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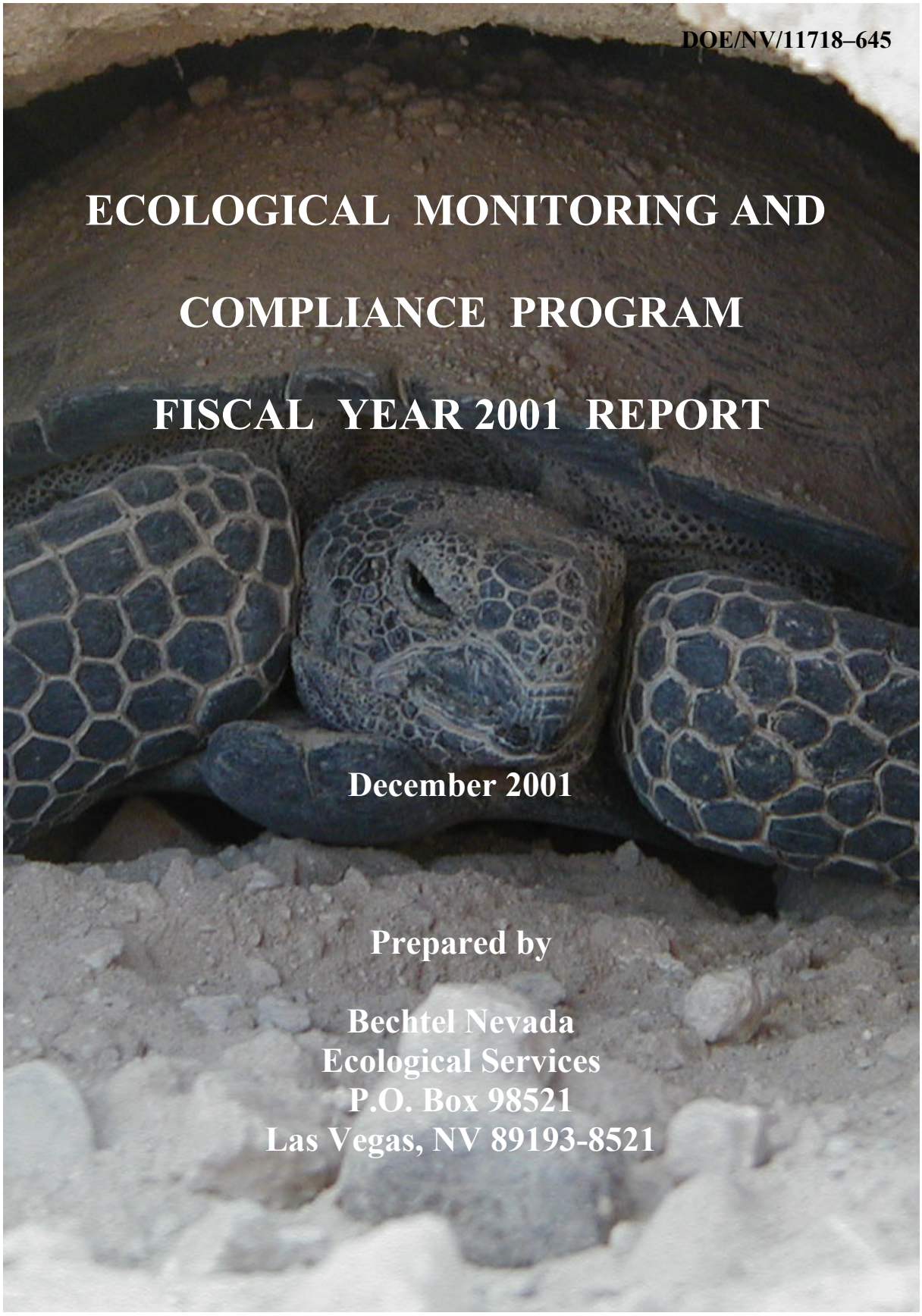

ECOLOGICAL MONITORING AND COMPLIANCE PROGRAM FISCAL YEAR 2001 REPORT

December 2001

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WORK PERFORMED UNDER
CONTRACT NO. DE-AC08-96NV11718

Prepared for the
U.S. Department of Energy
National Nuclear Security Administration
Nevada Operations Office
Environment, Safety, and Health Division
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ACRONYMS AND ABBREVIATIONS

