoise sign, and pertinent physical and biotic environmental parameters in spatial relation to U.S. Highway 93 and State Route 168. Detailed analyses could be conducted in parallel to fence-related data collection. Through surveys of designated plots along U.S. Highway 93 before and after fencing, the efficacy of fencing highways to recovery efforts for the desert tortoise can be examined. Questions to be addressed include the following: Does density of desert tortoises in habitat adjacent to highways change after fencing is installed? If so, over what time frame is the change observed? Do resident adult tortoises from nearby areas move into the habitat after fencing is installed? Is the fenced habitat able to support tortoises sufficiently, such that young tortoises are recruited into the population? Do tortoises that occupy areas near fenced highway experience mortality rates different from those far from highways and different from those in unfenced areas near highways? How do rates of traffic affect tortoise densities adjacent to paved and unpaved roadways? The presence of culverts and how culverts are used by tortoises should also be factored into these questions.

Many metrics to evaluate patterns of roads and routes exist. Roads can be grouped according to the aspect of landscape pattern measured: area/density/edge, shape, core area, isolation/proximity, contrast, contagion/interspersion, connectivity, and diversity (McGarigal et. al. 2002). Linear network pattern analysis may prove analytically useful (Forman 1995). While not an exact measurement of fragmentation, road density (the number of miles or kilometers of roads per unit area) is often used as a surrogate for desert tortoise habitat fragmentation, although other quantitative metrics for evaluating landscape fragmentation must be considered in context, including mean habitat patch size, number of patches, edge density, landscape shape index, and more. (These measures are often correlated with changes in the composition of native perennial plant communities, as well as changes in the relative presence of exotic and native annual plants, which may in turn have influences on the diets of tortoises, reinforcing the interactive nature of threats.)

9.7.3 Habitat Modeling for Tortoises in Coyote Spring Valley

Habitat models will be necessary to inform experiments in Coyote Spring Valley. Tortoise clearance activities should be coupled with careful collection of data on tortoise sign, vegetation, and landscape physical features (independent variables), in relation to tortoise density (dependent variable). Thus, a scientifically defensible map of independent variables must be constructed and related via multivariate statistics (any number of possible analyses of data of this type are available) to tortoise densities (or data on presence and absence).

The effects of spatial scale on the determination of presence or absence of tortoises in association with habitat parameters should be investigated, with collaborative efforts by existing modeling projects where available. The USGS is currently creating a habitat model for desert tortoises throughout their range using datasets at 250 m and 1-km resolutions with predictor variables that include topography, soil (texture, age and structure), geomorphology, climate, perennial plant distribution, and annual plant productivity (Gass et al. 2004). The measurement of these habitat parameters at several scales of resolution can aid efforts to examine the scale at which different habitat parameters predict occurrence or absence of tortoises, and can provide opportunities for collaboration in range-wide habitat modeling efforts. Where possible, historic information should be collected to aid in the interpretation of the current tortoise distribution and habitat conditions in Coyote Spring Valley. Anthropogenic factors also may have current and historic impacts on tortoise densities in Coyote Spring Valley. Data on traffic levels on the existing and historic highways, as well as grazing histories would be helpful in determining those factors on the current conditions.

Juvenile tortoises with the same genetic constitution as tortoises in Coyote Spring Valley should be generated at the DTCC and/or the CSCC to contribute to conservation efforts. At the same time, baseline tortoise densities should be ascertained at multiple sites in areas of varying spatial extent, and potential translocation sites for tortoises should be identified. Juveniles of different ages (or sizes) should be released into the CSICL, as well as adjacent, historically occupied federal lands (including those lands that have been restored following fire events). Tortoises should be marked, tracked, and measured periodically to assess their movements, bodily growth, health status (including susceptibility to disease following the stress of relocation), and survivorship in relation to important habitat variables identified from the habitat model. To gain the most power to test the effectiveness and efficacy of head-starting efforts, releases of juveniles into areas of widely diverging habitat quality will be necessary. Releases of different size classes of juvenile tortoises should also be attempted to determine if there is a size threshold beyond which the survival of head-started tortoises is elevated.

9.7.4 Surveys to Map Densities of Tortoises within Coyote Spring Valley

This CSI MSHCP offers an opportunity to contribute to regional and range-wide recovery of the desert tortoise by supporting efforts to assess tortoise densities in the surrounding region and by initiating head-start efforts in areas that provide suitable habitat. To do this properly, an intensive assessment of presence/absence and density of tortoises within Coyote Spring Valley is required. It is critically important to determine which areas within the valley contain moderate to high densities of tortoises and to assess those locations where tortoises simply exist in lower densities. If low-density areas are sparsely populated due to poor habitat, this should be determined. If stochastic processes not related to habitat are the cause of local low densities of tortoises, then these areas could be targeted for experimental releases of head-started tortoises. This assessment should be integrated with local habitat modeling and will benefit by refining estimates of tortoise density with indirect measures, described below. Population modeling is needed to assess the viability of population fragments that will result from urban development within Coyote Spring Valley; management should be directed to meet the goal of sustaining a viable population within the valley.

Current methods for estimating density of desert tortoise populations rely exclusively on counting live tortoises. The use of indices to estimate wildlife population sizes or density has been discouraged due to uncertainties (or unfounded assumptions) about the relationship between the index and the population parameter, high sampling variance, and a lack of validation, which is necessary during each year of survey (Anderson 2001, 2003; Thompson et al. 1998). Krzysik (2002), however, has used estimates of tortoise sign (burrows and scat) at decreasingly smaller spatial scales to calibrate local tortoise density estimated for the entire landscape. This method provided a distribution surface of relative tortoise densities across the landscape. Application of this concept or similar methods would contribute to other research opportunities and local habitat modeling for tortoises in Coyote Spring Valley, as well as providing a template for mapping densities of tortoises in Coyote Spring Valley and adjacent areas.

9.7.5 Ecological Implications of Fire and Habitat Restoration after Fire

Wildfire may already have had devastating effects on tortoise populations in Coyote Spring Valley south of the MSHCP site. It would be useful to study: 1) the effects of fire on seed banks and forage plant communities; 2) the effects of depleted shade resources on tortoises during activity periods and on their subterranean burrows; and 3) the effects of fire-induced habitat fragmentation on local populations and the loss of landscape linkages from fires on metapopulation persistence.

Herbaceous annual and perennial plant species comprise most of the diet of desert tortoises in the Mojave Desert (Esque 1994). Mojave Desert fires can greatly reduce that vegetation by incineration (Minnich 1986), and seed banks of annual plants in the Mojave Desert can be reduced 40 to 60% by a single fire, causing the plant community composition to shift from dominance by native annual plant species toward dominance by alien annual plant species, such as red brome (*Bromus madritensis*), cheatgrass (*Bromus tectorum*), splitgrass (*Schismus* spp.), and filaree (*Erodium cicutarium*) (Esque 2004). Although the nutrition found in alien annual grasses is comparable to native annual grasses (Nagy et al. 1998), a diverse diet is likely to provide a better nutritional balance for tortoises.

Post-fire surveys have shown that the immediate effects of fire on desert tortoise populations can be severe when fires occur during the tortoise's active season (Esque et al. 2003). Desert fires can reduce the structure and species richness of plant communities in the Mojave Desert (Duck et al. 1995, Brooks 1999, Esque 2004); however, no quantitative information is available concerning the effects of fire and subsequent habitat change on desert tortoise populations. For resource managers to understand how to manage landscapes to the benefit of desert tortoises, it would be useful to understand better the ecological implications of fire. A better understanding as to whether tortoises are stressed by fire-induced habitat changes would be helpful in addressing the ecological implications of fire. Managers need to know: 1) Do tortoises occupying recently burned areas alter their movements and activities in response to the loss of perennial vegetation and the change in the annual plant community? 2) How does the health and condition of tortoises living in burned areas compare with that of tortoises in similar, but unburned, habitats nearby? Do burned habitats offer opportunities to acquire food, water, and cover from environmental extremes as well as unburned habitats? 3) Do tortoises of all sizes respond to such habitat changes in a similar way? One well-designed experiment could answer all of these questions.

Restoration techniques have generally focused on desert perennial plant species, with little attention to the annual plant community – until very recently. Studies designed to learn about desert seed bank dynamics would be useful for understanding desert restoration. The ecological implications of the restoration of perennial vegetation relative to annual vegetation (i.e., food plants for tortoises) need to be established. Ideally, tortoises require both of these resources to persist in habitat that has been burned, but the relative importance of each has not been investigated.

This research should be initiated whenever opportunities present themselves in Coyote Spring Valley and in critical habitat areas that surround it. Recent burns that have occurred in the southern portions of the valley should be considered as providing potential research opportunities, and experimental translocation of animals into these areas in association with restoration efforts would provide valuable data on the responses of tortoises to burned and restored habitat. Coordination with active and future BLM efforts on reseeding and restoration should be pursued.

9.7.6 Paired Experiments to Address Threats Management

The CSI project provides opportunities to test the effectiveness of best management practices to mitigate threats to tortoise populations. These experiments could be set up as replicated, "paired" treatment/control plot experiments. Replicated pairs of fenced plots of perhaps five hectares could be constructed in Lincoln County (an area not scheduled for immediate development). In plots, responses to various treatments could be tested, such as:

- Annual grass-specific herbicide treatments to destroy alien annual grasses. An experiment could test the hypothesis that ridding parts of the desert of alien annual grasses might benefit the nutrition and subsequent reproduction in desert tortoise populations, decrease the prevalence of exotic grasses in the seed bank, provide a concomitant reduction in the incidence of fires, and ultimately increase recruitment in tortoise populations.
- A restoration treatment to test the effectiveness of habitat restoration techniques involving seeding of native annual plants. This would allow testing of the hypothesis that native annual vegetation is beneficial to the nutrition, physiology, and reproductive ecology of desert tortoises.
- A restoration treatment to test the effectiveness of habitat restoration techniques involving native perennial plants. The treatment could test the importance of native perennial vegetation on the behavior and activity of desert tortoises. Properly organized, an experiment would help determine the relative importance of vegetation structure and composition in sustaining desert tortoises.
- An irrigation treatment to test the possibility that enriching the desert with water could create "source" areas of tortoise populations that would generate surplus progeny that can be used to maintain populations in Coyote Spring Valley. Such an experiment would bear on the potential and efficacy of creating source areas as a management option in some Desert Wildlife Management Areas (DWMAs).

In paired experiments, experimental populations would be constituted. Physiological indicators (e.g., growth, health status) would be combined with demographic indicators (e.g., reproduction, age-specific survivorship) to assess the population response to treatment effects. All plots would include appropriate identified habitat covariates identified from the habitat model.

9.7.7 Staging Management and Research Activities

The previous section described the most important research opportunities and questions relevant to desert tortoises and the CSI development. The section below outlines specific actions necessary to efficiently address these questions and to guide implementation of the research. Short-term actions are those, in particular, that should be implemented within the first 12 months of program initiation.

9.7.7.1 Head-starting and Translocation Program

Short-term actions needed to establish a head-starting program capable of producing juvenile tortoises for release in translocation and management research projects within three to four years include:

- Building infrastructure for breeding and nurturing pens for tortoises, sufficient to maintain genetic isolation, at the DTCC and/or the CSCC.
- Collecting adult tortoises in the path of urbanization to add to a breeding colony at the DTCC and/or the CSCC.

Mid- to long-term actions for this research/management activity include:

- Releasing tortoises of different ages as a means to assess the probability of success in a head-starting/translocation program.
- Conducting repeated surveys of released tortoises to assess mortality, growth, and health of experimental tortoises.
- Enhancing adult populations in managed areas. This might include direct translocation of adults from areas in which the tortoises could be harmed, to areas in need of new adults. Regardless, this effort needs to begin with surveys to determine which areas are suitable to receive translocated or head-started tortoises and which areas could become source populations for the DWMAs (see below). Both objective and subjective measures will need to be considered in moving animals. This effort must be combined with research to discern the distribution and abundance of unique genetic population segments in efforts to preserve natural strains of tortoises in managed areas.

9.7.7.2 Assessing the Impacts of Paved Roads to Desert Tortoises

Short-term actions necessary to assess the impacts of roads to desert tortoise populations are listed below. Study-site selection should consider potential future highway widening projected within the area. They include:

- Clearing tortoises from CSI property and mapping all tortoises and sign in relation to highways.
- Choosing study sites in areas that will be fenced along U.S. Highway 93 in Coyote Spring Valley, conducting surveys at those sites to detect tortoise sign, marking resident animals prior to fencing.
- Choosing control sites in areas that will not be fenced along U.S Highway 93 in Coyote Spring Valley. Conducting surveys of these sites concurrent with those conducted on sites to be fenced.
- Coordinate with Clark County and appropriate agencies on timing and location of fencing along U.S Highway 93, State Route 168, and Kane Springs Road.
- Identifying culverts to integrate with fencing to provide habitat connectivity across roads.

Mid- to long-term actions for this research/management activity include:

- Determining and implementing a sampling schedule for all sites after fencing of roads has been completed. Include surveys for tortoise sign and record movements of marked resident tortoises.
- Implementing translocation action and head-starting tortoises in areas deemed appropriate for these conservation actions.
- Apply data from required traffic studies along U.S. Highway 93, State Route 168, and Kane Springs Road, as CSI urbanization progresses.

9.7.7.3 Habitat Modeling

Short-term actions necessary to facilitate habitat modeling for tortoises in Coyote Spring Valley include:

- Identifying vegetation and physiognomy variables for input into the habitat model.
- Collecting data identified in the above step as tortoises are cleared from development areas. These data need not be collected at the time of tortoise clearances, but they should be collected before any subsequent disturbances.

Mid- to long-term actions for this research/management activity include:

- Constructing, validating, and refining the habitat model.
- Translocating and monitoring juvenile tortoises in habitat areas with diverse characteristics.
- Employing the habitat model with various other projects, such as head-starting, habitat restoration, etc.

9.7.7.4 Surveys to Map Densities of Tortoises throughout Coyote Spring Valley

Short-term actions initiating the mapping of tortoise density throughout Coyote Spring Valley include the following, (although this effort is expected to extend at least through the mid-term):

- Conducting computer simulations designed to assess the importance of contagious dispersion to affect our ability to estimate population densities and to assess presence/absence in tortoise populations.
- Implementing intensive transect sampling surveys throughout Coyote Spring Valley in Spring 2008. The same methods as used in current range-wide monitoring may be adequate, but must be carried out with at least twice the density of transects. It may be necessary to stratify the sampling area into places where tortoises are likely to be found in moderate to high numbers, and places where tortoises may be expected in lower numbers. Surveys need to be designed to assess presence and absence, but also to assess the densities of clusters of tortoises should they be found in clusters.
- Assuming twice the density of transects as surveyed during normal range-wide monitoring, consideration should be given to modifying data collection on the supplemental transects to quantify sign (burrows, scat, carcasses) through distance-sampling methods.

9.7.7.5 Refining Estimates of Tortoise Density with Indirect Measures

Short-term actions to refine tortoise density-estimation techniques include:

- In all areas where tortoises are cleared within the Clark County parcel, any tortoise sign (e.g., burrows, scat, carcasses) should be quantified and mapped. These data need not be collected at the exact time of tortoise clearances, but they should be collected before any disturbance to the land by machines.
- Considering quantifying sign by adjusting for incomplete detectability through removal methods in randomly located plots (Thompson et al. 1998) or through distance sampling (e.g., Krzysik 2002).

Mid- to long-term actions for this research/management activity include:

- A study design should be developed for sampling (and modeling) tortoises and sign beyond the immediate clearance areas within Clark County.
- Sign should be used in multivariate statistical modeling to build a model of tortoise density in relation with sign.

9.7.7.6 Evaluating the Ecological Implications of Fire and Habitat Restoration

Fire- and habitat-restoration research should be pursued opportunistically, beginning as soon as possible and continuing into the long term. In the short term, general study designs should be developed to address research topics discussed under Research Opportunities for Desert Tortoises at CSI so that implementation can begin as appropriate opportunities present themselves.

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CHAPTER 10

Cumulative Effects

Chapter 10: Cumulative Effects

This section considers the past, present, and future projects authorized or under review, that are considered to contribute to the cumulative loss of Covered and Evaluation Species and their habitat.

10.1 INTRODUCTION

Cumulative effects under the ESA include the effects of future state, tribal, local government, or private actions that are reasonably certain to occur within the action area of the federal action subject to consultation (50 CFR 402.02). Future federal actions that are unrelated to the Proposed Action are not considered because they require separate consultation pursuant to Section 7 of the ESA. While the USFWS does not have the authority under Section 7 of the ESA to affect private actions, any such action resulting in the incidental take of an ESA-listed animal species requires the issuance of an incidental take permit from the USFWS.

The definition of a cumulative impact or effect under NEPA differs from that under the ESA. Under NEPA regulations, a cumulative impact or effect is defined as "…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions" (40 CFS 1508.7). The proposed action will contribute to "take" of Covered Species and/or their habitat in the region when added to incidental take permits and incidental take statements that have been, or will be issued by the USFWS for other projects. Cumulative impacts as defined under NEPA regulations are evaluated in the CSI Planned Development Project EIS (ENTRIX et al. 2007).

Some projects are not related to the proposed CSI Development in Lincoln County, but may cumulatively contribute to effects on sensitive species and their habitat. For example, it is reasonably certain that development on non-federal lands in Lincoln County will occur, as the adjacent Clark County, Nevada, is one of the fastest growing counties in the United States. Outside of Las Vegas proper, North Las Vegas, Mesquite, and Henderson represent some of the fastest growing areas in Clark County, and the Moapa and Moapa Valley area also growing rapidly. Furthermore, CSI is creating a new town, consisting of a master planned community, in Clark County, directly adjacent to the CSI development in Lincoln County. The incidental take permit for this development was issued under the Clark County MSHCP (RECON 2000).

Some actions or projects may be implemented to support the CSI development in Lincoln County, but will be evaluated under separate ESA Section 7 consultations, and are therefore not covered in the CSI MSHCP. For example, activities related to the production and delivery of water to the CSI Development Area in Lincoln County, as well as electricity and natural gas, will be covered by separate ESA consultations. These activities are assessed as cumulative effects. In some cases, certain utility infrastructure projects that will serve both the CSI developments in Lincoln and Clark County, and in some cases other development projects, will be addressed in their own, separate ESA consultations.

Those actions that have already been covered under a separate ESA consultation are part of the environmental baseline and are not included in this cumulative effects analysis. The environmental baseline is defined as "The past and present impacts of all federal, state, or private actions and other human activities in an action area, the anticipated impacts of all proposed federal projects in an action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process." (50 CFR §402.02) (USFWS and NMFS 1998). For example, the CSI development in Clark County, located directly south, was covered under separate ESA consultations and therefore is not addressed in this cumulative effects analysis. This project is addressed in the cumulative impact analysis of the CSI Planned Development Project Draft EIS.

10.2 INTERRELATED/INTERDEPENDENT ACTIONS

The ESA Section 7 handbook (USFWS and NMFS 1998) defines an interrelated activity as an activity that is part of the proposed action and depends on the proposed action for its justification. In other words, the activity would not occur if it were not for the existence of the proposed action under consultation. An interdependent action is defined as an action having no independent utility apart from the proposed action (50 CFR §402.02).

An effective way to determine whether other activities are interrelated to, or interdependent with, the proposed project is to apply the "but for" test (USFWS and NMFS 1998). The relevant inquiry is whether another activity would occur but for the proposed project under consultation. If it would not occur, but for the proposed action, then the activity is considered interrelated or interdependent and its effect on listed species must be assessed as part of the overall project. If the activity in question would occur regardless of the proposed project under consultation, then the activity is not interdependent or interrelated.

Consideration was given to water supply development activities that would be required to support the CSI development in Lincoln County. The final amount of build-out on the CSI property in Lincoln County is contingent upon the amount of water that will be available to support the development. In other words, full build-out of the planned town would not occur but for the development of future water rights. However, the source of at least half of the future water supply needed has not been determined. Furthermore, approval and development of water rights and applications, including those held in abeyance under Order No. 1169, is not reasonably certain to occur. Given the projected growth in Lincoln and Clark County, water supply development activities would likely occur *regardless* of the CSI development. Therefore, for the purposes of the CSI MSHCP, these activities are considered as cumulative effects.

Certain activities planned for implemented within BLM Utility Corridor will serve the CSI development in Lincoln County, and will be addressed in separate ESA consultations. For example, Lincoln County Power District (LCPD) plans to upgrade a portion of its existing transmission system (located in the BLM Utility Corridor west of U.S. Highway 93) and Coyote Springs Gas Transmission, LLC has plans for a natural gas pipeline. However, many of these activities will serve the CSI development in Clark County and other development projects, and would occur regardless of the CSI Development addressed in the CSI MSHCP. Therefore, these activities are considered as cumulative effects rather than interrelated or interdependent actions. Descriptions of these activities are provided in the following section.