BN	Bechtel Nevada
CAU	Corrective Action Unit
CWA	Clear Water Act
DOE/NV	U.S. Department of Energy, Nevada Operations Office
ELU	Ecological Landform Unit
EMAC	Ecological Monitoring and Compliance
E-MAD	Engine Maintenance, Assembly, and Disassembly
ESA	Endangered Species Act
ESHD	Environment, Safety, and Health Division
FWS	U.S. Fish and Wildlife Service
FY	Fiscal Year
GIS	Geographic Information System
m	Meter(s)
NNSA/NV	U.S. Department of Energy, ,National Nuclear Security Administration Nevada Operations Office
NTS	Nevada Test Site
R-MAD	Reactor Maintenance, Assembly, and Disassembly
RMP	Resource Management Plan

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ABSTRACT

The Ecological Monitoring and Compliance program, funded through the U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office, monitors the ecosystem of the Nevada Test Site (NTS) and ensures compliance with laws and regulations pertaining to NTS biota. This report summarizes the program's activities conducted by Bechtel Nevada during fiscal year 2001. Program activities included: (1) biological surveys at proposed construction sites, (2) desert tortoise compliance, (3) ecosystem mapping and data management, (4) sensitive species and unique habitat monitoring, and (5) biological monitoring at the HAZMAT Spill Center. Biological surveys for the presence of sensitive species were conducted for 23 NTS projects. Eleven sites were in desert tortoise habitat. These projects have the potential to disturb a total of 588 acres, where 568 acres of disturbance would be off-road driving. No tortoises were found in or displaced from project areas, and no tortoises were accidentally injured or killed at project areas. One tortoise was crushed by a vehicle on a paved road. A topical report describing the classification of habitat types on the NTS was completed and distributed. The report is the culmination of three years of field vegetation mapping and the analysis of vegetation data from over 1,500 ecological landform units. Compilation of historical wildlife data was initiated. A long-term monitoring plan for important plant species that occur on the NTS was completed. Site-wide monitoring was conducted for the western burrowing owl, bat species of concern, wild horses, and raptor nests. Sixty-nine of 77 known owl burrows were monitored. As in previous years, some owls were present year round on the NTS. An overall decrease in active owl burrows was observed within all three ecoregions (Mojave Desert, Transition, Great Basin Desert) from October through January. An increase in active owl burrows was observed from mid March to early April. A total of 55 juvenile owls was detected from 11 breeding pairs. Pellet analysis of burrowing owls was completed which identified key prey species. A total of 272 bats, representing 10 bat species were captured in mist-nets at water sources in the Great Basin Desert ecoregion. Bats were detected with the Anabat II call-recording system at water sources and selected tunnel and mine entrances. Thirty-seven adult horses and 11 foals were counted this year. Two of the eleven foals observed last year survived to yearlings. Seven active raptor nests were found and monitored this year. These included two Great-horned Owl nests, three Barn Owl nests, and two Red-tailed Hawk nests. Selected wetlands and man-made water sources were monitored for physical parameters and wildlife use. No dead animals were observed this year in any plastic-lined sump. The chemical spill test plans for four experiments at the HAZMAT Spill Center were reviewed for their potential to impact biota downwind of spills on Frenchman Lake playa.

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1.0 INTRODUCTION

The Environment, Safety, and Health Division (ESHD) of the U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office (NNSA/NV) requires ecological monitoring and biological compliance support for activities and programs conducted at the Nevada Test Site (NTS). Bechtel Nevada (BN) Ecological Services has implemented the Ecological Monitoring and Compliance (EMAC) program to provide this support. EMAC is designed to ensure compliance with applicable laws and regulations, delineate and define NTS ecosystems, and provide ecological information that can be used to predict and evaluate the potential impacts of proposed projects and programs on those ecosystems.

The ecological monitoring tasks conducted in fiscal year (FY) 2001 (October 1, 2000, through September 30, 2001) included: (1) Biological Surveys, (2) Desert Tortoise Compliance, (3) Ecosystem Mapping/Data Management, (4) Sensitive Species and Habitat Monitoring, and (5) HAZMAT Spill Center Monitoring. The five sections of this report document work performed under these five program areas.