Detention basins totaling up to 244 acres also would be constructed within the BLM Utility Corridor per Section 7 consultation. This is considered an interdependent action (an action which has no independent utility apart from the action under consideration), as it would only occur if the CSI Development were to occur in Lincoln County.

10.3 OVERVIEW OF PROJECTS/ACTIONS WITH THE POTENTIAL TO CONTRIBUTE TO CUMULATIVE EFFECTS

The following are projects/activities evaluated for cumulative effects in the CSI MSHCP.

10.3.1 Activities Related to Water Supply Development

Water rights that may be acquired for the CSI Development in Lincoln County are addressed as cumulative effects. Environmental concerns associated with the development, use and transport of existing and future water rights to the Development Area will be addressed in separate environmental documents as specific water rights and pipeline routes are determined in the future. Water supply and transmission projects that affect local and adjacent hydrologic basins unrelated to the CSI development also are discussed. The following activities are evaluated as cumulative effects.

- Existing local and regional water rights and future local or regional water rights to be developed that may be acquired for use in the CSI Development in Lincoln County.
- Mitigation water to be acquired to support terms and conditions of the CSI MSHCP.
- Storage and transmission of any water rights acquired or appropriated from the alluvial or regional aquifer and made available for use by or within the CSI development in Lincoln County.
- Water supply projects within the local basins of the White River Flow System unrelated to the CSI development.
- Water supply orders and agreements designed to protect the groundwater flow systems also are discussed.

WATER SUPPLY ORDERS AND AGREEMENTS

- Nevada State Engineer Order No. 1169
- Muddy River MOA

WATER SUPPLY DEVELOPMENT PROJECTS

- Coyote Spring Well and Moapa Transmission System Project N-76493
- Clark, Lincoln, and White Pine Counties Groundwater Development Project
- Kane Springs Valley Groundwater Development Project

10.3.1.1 Order 1169

In 1985, the Nevada Legislature authorized a program, a cooperative effort between the State of Nevada and the federal government, to study the carbonate-rock aquifer system of eastern and southern Nevada. Preliminary findings indicated that large-scale development (sustained withdrawals) have the potential to result in water-level declines in the aquifer system, deplete stored water, reduce flow of warm-water springs that discharge from regional aquifers, and deplete storage in nearby aquifers. However, confidence in prediction of the effects of development was low (Dettinger 1989). It was recommended that development be staged gradually and hydrologic conditions be monitored.

In response to water right protests filed by the Department of the Interior (USFWS, National Park Service, BLM, and other entities), the Nevada State Engineer (2002) issued a ruling, Order 1169, on ground water applications in several hydrogeographic basins within the regional carbonate aquifer system. In Order No. 1169, the Nevada State Engineer held in abeyance carbonate-rock aquifer system groundwater applications pending or to be filed in specified hydrogeographic basins, including Coyote Spring Valley (Basin 210), Black Mountains Area (Basin 215), Garnet Valley (Basin 216), Hidden Valley (Basin 217), Muddy River Springs aka Upper Moapa Valley (Basin 219), Lower Moapa Valley (Basin 220), and for further study of the appropriation of water from the carbonate-rock aquifer system, Lincoln and Clark Counties, Nevada, "…until further information is obtained by stressing the aquifer by those water rights already permitted for the appropriation of water from the carbonate-rock aquifer system." The Order specifies that a study must be conducted to provide information on the effect of pumping permitted rights that are not yet in production on prior existing rights and the environment. The results of this study will be used to assess long-term impacts to the aquifer and down-gradient flows. No additional water rights will be issued to appropriate waters until after the required pump test and report are completed and the Nevada State Engineer has determined that he has sufficient data to support the granting of additional permits.

The participants in the study must, at a minimum, include LVVWD, SNWA, CSI, Nevada Power Company, and MVWD. Under direction of the Nevada State Engineer, these entities are conducting pump tests and monitoring activities within the basins in accordance with Nevada State Engineer Order No. 1169. A regional Water Monitoring Plan was approved by the Nevada State Engineer on March 14, 2005 and is being implemented by several parties under the direction of the Nevada State Engineer. It is anticipated that the Water Monitoring Plan will be modified as data is collected or changed circumstances warrant.

10.3.1.2 Muddy River Memorandum of Agreement

On April 20, 2006, the SNWA, USFWS, CSI, the Tribe, and the MVWD signed the Muddy River MOA. The Muddy River MOA established conservation measures and monitoring and management criteria to be implemented concurrently with development of water projects within certain groundwater basins. The Muddy River MOA outlines specific conservation actions that each party would complete to minimize potential impacts to the Moapa dace if water levels decline in the Muddy River system as a result of cumulative withdrawal of 16,100 afa from the Regional Carbonate Aquifer in Coyote Spring Valley (Basin 210) and California Wash (Basin 218) basins. The parties agreed to establish a Recovery Implementation Program (RIP) as a conservation measure for the protection and recovery of Moapa dace and its habitat. The RIP has now been expanded to address additional species and their habitat in the Muddy River. CSI agreed to dedicate a portion of its current and future water rights for the survival and recovery of the Moapa dace and other species in the Muddy River, and agreed to provide funding for the restoration of Moapa dace habitat. The parties have been developing the RIP with an anticipated completion date during 2007.

The USFWS developed an intra-service, programmatic BO for the Muddy River MOA regarding the groundwater withdrawal and associated conservation measures for the Moapa dace (USFWS 2006). Future, site-specific actions resulting from implementation of the MOA will be tiered to this BO.

The 16,100 afa is proposed to be withdrawn from the carbonate aquifer at the MX-5, RW-2 wells, CSI Well #1, CSI Well #2, CSI Well #3, and CSI Well #4 (SNWA 9,000 afa), and potentially other wells in the Coyote Spring Valley Basin, and from a well-field located in the southwestern third of the Moapa Reservation (2,500 afa) in the California Wash Basin. Under the Muddy River MOA, CSI and SNWA agreed to relocate production further upgradient in the basin if impacts to the springs result from production at existing locations.

The following water rights are covered under the Muddy River MOA and BO.

- The SNWA proposes to develop its existing groundwater rights for 9,000 afa in Coyote Spring Valley (Permit 49414, 49660-49662, 49978-49987).
- CSI is permitted for 2600 afa in Coyote Spring Valley (Permit 70429, 70430, 74094, 74095). Two thousand acre-feet of the original 4,600 acre-feet of water rights held by CSI was conveyed to the Clark County-Coyote Springs Water Resource General Improvement District. An equal amount to 10 percent of the initial 4,600 afa permitted to CSI, or 460 afa, will be dedicated to the survival and recovery of Moapa dace and its habitat, and other aquatic species of the Muddy River. Furthermore, five percent (5%) of all rights above 4,600 afa that CSI and the Clark County-Coyote Springs Water Resource General Improvement District may, in the future, withdraw from or import to the Coyote Spring Valley for use in the Coyote Springs Development will be dedicated to the recovery of Moapa dace and the Muddy River. The use of this water was covered under the BO issued by the USFWS for the CSI development in Clark County (File No. 1-5-05-FW-536-Tier 010).
- Within the California Wash Basin, 2,500 afa (Permit 54075) was transferred from the LVVWD to the Moapa Band of Paiutes.
- The agreement also addresses MVWD rights within the Upper Moapa Valley Basin (Permit 52520, 55450, and 58269) and surface water rights in the Muddy Springs area and Jones Spring, some of which will be dedicated to the survival and recovery of Moapa dace.

10.3.1.3 Coyote Spring Well and Moapa Transmission System Project N-76493

SNWA would develop and convey 9,000 afa of groundwater from Coyote Spring Valley in northeastern Clark County, using new and existing facilities. A project-specific BO will be tiered from the USFWS's Intra-Service Programmatic BO for the Muddy River MOA. A project specific Biological Opinion for the Coyote Springs project was issued on May 9, 2007 (File No. 1-5-05-FW-536-Tier 2) and a final EA and FONSI were issued by the BLM in June 2007.

Facilities for this project will be located on federal lands managed by the BLM, and within the NDOT right-of-way (ROW) along Nevada State Route 168. The western half of the proposed Coyote Spring Project lies within the Gold Butte-Pakoon unit of desert tortoise critical habitat. This area is also designated as the Mormon Mesa ACEC by the BLM.

10.3.1.4 Clark, Lincoln, and White Pine Counties Groundwater Development Project

In August 2004, SNWA filed an application with the BLM Ely Field Office for rights-of-way for a proposed system of regional groundwater production, conveyance and treatment facilities, and power conveyance facilities in Clark, Lincoln, and White Pine counties. The proposed facilities would develop groundwater from the following six valleys: Spring, Snake, Cave, Dry Lake, Delamar, and Coyote Springs. SNWA holds groundwater rights and applications for approximately 167,000 afa that would be developed and conveyed by the project, in Spring (68,000 afa), Snake (50,679 afa), Cave (11,564 afa), Dry Lake (11,584 afa), Delamar (11,584 afa), and Coyote Spring (11,584 afa) valleys (SNWA 2007). Under a cooperative agreement with SNWA, capacity is also being provided for the Lincoln County Water District (SNWA 2007). The BLM is currently preparing an EIS for the project. Water rights are being permitted through the Nevada State Engineer's office. A regional groundwater model is being prepared by the BLM as part of the EIS analysis.

The proposed facilities include approximately 328 miles of pipeline, five pumping stations, six regulating tanks, a buried storage reservoir, a water treatment facility, 14 production well sites, 349 miles of overhead power lines, eight electrical substations, and four hydroturbine energy recovery facilities. SNWA anticipates major facility construction between 2009 through 2018 (SNWA 2007).

10.3.1.5 Kane Springs Valley Groundwater Development Project

The Bureau of Land Management (BLM) has recently closed the comment period (ended August 20, 2007) for the Kane Springs Valley Groundwater Development Project Draft EIS. This Draft EIS analyses the proposed action submitted by the Lincoln County Water District (LCWD) for obtaining ROW access on BLM-managed land. The ROWs, if granted, would authorize LCWD to construct a groundwater conveyance system in Kane Springs Valley. Phase 1 of the proposed action would consist of development of infrastructure to remove and convey 1,000 acre-feet of water. Future phases would be dependent upon water demand and future water rights.

10.3.1.6 Coyote Springs Investment LLC and Affiliates Water Supply Development Activities

Environmental concerns associated with the use and transport of existing and future water rights to the Development Area will be addressed in separate environmental documents as specific water rights and pipeline routes are determined from time to time.