This year, work also continued toward archiving and documenting geospatial EMAC data to allow its distribution to agencies and scientists. These efforts included entering historic capture or sighting records for animals into geospatial databases, producing metadata for the NTS ecosystem mapping data, and creating geospatial coverages of historical preactivity survey sites. Also, computerized photographic files of sensitive habitats (e.g., wetlands, sensitive plant locations) and species (e.g., horses) continued to be updated and organized to facilitate retrospective analysis of the data. Any data sharing and collaboration with other agencies and scientists which occurred during the year are mentioned in this report under each EMAC sub-task.

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2.0 BIOLOGICAL SURVEYS

Biological surveys are performed at proposed NTS project sites where land disturbance will occur. The goal is to minimize adverse effects of land disturbance on sensitive plant and animal species, their associated habitat, and important biological resources. Sensitive species include those protected under state or federal regulations which are known or suspected to occur on the NTS (Table 1). Important biological resources include such things as cover sites, nest or burrow sites, roost sites, or water sources important to sensitive species. Survey reports are written to document species and resources found and to provide mitigation recommendations.

2.1 Sites Surveyed and Sensitive Species Observed

Biological surveys for 23 projects were conducted on or near the NTS (Figure 1, Table 2). For some of the projects, multiple sites were surveyed (Figure 1). A total of 718.31 acres was surveyed for the projects (Table 2).

Eleven of the projects had sites within the range of the threatened desert tortoise (*Gopherus agassizii*) (Figure 1). Sensitive species (or their sign) and important biological resources found within proposed project boundaries included nesting barn owls, sensitive plant populations, potential tortoise burrows, kit fox dens, predator burrows, Joshua trees, and cacti (Table 2). A pair of breeding barn owls were found in each of two buildings scheduled for demolition (Projects 01-06 and 01-18). A known population of Clokey's eggvetch (*Astragalus oophorus* var. *clokeyanus*) in Area 12 occurs within a proposed disturbance area for the U12v Tunnel Seismic Lines project (Project 01-23). A new population of Pahute Mesa beardtongue (*Penstemon pahutensis*) was found in Area 12 on Rainier Mesa during surveys for the same project. The most extensive surveys conducted were transect surveys along approximately 160 miles of staked lines over an 8,700-acre area in Frenchman Flat where geoseismic studies will be conducted (Project 01-21). Off-road driving will occur along these lines by trucks creating seismic vibrations and by equipment trucks needed to place and retrieve geophones. Active predator and kit fox burrows were the only significant resources found during these extensive transect surveys. BN completed 19 biological survey reports (BN, 2000; 2001a-r) which included conservation recommendations, where appropriate (Table 2).

2.2 Potential Habitat Disturbance

Sixteen of the projects for which surveys were conducted were entirely on sites previously disturbed (e.g., industrial waste sites, existing borrow areas, existing well pads, road renovations), and therefore no pristine habitat was, or will be, disturbed at these sites (Table 2). Surveys are conducted at old industrial or nuclear weapons testing sites whenever vegetation has re-invaded a site or it is suspected that a sensitive species may be found. For example, tortoises may move through revegetated earthen sumps and may be concealed under vegetation during activities where heavy equipment is used. Preactivity surveys are conducted at such revegetated sites to ensure they are not in harm's way. Also, burrowing owls frequently inhabit burrows and

Table 1. Sensitive species that are protected under state or federal regulations which are known to occur on or adjacent to the NTS

Plant Species	Common Names	Status [a]
Arctomecon merriamii	Desert bearpoppy	SOC
Astragalus beatleyae	Beatley's milkvetch	SOC
Astragalus funereus	Funeral Mountain milkvetch	SOC
Astragalus oopherus var. *clokeyanus*	Clokey's egg vetch	RA
Camissonia megalantha	Largeflower suncup	SOC
Cymopterus ripleyi var. *saniculoides*	Ripley's springparsley	SOC
Frasera pahutensis	Modoc elkweed	SOC
Galium hilendiae ssp. *kingstonense*	Hilend's bedstraw	SOC
Penstemon albomarginatus	Whitemargin beardtongue	SOC
Penstemon fruticiformis var. *amargosae*	Death Valley beardtongue	SOC
Penstemon pahutensis	Pahute Mesa beardtongue	SOC
Phacelia beatleyae	Beatley's scorpionweed	SOC
Phacelia parishii	Parish's scorpionweed	SOC
Reptile Species		
Gopherus agassizii	Desert tortoise	LT, NPT
Sauromalus obesus	Chuckwalla	SOC
Bird Species[b]		
Athene cunicularia hypugea	Western burrowing owl	SOC, P
Alectoris chukar	Chukar	G
Aquila chrysaetos	Golden eagle	EA, P
Buteo regalis	Ferruginous hawk	SOC, P
Callipepla gambelii	Gambel's quail	G
Charadrius montanus	Mountain plover	PT, P
Empidonax wrightii	Gray flycatcher	SOC
Falco peregrinus anatum	American peregrine falcon	<LE, P
Ixobrychus exillis hesperis	Western least bittern	SOC, P
Phainopepla nitens	Phainopepla	SOC
Plegadis chihi	White-faced ibis	SOC, P
Vermivora luciae	Lucy's warbler	SOC

Table 1. (Continued)

Mammal Species	Common Name	Status [a]
Antilocapra americana	Pronghorn antelope	G
Corynorhinus townsendii pallescens	Townsend's big-eared bat	SOC
Equus asinus	Burro	H&B
Equus caballus	Horse	H&B
Euderma maculatum	Spotted bat	SOC, NPT
Felis concolor	Mountain lion	G
Lynx rufus	Bobcat	F
Myotis ciliolabrum	Small-footed myotis	SOC
Myotis evotis	Long-eared myotis	SOC
Myotis thysanodes	Fringed myotis	SOC
Myotis volans	Long-legged myotis	SOC
Myotis yumanensis	Yuma myotis	SOC
Nyctinomops macrotis	Big free-tailed bat	SOC
Ovis canadensis nelsoni	Desert bighorn sheep	G
Odocoileus hemionus	Mule deer	G
Sylvilagus audubonii	Desert cottontail	G
Urocyon cinereoargenteus	Gray fox	G
Vulpes velox macrotis	Kit fox	F

[a]Status Codes:

Endangered Species Act (ESA), U.S. Fish and Wildlife Service (FWS)
LT - Listed Threatened
PT - Proposed for listing as Threatened
RA - Former Candidate or Proposed species; current information does not support proposal to list because species has proven more abundant or widespread, or to lack identifiable threats; a species of concern
<LE - Former listed endangered species
SOC - Species of concern

U.S. Department of Interior
H&B - Protected under Wild Free Roaming Horses and Burros Act
EA - Protected under Bald and Golden Eagle Act

State of Nevada
NPT - Protected Threatened
G - Regulated as game
F - Regulated as fur-bearer
P - Protected bird

[b]Does not include all bird species that are protected by the Migratory Bird Treaty Act or by the state. Additionally, there are 26 birds which have been observed on the NTS, which are all protected by the state.

Figure 1

Table 2. Summary of biological surveys conducted on the NTS during FY 2001

Project No.	Project	Important Species/ Resources Found	Area Surveyed (acres)	Proposed Project Area in Undisturbed Habitat (acres)	Conservation Recommendations
01-01	Remediation at U3ax/bl Crater (Corrective Action Unit [CAU] 110)	None	11.1	0	None
01-02	Construction of Outlet Ditch and Access Road at Well ER-5-4	None	6.2	0	None
01-03	Construction of Upper U12v Tunnel Access Road	Yucca, cacti	22.0	2.5	Avoid mature trees
01-04	Characterization of Area 6 Injection Well and Drain Pit (CAU 335)	None	1.4	0	None
01-05	Characterization of Area 22 Weather Station Fuel Storage (CAU 321)	None	3.3	0	None
01-06	Demolition of Decon Building at R-MAD Facility (CAU 254)	Nesting barn owls	0	0	Monitor chicks, postpone demolition until chicks fledge
01-07	Test Cell A Leachfield Remediation (CAU 261)	None	0.2	0	None
01-08	Soil Sampling at Area 22 Weather Station Fuel Storage (CAU 321)	None	0.5	0	None
01-09	Remediation at Area 22 Sewage Lagoons and Desert Rock Airport Strainer Box (CAU 230/320)	Yucca, cacti	3.2	0.25	Avoid yucca and cacti
01-10	U12 G Tunnel Bat Survey	None	0	0	None
01-11	Construction of runway and pad for Lost Link Aerial Operations Facility	None	21.7	7.9	None
01-12	Reuse of Area 2 and Area 8 Borrow Pits	None	12.6	0	None
01-13	Erosion Control at Area 27 Landfill	Potential tortoise burrows, quail, deer and predator signs	0.5	0.09	Avoid burrows
01-14	G Tunnel Fungi Survey	None	0	0	Identify fungi samples taken
01-15	Remediation at Area 3 Mud Plant and Camp (CAU 34)	Doves, raptor	3.7	0	Contact biologists if tamarisk trees are to be removed
01-16	Plugging of Existing Boreholes	Buried pipes used by burrowing owls	12.2	0.1	None
01-17	Renovation of Mercury Highway	None	0.1	0	None