CSI proposes to utilize existing local and regional water rights and future local or regional water rights for the new planned community with resource conservation features (see Chapter 6, Conservation Measures). Drinking water will be supplied to the community from groundwater produced within or transported to the Development Area and water service will be provided by the Coyote Springs–Lincoln County GID either directly or indirectly under a management contract with another governmental entity. CSI anticipates this demand being met by alluvial or carbonate aquifer production within multiple basins. At present, CSI does not know which basin or basins will be the source of water. It is anticipated that the water will be produced from basins within the White River and Meadow Valley subregional flow systems from sources either developed by CSI, an affiliate of CSI, or by LCWD/Vidler. Figure 10-1 shows potential sources of water for CSI planned development. Further, it is anticipated that the water supply will be obtained in multiple phases that, when completed, will provide the total demand of the development. A summary of water rights currently owned by CSI or an affiliate or being investigated for use in the CSI development in Lincoln County is presented in Tables 10-1 and 10-2, respectively.

CSI does not intend to seek a transfer of any vested, permitted, or certificated surface water rights to the Development Area. It is anticipated that surface water now owned or subsequently acquired by CSI or its affiliates will be utilized to support continuing farm and ranching operations within Lincoln County, be dedicated to the USFWS for mitigation purposes in support of aquatic resources that may be impacted by the proposed groundwater production, or be exchanged with third parties for water that may be used to serve the CSI Development (Appendix R). All stock watering rights are excluded from the figures regardless of whether they are an appropriation of surface water or groundwater.

An estimated 70,000 afa is needed for a water supply at full build-out. The long-term demand for golf course, park, and common area landscape irrigation is not included in this 70,000 afa estimate, as treated effluent will be used for irrigation. The project is being designed and constructed to allow the use of treated effluent for irrigation of such areas as soon as a sufficient supply of treated effluent is available to serve each respective area. Approximately 50 percent, or 35,000 afa at full buildout, of the water used to serve the development would be reclaimed.

CSI anticipates the total water supply would be assembled in small increments over a period of years rather than being obtained in a single acquisition. CSI plans to maintain a two (2) to five (5) lead time for water being available to serve the project prior to the water being required for continuing development. Further, CSI acknowledges that environmental concerns and issues associated with the water supply will be addressed in phases as specific sources are identified and applications filed seeking authorization for the use of such water within the Development Area.

For some of these, ESA consultation has been completed, and for others consultation is yet to be completed.

10.3.1.6.1 ESA Consultation Completed

- Production of 9,000 afa of Coyote Spring Valley Basin water rights owned by SNWA was authorized under the BO issued January 30, 2006 (File No. 1-5-05-FW-536) (Permit 49414, 49660-49662, 49978-49987). CSI may seek the right to use a portion of SNWA's water rights on a temporary basis or it may seek to acquire these water rights, either in whole or in part, from SNWA in exchange for other water rights appropriated outside the Coyote Spring Valley Basin. It is not certain that any such exchange will be accomplished.
- Production of CSI's 4,600 afy in Coyote Spring Valley Basin authorized under the Muddy River MOA BO and subsequent project level BO for CSI development in Clark County, Nevada (File No. 1-5-05-FW-536-Tier 01, Cross Reference 1-5-00-FW-575).
- Permit 18437 (Cert. 5683) – indirectly addressed under the BO issued January 30, 2006 (File No. 1-5-05-FW-536) because it is covered under the Back-up Water Rights Agreement dated April 20, 2006, which is one of the Muddy River Agreements entered into pursuant to the Muddy River MOA. The Muddy River MOA was covered by the BO.
- Kane Springs Water Rights–LCWD/Vidler ROW Application No. N-79734. Construction and maintenance of wells, pumps, motors, valves, meters, reservoirs, electric power lines, telemetry, pipelines and all related appurtenances as may be authorized under Application No. N-79734. The Final EIS for this project was released by BLM on February 8, 2008. A BO for this project was issued on April 9, 2008 (File Nos. 84320-2008-F-007 and 84320-2008-I-0216).

10.3.1.6.2 ESA Consultation to be Completed

- Any additional water rights that are acquired or appropriated within the Coyote Spring Valley Basin and made available for use by or within the Development Area, other than those water rights described above.
- Lake Valley Water Rights – Transmission facilities will be covered under a Section 7 consultation after a ROW application is, or applications are filed with the BLM seeking authorization to connect wells with SNWA regional pipeline system or another regional system. It is anticipated that a collection system will be developed for water delivery to a transmission pipeline. It is anticipated that the transmission pipeline and related appurtenances will be constructed within the designated BLM utility corridors established by Congress under the LCCRDA.
- Any other water rights acquired or appropriated from other alluvial or regional aquifers and made available for use by or within the Development Area.
- Meadow Valley Wash groundwater rights that are proposed for use as mitigation of potential impacts to the Muddy River may be covered under a Section 7 consultation depending upon USFWS's acceptance of the water for mitigation purposes and the selected manner of delivery to the Muddy River.

CSI is under contract to purchase all water rights for which LCWD/Vidler obtains permits authorizing the appropriation of water from the carbonate aquifer within the Kane Springs Valley Basin, subject to the satisfaction of certain stated conditions.

CSI is seeking, either directly or through TRP, a CSI affiliate, to acquire additional certificated water rights within the White River and Meadow Valley flow systems for purposes of: 1) using the water at Coyote Springs, 2) exchanging it with third parties for other water rights that can be utilized within the development, 3) providing a source of mitigation water, or 4) ensuring continued farming and ranching operations within Lincoln County.

Table 10-1 Water Rights Owned by CSI or an Affiliate Potentially Available for Serving the CSI Development in Lincoln County[a]

Administrative Groundwater Basin Name[a]	Administrative Groundwater Basin Code[b]	Amount (afa) [c,d]	Status	Owner/Water Purveyor	Federal Actions Required	ESA Consultation Status
Coyote Spring Valley	210	4,600±[e]	Certificated, committed to development in Clark County	CSI		Addressed under previous ESA consultation, 1-5-05-FW-536 Tier 01, March 2, 2006
Muddy River Springs Area	219	20± alluvial	Certificated, committed to MVWD as part of the backup water supply under the Muddy River MOA documents	CSI/MVWD		Addressed under previous ESA consultation, 1-5-05-FW-536, January 30, 2006
Lower Meadow Valley Wash	205	570± alluvial	Permitted, proposed for mitigation use	CSI	unknown at this time	Will be undertaken when appropriate after decision is made regarding the use of the water
Lake Valley	183	30,622±; 24,100 from alluvial aquifer, remaining are surface water rights	Permitted and certificated, and currently in use; substantially all of the certificated groundwater is subject to pending applications to change the manner and place of use from irrigation in Basin 183 to municipal in Basin 210.	TRP	one or more ROW grants	Will be undertaken in connection with the proposed transfer of specifically identified water rights
Panaca Valley	203	5,119± alluvial	certificated	TRP	if used, a ROW grant will be necessary	Will be undertaken in connection with the proposed transfer of specifically identified water rights
Patterson Valley	202	1,280± alluvial	certificated	TRP	if used, a ROW grant will be necessary	Will be undertaken in connection with the proposed transfer of specifically identified water rights
Rose Valley	199	1,410± alluvial	certificated	TRP	if used, a ROW grant will be necessary	Will be undertaken in connection with the proposed transfer of specifically identified water rights
Eagle Valley	200	720+ alluvial	certificated	TRP	if used, a ROW grant will be necessary	Will be undertaken in connection with the proposed transfer of specifically identified water rights
Spring Valley	201	779± alluvial	certificated	TRP	if used, a ROW grant will be necessary	Will be undertaken in connection with the proposed transfer of specifically identified water rights

NOTE: Total Water Rights Owned by CSI or TRP potentially available for water supply for CSI development in Lincoln County, subject to State Engineer approval, is equal to 36,000± afa.

[a]Nevada Affiliates include Tuffy Ranch Properties, LLC.
[b]Nevada Water Resources Division, State Water Engineer's office in Carson City.
[c]No transfer of surface water to the Development Area is intended.
[d]Unless otherwise noted, water rights would be for the groundwater carbonate aquifer, excludes stock watering rights owned by CSI or an affiliate whether such right is a surface or groundwater rights.
[e]1,000 acre-feet of the original 4,600 acre-feet of water rights held by CSI was conveyed to the Clark County-Coyote Springs Water Resource General Improvement District.

Table 10-2 Potential Sources of Water Supply Being Investigated by CSI for Remaining Water Rights Needed for CSI Development in Lincoln County[a]

Administrative Groundwater Basin Name[b]	Administrative Groundwater Basin Code[b]	Surface Source[c]	Groundwater Source[d]	Status	Water Purveyor/ Applicant	Federal Actions Required	ESA Consultation Status
Coyote Spring Valley	210	no	yes	applications – at present CSI does not anticipate that these applications will meet any substantial portion of the total demand. They are junior to pending SNWA applications. Permits – potential acquisition of existing permitted rights to by exchange with third parties.	CSI third parties	ESA compliance	Will commence as and when appropriate
Muddy River Springs Area	219	yes	yes	certificated[d]	third parties	unknown	Will occur if necessary
Lower Meadow Valley Wash	205	yes	yes	permit / certificated [d]	third parties	unknown	will occur if necessary
Lake Valley	183	yes	yes	permit / certificated [d]	LCWD/Vidler third parties	right-of-way	Separate Section 7 consultation in connection with application if and when filed. by LCWD/Vidler
Lake Valley	183	yes	yes	applications	LCWD/Vidler third parties	right-of-way	Separate Section 7 consultation in connection with application if and when filed. by LCWD/Vidler
Lake Valley	183	yes	yes	pending applications for new appropriations from the carbonate aquifer. These applications are subordinate to pending application held by LCWD/Vidler.	CSI	right-of-way	Separate Section 7 consultation in connection with application if and when filed.
Panaca Valley	203 V	yes	yes	permit/ certificated [d]	third parties	right-of-way	Separate Section 7 consultation in connection with application if and when filed.
Patterson Valley	202	yes	yes	permit/ certificated [d]	LCWD/Vidler third parties	right-of-way	Separate Section 7 consultation in connection with application if and when filed. Separate Section 7 consultation by LCWD/Vidler
Spring Valley	201	yes	yes	permit/ certificated [d]	third parties	right-of-way	Separate Section 7 consultation in connection with application if and when filed.