Table 2. (Continued)

Project Number	Project	Important Species/ Resources Found	Area Surveyed (acres)	Proposed Project Area in Undisturbed Habitat (acres)	Mitigation Recommendations
01-18	Demolition of Building 210	Nesting barn owls	0	0	Monitor chicks, postpone demolition until chicks fledge
01-19	Remediation at Site 02-99-01 (CAU 387)	Inactive predator burrows	0.01	0	None
01-20	Characterization/Remediation at Area 3 Camp Injection Wells (CAU 322)	None	0.9	0	None
01-21	Frenchman Flat Geo-Seismic Study	5 kit fox dens/burrow sites, 14 predator burrows	580	568	Avoid burrows
01-22	Remediation at Six Spill and Surface Debris Sites (CAU 392)	None	5.1	0	None
01-23	U12v Tunnel Seismic Lines	*Astragalus oophorus* var. *clokeyanus*, *Penstemon pahutensis*	33.6	9.69	Reroute line to avoid *A. oophorus* var. *clokeyanus*
	Total		718.31	588.53	

culverts at disturbed sites, so preactivity surveys are conducted to ensure that adults, eggs, and nestlings in burrows are not harmed.

Nineteen of the 23 projects were located either partially or entirely in areas that had not been previously disturbed. The proposed projects for which surveys were conducted this fiscal year have the potential to disturb a total of 588.53 acres, where 568 acres of disturbance will be off-road driving along regularly-spaced lines in Frenchman Flat (Project 01-21) (Table 2). Only four of the 23 projects are expected to disturb any areas designated as important habitat on the NTS (Table 3, Figure 2).

Table 3. FY 2001 projects within important habitats* and acreage proposed for disturbance

Project No.	Site Name	Pristine Habitat (acres)	Unique Habitat (acres)	Sensitive Habitat (acres)	Diverse Habitat (acres)
01-02	Construction of Outlet Ditch and Access Road at Well ER-5-4			0	
01-12	Reuse of Area 8 Borrow Pit			0	
01-16	Plugging of Existing Boreholes U4av PS#1A, U9bi #2 PS#1A			0	
01-23	U12v Tunnel Seismic Lines		7.84		
	Total	0	7.84	0	0

*Important Habitat Definitions:

Pristine: Habitat with few man-made disturbances
Unique: Habitat containing uncommon biological resources such as a natural wetland
Sensitive: Habitat containing vegetation associations which recover very slowly from direct disturbance
Diverse: Habitat with high plant species diversity

Figure 2 here

3.0 DESERT TORTOISE COMPLIANCE

The desert tortoise occurs within the southern one-third of the NTS. This species is listed as threatened under the Endangered Species Act (ESA). In December 1995, NNSA/NV completed consultation with the U.S. Fish and Wildlife Service (FWS) concerning the effects of NNSA/NV activities, described in the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DOE/NV, 1996), on the desert tortoise. A final Biological Opinion (Opinion) (FWS, 1996) was received from the FWS in August 1996. The Opinion concluded that the proposed activities on the NTS were not likely to jeopardize the continued existence of the Mojave population of the species and that no critical habitat would be destroyed or adversely modified. All terms and conditions listed in the Opinion must be followed when activities are conducted within the range of the desert tortoise on the NTS.