Table 10-2 Potential Sources of Water Supply Being Investigated by CSI for Remaining Water Rights Needed for CSI Development in Lincoln County[a]

Administrative Groundwater Basin Name[b]	Administrative Groundwater Basin Code[b]	Surface Source[c]	Groundwater Source[d]	Status	Water Purveyor/ Applicant	Federal Actions Required	ESA Consultation Status
Kane Springs Valley	206	no	yes	permits and applications – subject to purchase agreement if and when permitted and rights-of-way granted	LCWD/Vidler	right-of-way	Separate Section 7 consultation by LCWD/Vidler, Kane Springs Valley Groundwater Development Project EIS in process
Garden Valley	172	no	yes	applications	third parties	right-of-way	Separate Section 7 consultation in connection with application if and when filed.
Coal Valley	171	no	yes	applications	third parties	right-of-way	Separate Section 7 consultation in connection with application if and when filed.
Pahroc Valley	208	no	yes	applications	third parties	right-of-way	Separate Section 7 consultation in connection with application if and when filed.
Cave Valley	180	no	yes	applications	third parties LCWD/Vidler	right-of-way	Separate Section 7 consultation in connection with application if and when filed. Separate Section 7 consultation by LCWD/Vidler
Dry Lake Valley	181	no	yes	applications	third parties	right-of-way	Separate Section 7 consultation in connection with application if and when filed.
Delamar Valley	181	no	yes	applications	LCWD/Vidler third parties	right-of-way	Separate Section 7 consultation in connection with application if and when filed. Separate Section 7 consultation by LCWD/Vidler
White River Valley	207	no	yes	applications	third parties	right-of-way	Separate Section 7 consultation in connection with application if and when filed.

[a]Amount of water rights have not be included here as water rights are still pending and/or it is unknown the amount of water available to CSI or an affiliate.

[b]Nevada Water Resources Division. State Water Engineer's office in Carson City, Nevada.

[c]CSI anticipates surface water as being potential sources of mitigation water requirements.

[d]These water rights are owned by entities other than CSI or an affiliate.

[e]Unless otherwise noted, applications for groundwater appropriations relate to rights would be for the carbonate aquifer.

Additionally, CSI is seeking to acquire by exchange additional water rights within the Coyote Spring Valley Basin. Any exchange would involve the transfer of existing permitted and/or certificated water rights outside the basin for permitted rights within the basin.

Water obtained from LCWD/Vidler within the Kane Springs Valley Basin is planned to provide the initial water for the Development Area. The Nevada State Engineer conducted a hearing on the LCWD/Vidler Kane Springs applications during April 4-6, 2006. The Nevada State Engineer issued Ruling 5712 on February 2, 2007. A total of 1,000 afa was permitted under this Ruling. LCWD still has four (4) applications for appropriations within this basin pending before the Nevada State Engineer. LCWD/Vidler filed an application with the BLM (Serial File N-79734) for a pipeline ROW between the Kane Springs well field and the northern boundary of the Development Area. The application also addresses all related appurtenances for the operation of the pipeline. An EIS is being prepared for purposes of NEPA compliance. CSI anticipates subsequent phases of the water supply to include additional water rights acquired within the Coyote Spring Valley Basin, the Kane Springs Valley Basin, the transfer of existing permitted and certificated water rights owned by CSI or TRP, and the acquisition of water rights from LCWD/Vidler that are permitted for use in the Development Area.

CSI has had preliminary discussions with LCWD/Vidler regarding the purchase of additional water rights they are able to permit and develop within the Lake Valley, Patterson Valley, Pahroc Valley, Coal Valley, Garden Valley, Cave Valley, Dry Lake Valley, or Delamar Valley basins. The initial discussions are focusing on Lake and Patterson Valleys. The other basins are being reviewed in lower priority due to potential concerns about other aquatic species or because LCWD/Vidler applications are junior to other pending applications. It is noted that CSI anticipates that any agreement reached with LCWD/Vidler regarding the purchase of such water rights would contain terms substantially the same as the terms in the Kane Springs purchase agreement.

CSI proposes to begin assembling the necessary water rights from within the basins closest to the development to minimize the environmental impacts associated with infrastructure development. CSI anticipates moving northward from the Kane Springs Valley Basin until the Lake Valley Basin is reached, if necessary. However, CSI is and will remain sensitive to environmental conditions and potential impacts, and as a result, basins between Kane Springs and Lake Valley may be omitted to minimize impacts depending on the timing of regional projects. CSI may change its initial plan for assembling the necessary water rights based on environmental considerations, or economic conditions and/or acquisition availability and transferability. Nonetheless, CSI anticipates the necessary groundwater supply being developed within and all required mitigation water being provided from sources within the White River and/or the Meadow Valley Wash flow systems. Water supply development and utilization will be consistent with the terms and conditions of each respective permit authorizing the appropriation of water to serve the Development Area.

Water rights addressed in the Muddy River MOA and Order 1169 are described below. Actions related to additional water rights development are discussed in the next section. Additional activities related to water supply are described in subsequent sections.

10.3.1.6.3 Water Rights Addressed in the Muddy River MOA

The Muddy River MOA established monitoring and management criteria to be implemented concurrently with development of water projects within certain groundwater basins, including the Coyote Spring and California Wash hydrographic basins. The Regional Water Monitoring Plan, required under Order 1169 and approved by the Nevada State Engineer (2005), is being implemented. CSI has been working with SNWA, the LVVWD, the MVWD, and Nevada Power Company under the direction of the Nevada State Engineer to conduct pump tests and monitoring activities within the basin and surrounding basins in accordance with Order 1169. The Nevada State Engineer may modify pumping if the exercise of existing water rights is found to have unacceptable adverse impacts. Further, production within the Coyote Spring Basin during the pump test is subject to the trigger levels set forth in the Muddy River MOA.

The results of this study will be used to assess long-term impacts to the aquifer and down-gradient flows. The Nevada State Engineer will not issue additional water rights within the subject basins until after the required pump test and report are completed. At that time, the Nevada State Engineer may determine that there is still insufficient data available to make a determination, that sufficient data is available and that no further rights will be granted, or that sufficient data exist to support the grant of additional water rights pending before the Nevada State Engineer, either in whole or in part.

During build-out of the CSI development over time, additional data will become available to support the Nevada State Engineer's actions and decisions, and to support implementation of agreements under the Muddy River MOA. Therefore, phasing the development over time will support adaptive management of water rights within these basins.

10.3.1.7 Future Water Supply Development and Transmission Activities

There likely will be different activities associated with developing water rights that are permitted for use within the CSI Development project depending on the basin of origin of the respective water rights. In the event additional water rights are acquired within the Coyote Spring Valley, an application to change the point of diversion, manner, and place of use will be required. The point of diversion would be changed to one or more of CSI's existing production wells or a new production well within the Development Area. This would avoid the need for any additional surface disturbance in connection with groundwater production beyond that already occurring within the Development Area.

Development of Kane Springs water will require the equipping of the existing exploratory well and the possible drilling of additional wells, depending on the quantity of water ultimately permitted. A backup production well will likely to be necessary to ensure an uninterrupted supply in the event of a well failure. Also, it is likely that two (2) monitoring wells will need to be drilled, equipped with monitoring equipment and maintained. In addition to the wells, a pipeline will be constructed from the well field to CSI's property and delivered to a water treatment facility that will be constructed within the Development Area. Appurtenances associated with the pipeline will include, without limitation, a storage reservoir, electric power supply, telemetry, valves, pumps, meters, and monitoring equipment.

Existing certificated water rights for which an approved change in the manner and place of use occurs are not anticipated to require any new wells. However, equipment within the wells will likely be replaced and upgraded, with monitoring equipment being incorporated into the production system. However, new wells may be utilized to minimize surface disturbing impacts. Depending on the location of the well or wells, a collection system may need to be constructed for delivering the water to a transmission pipeline. Depending on the well field location, the receiving transmission line may be a pipeline constructed by CSI, LCWD/Vidler, or SNWA. Any such line will likely include storage reservoirs, pump stations, electric power supply, telemetry, valves, pumps, meters, and monitoring equipment. Pursuant to the provisions of the LCLA, BLM utility corridors were designated for the benefit of Lincoln County. The same act designated other BLM utility corridors for the benefit of SNWA. At this time neither LCWD/Vidler nor CSI have proposed a specific pipeline project other than the Kane Springs pipeline. However, for purposes of minimizing environmental impacts, LCWD and SNWA entered into an agreement pursuant to which LCWD obtained certain capacity rights in the SNWA project, after which LCWD assigned rights to the Coyote Springs–Lincoln County GID. In the event the GID proposes a pipeline project that would utilize this reserved capacity, the GID will be responsible for preparing all environmental documentation resulting from the filing of any right-of-way application.

10.3.1.7.1 Production Wells

Production wells to serve the development or to provide mitigation water may be constructed, operated, and maintained within or without the CSI Development Area. Production will be conducted in a manner consistent with the terms and conditions of the respective permits and any other agreement CSI has entered into with third parties. The total number of production wells that will be required is unknown at this time. Further, environmental issues associated with groundwater production will be separately addressed as specific sources are identified. Cumulative impacts of each phase will address the combined impacts of the current phase, the previously permitted phases, and future sources to the extent they are specifically identified at such time.

Monitoring wells will be constructed, operated, and maintained throughout the Development Area and surrounding areas consistent with the terms and conditions of all applicable permits, rulings, and orders of the Nevada State Engineer, and CSI's contractual obligations with third parties. The number of monitoring wells to be constructed will be determined by the Nevada State Engineer prior to permit issuance, provided that the number and location of such wells may be modified from time to time by the Nevada State Engineer. Monitoring wells will be constructed, operated, maintained, repaired, and replaced as required or deemed appropriate by the Nevada State Engineer and CSI/GID (depending on ownership) from time to time, subject to all applicable permit terms and conditions, orders, and rulings of the Nevada State Engineer. The exact number of monitoring wells cannot be determined at this time. To the extent monitoring wells are located outside the Development Area they will be addressed in the same environmental documentation that is prepared for the associated production well, pipeline, and related appurtenances.

10.3.1.7.2 Storage Facilities

Reservoirs will be constructed within the Development Area and may be constructed off-site as well. These reservoirs will be aboveground or underground tanks, which may either be cement, in-ground tanks or welded steel aboveground tanks or lined earthen reservoirs. The purpose of these reservoirs is to store raw water and distribute treated water to the community and to meet the requirement of providing water for fire protection at certain elevations. The average capacity of the tanks will be 3 to 4 million gallons. A buried communication line will be installed to operate the valves on the tank(s). To the extent storage facilities will be constructed outside the Development Area they will be addressed in the same environmental documentation that is prepared for the associated wells, pipelines, and related appurtenances.

10.3.1.7.3 Adjacent Water Delivery System

A water delivery system, consisting of wells, pumps, motors, storage facilities, pipelines, telemetry, power line, and all related appurtenances, will be constructed between the well field located within the adjacent Kane Springs Valley Basin and the Development Area. This system is separate from and independent of SNWA's regional groundwater project.

The Kane Springs facilities are proposed to be constructed along the south side of the existing Kane Springs Road, and within the Kane Springs right-of-way and the congressionally designated BLM utility corridor. The Kane Springs delivery system will require approximately 5 to 13 miles of pipeline to bring Kane Springs water from the well field to the northern boundary of the Development Area. The pipeline (up to 36 inches in diameter) and related appurtenances will be extended approximately 3 to 4½ miles from the northern boundary to the initial treatment facility. The pipeline would utilize the utilities corridor to avoid and minimize impacts to Kane Springs Wash. This activity will be covered under a separate ESA consultation.

10.3.1.7.4 Regional Water Transmission System

It is anticipated that additional out-of-basin water transfers will be necessary to develop and sustain the CSI community in the Development Area.

Water may be provided to the Development Area by means of the SNWA Groundwater Project at some future date. LCWD entered into an agreement with SNWA under which LCWD reserved capacity in the Groundwater Project in anticipation of future deliveries of groundwater from various areas within Lincoln County to the Development Area (including the CSI Clark County Development). LCWD has assigned its rights and delegated its obligations to SNWA in connection with the Groundwater Project to the Coyote Springs–Lincoln County GID. An EIS is currently being prepared in connection with SNWA Groundwater Project ROW application. At the present time, no specific water resources have been identified for potential transport via the SNWA Groundwater Project and, therefore, are not being addressed in the SNWA Groundwater Project EIS. If and when specific water rights are identified for transport via this project, environmental issues and NEPA compliance will occur in connection with processing applications for ROWs or other federal permits that are required for the project, if any.

Water may be provided to the Development Area by means of a LCWD/Vidler pipeline that would be constructed within congressionally designated Lincoln County BLM utility corridors. At the present time, LCWD/Vidler do not have a specific pipeline project identified nor have any specific water rights been identified for potential transport via a LCWD/Vidler pipeline to the Development Area. If and when specific water rights are identified for transport via this project, environmental issues and NEPA compliance will occur in connection with processing applications for rights-of-ways or other federal permits that are required for the project, if any.

Water may be provided to the Development Area by means of a CSI pipeline that would be constructed within congressionally designated BLM utility corridors. At the present time CSI, does not have a specific pipeline project identified nor have any specific water rights been identified for potential transport via a CSI pipeline to the Development Area. If and when specific water rights are identified for transport via this project, environmental issues and NEPA compliance will occur in connection with processing applications for ROWs or other federal permits that are required for the project, if any.

10.3.2 Activities Related to Utility Infrastructure

Certain activities will be implemented within BLM utility corridors to serve the CSI development in Lincoln County, and will be addressed in separate ESA consultations, as described below. These actions will be evaluated in the CSI ESA consultation as cumulative effects. Additionally, many of these activities will serve the CSI development in Clark County and other development projects.

- Coyote Springs Gas Transmission, LLC ROW Application N-82066 and TUP Application N-82066-01.
- Pardee Homes of Nevada Application N-82373. Detention basins along the western side of U.S. Highway 93 to protect the CSI development in Clark County is covered under a Section 7 consultation resulting from processing Application N-82373 on file with the BLM.
- L&S Power BLM application for one 500 kV-AC line. This project may indirectly serve the CSI Development.
- Lincoln County Power District (LCPD) 138 kV transmission line project. LCPD proposes to upgrade its existing 69 kV transmission line, located in the ROW corridor west of U.S. Highway 93, to 138 kV. This project may serve the CSI Development in addition to other areas in Lincoln County. LCPD also will construct and operate the electric utility facilities for the Kane Springs Valley Groundwater Development Project.
- Nevada Power Company and Sierra Pacific Power Company – Ely Energy Center. One of the 500 kV lines may serve the CSI Development indirectly.

10.3.2.1 Coyote Springs Gas Transmission, LLC - Natural Gas Pipeline

A natural gas pipeline within an existing BLM utility corridor extending from the Kern River Interstate Transmission Line in the vicinity of Apex, Nevada to the southwestern corner of the Clark County project will be covered under a Section 7 consultation resulting from processing Application N-82066 and TUP Application N-82066-01. Coyote Springs Gas Transmission, LLC has filed a ROW application and a TUP application with the BLM for the construction of a 12-inch-diameter, natural gas pipeline. Initially, the pipeline will serve development in Clark County. However, the line will be designed for future capacity expansion in order to serve the CSI Development Area in Lincoln County. This activity will be covered under a separate ESA Section 7 consultation and therefore, it is addressed as a cumulative impact. This activity is pending and/or has been withdrawn.

10.3.2.2 Pardee Homes of Nevada - Detention Basins in Clark County

ESA compliance for detention basins along the western side of U.S. Highway 93 in Clark County has been addressed in a tiered BO from the CSI Clark County BO. The applicant is Pardee Homes of Nevada.

10.3.2.3 Great Basin Transmission LLC Electrical Transmission Project

The Great Basin Transmission LLC Electrical Transmission Project involves the proposed construction, operation, and maintenance of a 540-mile-long 500 kV transmission line between Midpoint Substation near Twin Falls, Idaho, to the Dry Lake area northeast of Las Vegas. Approximately 383 miles of this project would be located in the BLM Ely District within the approved Southwest Intertie Project corridor, located on the west side of U.S Highway 93. The ROW for the Southwest Intertie Project corridor was granted by the BLM in the

1990s. Great Basin Transmission LLC is currently developing final engineering and construction plans for this project (BLM 2007, Weeks pers. comm.). Coyote Springs 138 KV Transmission Line Project

LCPD is proposing to upgrade a portion of its existing transmission system from 69 kV to 138 kV and construct up to five new substations to accommodate the upgrade. The existing line is located in the BLM Utility Corridor west of U.S. Highway 93. Up to 11.2 miles of transmission line would be upgraded between the proposed Scott Substation to the proposed Sheep Mountain Substation. The proposed Scott Substation would be located on private property east of U.S. Highway 93 in Lincoln County, approximately five miles south of the intersection of Kane Springs Road and U.S. Highway 93. The proposed Sheep Mountain Substation would be located on BLM-managed land west of U.S. Highway 93. Ancillary facilities, including three additional substations, step-down transformers for fiber optic and cellular tower facilities, and related electrical components, would be primarily located along State Route 168. This project may serve the CSI Development in Lincoln County. LCPD also will construct and operate the electric utility facilities for the Kane Springs Valley Groundwater Development Project.

10.3.2.4 Ely Energy Center

Nevada Power Company and Sierra Pacific Power Company (SPPC) have applied to the Public Utility Commission of Nevada for approval to expand their existing generation portfolio by developing coal-fired generation units near Ely, White Pine County, Nevada. The power generation station would be known as the Ely Energy Center. A major transmission line would be developed from northeast Nevada to the Las Vegas area, and would interconnect the electrical systems of Nevada Power Company and SPPC. This project may indirectly serve the CSI Development.

Two new 500kV electric transmission lines, each line 270 to 315 miles long, would interconnect the Ely Energy Center with the SPPC and Nevada Power Company electric systems in northern and southern Nevada. Telecommunications facilities are proposed that would allow these two companies to communicate with the Ely Energy Center and the electrical transmission facilities. The electric transmission facilities would be built between the proposed Ely Energy Center and the existing Harry Allen substation in Clark County (Apex Valley) northeast of Las Vegas. The proposed line would intersect the previously federally-designated Southwest Intertie Project utility corridor and would extend to the Harry Allen substation in northeast Las Vegas. A new substation would be constructed at Robinson Summit and the existing Harry Allen substation in Clark County would be expanded. A portion of the 500 kV is proposed to be constructed through the Delamar Valley to Kane Springs Valley, and west along the Kane Springs Road, within the 2,640-foot-wide LCCRDA corridor, to U.S. Highway 93.

A notice of intent to prepare an EIS was published in the Federal Register in January of 2007 (BLM 2007) and scoping meetings were held in February 2007. The EIS will assess the potential impacts of initially granting ROWs and subsequent conveyance for the proposed power facility and granting a ROW for proposed rail lines, transmission lines with fiber optic cable, substations, water well-fields and pipeline delivery systems, and associated facilities in White Pine County, Lincoln, Nye, Elko, and Clark counties, Nevada.

10.3.3 Additional Planning Efforts

A number of planning efforts have the potential to cumulatively affect Covered and Evaluation Species.

- Lincoln County Land Act (2000) and Environmental Assessment for Phase I implementation.
- Lincoln County Conservation, Recreation, and Development Act (2004)
- Resource Management Plan/EIS for the BLM Ely District
- Southern Nevada Public Lands Management Act (Public Law 105-263)
- White Pine County Conservation, Recreation, and Development Act of 2006 (Public Law 109-432)
- Toquop Energy Project – ongoing NEPA evaluation

10.3.3.1 Lincoln County Land Act (2000), and Lincoln County Conservation, Recreation, and Development Act (2004)

Congress passed the LCLA on October 13, 2000, in order to allow some of the rapid growth in Mesquite and Clark County, to benefit Lincoln County, and help alleviate the disparity between federal and non-federal land. Lincoln County is predominantly federally administered and under the LCLA, 13,500 acres of federally administered lands was available for disposal by the BLM by October 1, 2005.

The LCLA was amended through the LCCRDA of 2004. Through this act, the BLM was required to sell the land identified in the LCLA within 75 days after the date of enactment of the LCCRDA (November 30, 2004; Public Law No: 108-424).

An Environmental Assessment for the LCLA of 2000 Phase I Implementation (LCLA EA) addressed environmental impacts of selling 6,478 acres of land in the southeastern corner of Lincoln County, Nevada (BLM 2000a). It did not address the environmental impacts of developing this land. When the 13,500 acres of land were sold in this area as a result of the LCCRDA of 2004, there was no time to prepare a NEPA document for the full acreage because the sale was required within 75 days of the passage of the act. A BO was issued by the USFWS in 2001 (File No. 1-5-01-F-517) for the disposal of the entire 13,500 acres, although no direct incidental take of desert tortoise or Virgin River fishes was authorized.

The lands sold on February 9, 2005, for approximately $47 million. The revenue generated from the sale of the lands may be used for the following:

- 5 percent (5%) for the State of Nevada for use in the general education program of the state;
- 10 percent (10%)_for the County for use as determined through normal budgeting procedures; and
- The remainder is to be deposited in a special account available as follows:
  - Inventory, evaluation, protection, and management of unique archaeological resources;
  - Development of a multiple-species habitat conservation plan in the county;
  - Reimbursement of costs incurred by the BLM in preparing sales under this Act;
  - Processing public land use authorizations; and
  - Acquisition of environmentally sensitive land.

Under the LCLA, the Secretary of the Interior must cooperate with Lincoln County and the City of Mesquite, and must adhere to FLPMA and other applicable laws in the disposal of these lands by a competitive bidding process for fair market value, at a minimum.

Development of the disposed lands would be conducted in accordance with a Development Agreement and Conveyance Agreement between the developer(s) and Lincoln County. Lincoln County and the developer(s) would be required to enter into a Development Agreement within 30 days of the sale. In addition, the developer(s) would be required to prepare and obtain County approval of a land use map identifying a general concept for master planning and development of the property.

All purchasers would be required to indicate their intent to comply with Lincoln County zoning ordinances and any master plan for the area developed and approved by Lincoln County in coordination with the City of Mesquite. This means all development on lands lying adjacent to Mesquite will have to comply with the City of Mesquite's Long Range Comprehensive Master Plan, which is currently being developed.

10.3.3.2 Resource Management Plan / EIS for the BLM Ely District

A Resource Management Plan (RMP) for the Ely District of the BLM is presently under development, which may designate additional lands for disposal to private ownership. The RMP is scheduled for finalization in late 2007 or early 2008.

10.3.3.3 Southern Nevada Public Lands Management Act of 1998 (Public Law 105-263) and Clark County Conservation of Public Land and Natural Resources Act of 2002

In 1998, Congress enacted the Southern Nevada Public Lands Management Act (Public Law 105-263) (SNPLMA), which authorized the BLM to dispose, for development, approximately 52,000 acres of public lands located within a specific boundary of the Las Vegas Valley. Under the Clark County Conservation of Public Land and Natural Resources Act of 2002 (Public Law 107-282), Congress authorized the disposal of an additional 22,000 acres of BLM-managed land. The BLM has sold some of these lands for private development, and likely will continue to offer public lands for sale pursuant to the terms of these Acts. The development of these lands will facilitate future population growth, and the associated water demands, of the Las Vegas Valley.

10.3.3.4 White Pine County Conservation, Recreation, and Development Act of 2006 (Public Law 109-432)

On December 20, 2006, this law designated in Nevada approximately 538,000 acres of wilderness in 12 new Wilderness Areas and expanded two existing Wilderness Areas, eight of which are managed by the BLM Ely Field Office. Additionally, more than 54,000 acres of BLM land are released from wilderness study designation. The White Pine bill is modeled after the SNPLMA, the Clark County Lands bill, and the Lincoln County Lands bill. Currently, more than 94 percent (94%) of White Pine County land is managed by federal agencies. This bill sets up an account to dispose of up to 45,000 acres of public lands out of BLM management and into private ownership. However, this land is located in eastern Nevada, north of Lincoln County, and therefore is not considered further in the evaluation of cumulative effects.

The bill provides amendments to the SNPLMA of 1998. This title proposes new conservation-oriented expenditure categories from a Special Account. One of these categories is for implementation of the Clark County MSHCP. For SNPLMA improvements, the bill also contains a measure to speed the progress of local government parks and trail projects that replaces a cumbersome reimbursement system.

This title provides for the construction of the “Drop 2” reservoir along the Colorado River and provides for the lining of the All-American Canal to conserve and capture Colorado River water. This is expected to result in the conservation of an average of 60,000 afa of water. In return for financing of the projects, Nevada will be guaranteed the right to divert and consume a portion of water from Lake Mead in addition to Nevada’s basic apportionment of 300,000 acre-feet.

This measure would help meet a small portion of the existing or future water demand within the area, which may help reduce the demand for groundwater development.

10.3.3.5 Sithe Global Power–Toquop Energy Project

Toquop Energy, LLC (a subsidiary of Sithe Global Power, LLC) is proposing to construct a 750 megawatt, coal-fired power plant in southeastern Lincoln County. In April 2003, the BLM Ely Field Office issued a Final EIS for the Toquop Energy Project, proposed by Toquop Energy, Inc. (Proposed Toquop Land Disposal Amendment to the Caliente Management Framework Plan and Final Environmental Impact Statement for the Toquop Energy Project, March 2003).

The project analyzed in the 2003 EIS was a 1,100-megawatt (MW) natural gas-fired electric power generation plant and associated facilities in Lincoln County in southern Nevada. Toquop Energy, Inc., proposed the project in order to generate electrical power for use by consumers and to meet the needs of forecasted electric load growth. The BLM has determined that, although an EIS for the original gas-fired power plant has been completed, the currently proposed coal-fired power plant has a number of components that are different from the previously proposed gas-fired technology. The BLM recently released an updated Draft EIS for this project on October 12, 2007. Public meetings were held in November 2007, and the comment period closed on December 11, 2007. Public scoping meetings were held in March of 2006 and an EIS is forthcoming. This Draft EIS addresses impacts of developing the power plant on the Toquop parcel.

It is estimated that the plant would require up to 2,500 afa of water, and would be supplied by existing water rights purchased via the LCWD. The water supply and pipeline were addressed in the previous EIS. The project is committed to using municipal wastewater, if available, as the water source. The Toquop Energy Project would interconnect with existing 345 kV and 500 kV transmission lines as previously studied. The facility would be located on a 640-acre parcel of land located 50 miles south-southwest of Caliente, and 14 miles northwest of Mesquite, Nevada.

The footprint of the proposed coal-fired plant is larger than what was analyzed in the 2003 EIS; the power plant, ash disposal, and topsoil storage areas would occupy a total of 475 acres. Plus, additional acreage of desert tortoise habitat would be disturbed due to construction of the rail spur. Fencing off the entire 640-acre area would make it all unavailable to desert tortoises.

10.3.4 Federal Actions to be Evaluated in the CSI Environmental Impact Statement

The following activities are mostly ESA-related, federal actions that are not evaluated as cumulative effects in this CSI MSHCP, but will be evaluated as cumulative impacts in the CSI Planned Development Project EIS.

- **Southeastern Lincoln County Habitat Conservation Plan.** Currently under development.
- **Clark County Multiple-Species Habitat Conservation Plan and Environmental Impact Statement.** In 2000, Clark County, Nevada and other applicants and participants completed a multiple-species HCP (Clark County MSHCP) for a series of covered activities that would occur in Clark County over the next 30 years. Activities include development, recreation, agriculture, flood control, mineral activities, off-highway vehicle use, solid waste, transportation, utilities, and sewer and water. Seventy-nine species are covered under the plan, with an additional 103 species as evaluation or watch list species.
- **Intra-Service Programmatic BO for the Muddy River MOA.** In 2006, the USFWS issued a programmatic BO for the Muddy River MOA among the SNWA, MVWD, CSI, Moapa Band of Paiutes, and the USFWS (File No. 1-5-05-FW-536). The BO evaluated the effects of the cumulative groundwater withdrawal of 16,100 afa from two basins within the regional carbonate aquifer to the federally listed as endangered Moapa dace at a programmatic level, in light of the conservation measures proposed in the MOA.
- **Coyote Springs Investment Project, Clark County, Nevada.** The CSI development on private land in Clark County, located immediately south of the CSI development in Lincoln County, is covered by the 1995 and 2000 incidental take permit issued by the USFWS to Clark County. Incidental take of Covered Species within the Corps' jurisdictional wetlands was not authorized under the Clark County MSHCP, thus necessitating an ESA Section 7 consultation. An EA was prepared (ENTRIX et al. 2005), a CWA Section 404 permit was issued by the Corps (Corps File No. 200125042) and a BO was issued by the USFWS in 2006 (File No. 1-5-05-FW-536-Tier 01). The EA evaluated the potential direct, indirect, and cumulative environmental impacts associated with issuance of the 404 permit for altering desert dry washes (ephemeral washes) to accommodate the CSI development. Authorization of this action will result in the conversion of approximately 6,881 acres of land within the Project Development Area from unoccupied desert to a planned community that will include residential housing, golf courses, public facilities, associated commercial development, and resource conservation attributes. Additionally, approximately 6,219 acres in Clark County, Nevada was set aside as the Coyote Springs Investment Conservation Lands to preserve important natural resource values of the area. Moapa dace is not included as a Covered Species in Clark County's MSHCP. Incidental take for the Moapa dace, and use of 4,600 afa of Coyote Spring Valley Basin water rights owned by CSI (2,600 afa) and the Clark County-Coyote Springs Water Resources General Improvement District (2,000 afa) to support the CSI development in Clark County, was tiered to the Intra-service programmatic BO for the Muddy River MOA (1-5-05-FW-536-Tier 02). The CSI development in Clark County has the potential to affect the Coyote Spring Valley (Basin 210) and Muddy Springs Area (Basin 219).
- **Clark County Desert Conservation Plan.** In 1995, the Clark County Desert Conservation Plan (1995) was created to minimize, monitor and mitigate the impacts on the desert tortoise on non-federal land in Clark County, Nevada.
- **Desert Tortoise (Mojave Population) Recovery Plan (USFWS 1994).** This document provides information on species life history and distribution, threats, and identifies steps towards population recovery. Recovery criteria for future downlisting and recovery units also are identified.

- **Approved Caliente Management Framework Plan Amendment and Final EIS for the Management of Desert Tortoise Habitat (BLM 2000b).** The Plan Amendment and Final Environmental Impact Statement for the Caliente Management Framework Plan implemented management goals and actions for BLM-administered desert tortoise habitat in Lincoln County, Nevada. These goals and actions, some of which are recommended in the USFWS (1994) approved Desert Tortoise (Mojave Population) Recovery Plan, will assist the recovery and delisting of the desert tortoise in the Northeastern Mojave Recovery Unit. This amendment was required to comply with the ESA of 1973, which mandates that all federal agencies conserve and recover listed species within their administrative units.
- **BLM Las Vegas Field Office Programmatic Biological Assessment.** The Las Vegas Field Office of the BLM is in the process of completing a programmatic biological assessment for activities on all lands within its jurisdiction. This biological assessment will support a Section 7 consultation with the USFWS under the ESA.
- **Virgin River Habitat Conservation and Recovery Program.** The City of Mesquite initiated development of the Virgin River Habitat Conservation Plan (VRHCP) in June 2004, with the intent of obtaining an incidental take permit. In April 2005, an agreement was reached between the City of Mesquite, the USFWS, and Clark County to expand the scope of the VRHCP by providing an opportunity for ESA compliance associated with activities beyond the discretion of the City of Mesquite, as well as implementing recovery actions. This resulted in the proposal to develop the Virgin River Habitat Conservation and Recovery Program (VRHCRP). Guidance and direction for development of the VRHCRP was sought from other cooperating agencies/entities including the SNWA, Virgin Valley Water District (VVWD), BLM, NPS, and NDOW. The VRHCRP will serve as the primary mechanism for implementing conservation measures associated with aquatic and riparian species in the Virgin River Basin. Additionally, the framework for administration of the VRHCRP, as well as the technical, stakeholder, and public involvement processes would be adapted and modified to include the Virgin River Basin Resource Conservation Assessment (VRBRCA) process. The VRBRCA is broader in scope than the VRHCRP and includes: 1) assessing the status, including potentially conducting presence/absence surveys and developing objectives and a monitoring program for approximately 55 additional species; 2) involvement by more entities in the plan development decision making process; 3) coordination with the Clark County MSHCP process; 4) integration of potential recreational and cultural resource issues; and 5) the production of a document structured for a resource conservation assessment (Clark County Format).

10.3.5 Summary of Cumulative Effects

10.3.5.1 Moapa Dace and Virgin River Chub

Water supply development that result in declines to the carbonate aquifer has the potential to affect habitat of Moapa dace and Virgin River chub, which inhabit the Muddy River and its associated springs, as well as springs that support populations of aquatic species. Previous studies on groundwater development by Las Vegas Valley Water Department (LVVWD 2001, as cited in BLM 2007), USFWS (2006, as cited in BLM 2007), and Schaefer and Harrill (1995, as cited in BLM 2007), in part or all of the White River Groundwater Flow System have indicated that groundwater levels within the carbonate aquifer would decline, and also that flows in the springs and the Muddy River would be reduced after a several decades of groundwater pumping. However, study on effects of groundwater development of only the water rights and pending applications has not been completed.

Groundwater development in the Muddy River Springs Area, California Wash, Coyote Spring Valley, and the Kane Springs Valley (by stipulation) groundwater basins by SNWA, CSI, MVWD, and the Moapa Band of Paiutes (Tribe) would occur in compliance with the Muddy River MOA. This MOA implemented triggers protection of the Moapa dace in relation to their groundwater development actions in these basins. These actions would ensure that groundwater pumping would not result in significant adverse effects to surface waters in the Muddy River system, through monitoring and required reductions and/or cessations in pumping to protect surface flows.

Order 1169 held in abeyance the appropriation of additional waters from the Coyote Spring Valley and neighboring hydrographic basins until completion of a pump test that would determine impacts to flows of the

Muddy River Springs. The pump test requires at least half of the existing permitted water in the basin be pumped for two consecutive years during a minimum five-year study period using a "staged development" (phased pumping) approach. Groundwater rights held in abeyance by this decision include, among others, 108,600 afa and 27,500 afa from Coyote Spring Valley hydrographic basin applied for by CSI and LVVWD, respectively.

CSI has secured, through an affiliate, water rights in northern and central Lincoln County. Also, CSI has secured Kane Springs Valley water from LCWD/Vidler, pending appropriation by the Nevada State Engineer. By stipulation among LCWD/Vidler and USFWS, groundwater production by Kane Springs was made subject to the Trigger Levels set out in the Muddy River MOA. Other large groundwater projects, such as the Clark, Lincoln, and White Pine County Groundwater Development Project will likely have monitoring and mitigation plans associated with them, which would also prevent adverse effects to groundwater and surface water levels linked to the White River Groundwater Flow System. Hydrologic and biologic monitoring, management, and mitigation plans are also being prepared by SNWA and Department of Interior agencies for SNWA's permitted water rights in Spring Valley, pursuant to a stipulation for withdrawal of protest signed in September 2006.

Overall, significant cumulative impacts could potentially occur to groundwater in the White River Groundwater Flow System as a result of groundwater development projects in the cumulative analysis area, but would likely be avoided by monitoring and mitigation plans associated with the Muddy River MOA, Stipulation between USFWS and LCWD/Vidler, and components of EIS processes (e.g., proposed monitoring plan for Clark, Lincoln, and White Pine Counties Groundwater Development Project).

Alteration of WOUS in Lincoln and Clark counties that connect to the Pahranagat Wash would be unlikely to adversely affect Moapa dace and Virgin River chub because of a combination of BMPs and because the Pahranagat Wash's channel only connects to the Muddy River during 100-year flood events. Other activities and projects would be unlikely to affect the Muddy River, except for the Muddy River Recovery Implementation Program, which would be expected to provide benefits to these two federally listed species.

Because these cumulative impacts to groundwater would likely be avoided, it is unlikely that cumulative effects would result in jeopardy for the Moapa dace and Virgin River chub. However, the potential to adversely affect these species would exist, alongside benefits received from the Muddy River Recovery Implementation Program.

10.3.5.2 Desert Tortoise, Banded Gila Monster, and Western Burrowing Owl

Development of CSI lands in Clark County (6,881 acres) and Lincoln County (up to 20,716 acres on CSI lands and up to 244 acres in the BLM Utility Corridor for detention basins) could result in the loss of up to 28,221 acres of special status species habitat in Coyote Spring Valley. Indirect effects on surrounding lands from increased fragmentation, predators, noise, recreation, and other actions could also occur.

Development of a Multiple-Species Habitat Conservation Plan for CSI lands in Lincoln County would provide a mechanism to protect terrestrial special status species occurring within the project area. Conservation measures would include adding lands to the existing CSICL, funding research and management initiatives for desert tortoise, and implementing best management practices. These measures would enhance recovery actions for the desert tortoise, a beneficial effect to the species. Surveys for banded Gila monster and western burrowing owl would provide additional scientific information that could assist in future recovery efforts and reducing effects of the phased CSI Development Project. Protected lands within the CSICL in Clark County and 7,548 acres within Lincoln County, as well as the surrounding BLM and USFWS lands, would provide protection and unfragmented habitat for desert tortoise, banded Gila monster, western burrowing owl, and other Evaluation and Watch List terrestrial species in the area. Adverse effects to desert tortoise from development of CSI lands in Clark County would be offset by conservation measures as identified in the Clark County Multiple-Species Habitat Conservation Plan. Adverse effects to desert tortoise from development of the LCLA lands, Alamo Industrial Park and Community Expansion Area, and Toquop Energy Project and maintenance of road and railroad ROWs would be offset by conservation measures as identified in the Southeastern Lincoln County Habitat Conservation Plan, which addresses incidental take for desert tortoise and southwestern willow flycatcher. In 2005, approximately 403,000 acres of desert tortoise habitat burned southern Nevada, including 15,559 acres (4 percent) of the Mormon Mesa CHU. In 2006, one fire burned 22 acres of the Mormon Mesa CHU.

Table 10-3 highlights potential habitat disturbance of all projects with the cumulative effects analysis area for this project (Lincoln and Clark counties, Nevada).

Table 10-3 Acres Disturbed or to be Disturbed of Desert Tortoise Habitat within the Cumulative Effects Analysis Area

Project	Desert Tortoise Habitat Disturbed (Acres)
CSI Development and detention basins in Lincoln County	up to 20,716 acres for the CSI Development and 244 acres for the detention basins
CSI Development in Clark County	included in Clark County MSHCP acreage below
Coyote Spring Well and Moapa Transmission System Project	121.7 acres
Toquop Energy Project	included in SLCHCP acreage below
Additional Moapa Valley Water District Groundwater Pumping in Upper Moapa Valley	unknown, none if no new wells are constructed
Clark, Lincoln, and White Pine Counties Groundwater Development Project	unknown
Alamo Industrial Park and Community Expansion Sale	included in SLCHCP
Ely Energy Center	0 acre, outside of desert tortoise's range
Coyote Springs 138-kV Transmission Line Project	165.5 acres of permanent disturbance and 125.1 acres of temporary disturbance
Great Basin Transmission LLC Electrical Transmission Project	160 acres of permanent disturbance and 165 acres of temporary disturbance
BLM LVFO Programmatic BA	5,280 acres
BLY Ely District RMP	generalized plan, includes 212,500 acres of ACECs designated for protection of desert tortoise habitat
Muddy River MOA	none
Muddy River RIP	unknown, likely none, as activities would be focused along the Muddy River and its floodplain
buildout of LCLA property	included in SLCHCP acreages below
Virgin River Conservation Management Assessment (VRCMA)	conservation measures will be proposed, no adverse effects anticipated
Southeastern Lincoln County Habitat Conservation Plan (SLCHCP)	18,476 acres total affected by activities covered under the SLCHCP, offset by conservation measures
Virgin River Habitat Conservation and Recovery Program	any effects to desert tortoise addressed through CC MSHCP
Kane Springs Groundwater Development Project	23 acres of permanent habitat disturbance, 191 acres of temporary habitat disturbance
Reservoir and Flood Control Facilities in the BLM utility corridor Environmental Assessment for Pardee Homes of Nevada	426.79 acres of permanent disturbance and 241.8 temporary disturbance from detention basins
Southern Nevada fire complex from 2005	Approximately 403,000 acres were disturbed in southern Nevada
Clark County MSHCP	up to 145,000 acres of desert tortoise habitat disturbed, permitted under the CCMSHCP and offset by conservation measures
Total	greater than 192,355 acres of desert tortoise habitat disturbed in Lincoln and Clark counties, Nevada; approximately 403,000 acres were disturbed from fires, many of the acres likely overlap with the 1192,355 acres disturbed by other projects and actions

Protected lands within the CSICL in Clark County, as well as the surrounding BLM and USFWS lands, would continue to provide protection and unfragmented habitat for desert tortoise, banded Gila monster, western burrowing owl and other special status species in the area.

Overall, cumulative effects to desert tortoise would be adverse, through the loss of habitat from various projects involving ground disturbance. However, avoidance, minimization, and mitigation measures from the Clark County MSHCP, Southeastern Lincoln County HCP, and CSI MSHCP would offset much of the effects of these projects and would provide habitat protection and research and management opportunities in the

Northeastern Mojave Recovery Unit. Cumulative effects to desert tortoise would result in adverse effects, but would not result in jeopardy for the species.

Cumulative effects to banded Gila monster and western burrowing owl would be similar to those for the desert tortoise, although HCP efforts would be less for the banded Gila monster (Clark County MSHCP and CSI MSHCP only) and western burrowing owl (CSI MSHCP and as an Evaluation Species in Clark County MSHCP). Adverse effects would occur to these species, but would not be expected to result in population level effects, as the amount of remaining habitat is large in comparison to those lands disturbed by projects.

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