The Desert Tortoise Compliance task of EMAC was developed to implement the terms and conditions of the Opinion, to document compliance actions taken by NNSA/NV, and to assist NNSA/NV in FWS consultations. The terms and conditions that were implemented for NNSA/NV by BN staff biologists in FY 2001 included: (1) conducting clearance surveys at project sites within 24 hours from the start of project construction, (2) ensuring that environmental monitors are on-site during heavy equipment operation, and (3) preparing an annual compliance report submitted to the FWS.

3.1 Project-specific Compliance Activities

Biologists conducted desert tortoise clearance surveys prior to ground-disturbing activities for 8 proposed NTS projects at 11 different sites (Table 4, Figure 1). One tortoise burrow and three potential tortoise burrows were the only tortoise sign found (Table 2, Project Numbers 00-19 and 00-22). Only two potential tortoise burrows were found in a buffer zone surveyed outside the project area for Project 01-13 (Table 4). No tortoises or other sign of tortoises were found. BN Ecological Services ensured that on-site construction monitoring was conducted by a designated environmental monitor at all sites where clearance surveys were performed.

Only three of the eight projects (Projects 01-09, 01-13, and 01-21) have the potential of disturbing tortoise habitat as most of the projects were in already-disturbed areas (Table 4). Post-activity surveys will be conducted during the first quarter of next FY at these three sites to document long-term disturbance to viable tortoise habitat. Post-activity surveys are not conducted if viable tortoise habitat is not found within the project area boundaries during the clearance survey, and if the environmental monitor documented that the project stayed within its proposed boundaries. Acres of disturbed tortoise habitat will be reported in the annual report that will be submitted in January 2002 to the FWS.

Table 4. Summary of tortoise compliance activities conducted by BN biologists during FY 2001

Project Number	Project	Compliance Activities	Tortoise Habitat Disturbed (acres)
01-02	Construction of Outlet Ditch and Access Road at Well ER-5-4	Voluntary 100 percent-coverage survey, site is in area exempt from terms and conditions of Biological Opinion	N/A[1]
01-05	Characterization of Area 22 Weather Station Fuel Storage (CAU 321)	100 percent-coverage survey	0 (APD[2])
01-07	Test Cell A Leachfield Remediation (CAU 261)	100 percent-coverage survey	0 (APD)
01-08	Soil Sampling at Area 22 Weather Station Fuel Storage (CAU 321)	100 percent-coverage survey	0 (APD)
01-09	Remediation at Area 22 Sewage Lagoons and Desert Rock Airport Strainer Box (CAU 230/320)	100 percent-coverage survey	TBD[3]
01-13	Erosion Control at Area 27 Landfill	100 percent-coverage survey, flagged 2 potential tortoise burrows outside project area	TBD
01-17	Renovation of Mercury Highway	100 percent-coverage survey	0 (APD)
01-21	Frenchman Flat Geo-Seismic Study	100 percent-coverage survey	TBD
01-22	Remediation at Two of Six Spill and Surface Debris Sites (CAU 392)	100 percent-coverage survey	0 (APD)
		Total	TBD

[1]N/A - Not applicable
[2]APD - Area previously disturbed
[3]TBD - To be determined during a post-activity survey

3.2 Other Compliance Activities

On January 18, 2001, BN submitted to ESHD the annual report that summarized tortoise compliance activities conducted on the NTS from January 1 through December 31, 2000 (BN, 2001s). This report, required under the Opinion, contains (1) the location and size of land disturbances that occurred within the range of the desert tortoise during the reporting period; (2) the number of desert tortoises injured, killed, or removed from project sites; (3) a map showing the location of all tortoises sighted on or near roads on the NTS; and (4) a summary of construction mitigation and monitoring efforts.

Compliance with the Opinion will ensure that the two goals of the NNSA/NV Resource Management Plan are being met; namely, that the desert tortoise is protected on the NTS and that the cumulative impacts on this species are minimized (DOE/NV,1998). In the Opinion, the FWS has determined that the "incidental take"[1] of tortoises on the NTS and the cumulative acreage of tortoise habitat disturbed on the NTS are parameters to be measured and monitored annually. During this FY, the threshold levels established by the FWS for these parameters were not exceeded (Table 5). No desert tortoises were accidentally injured or killed, nor were any captured or displaced from NTS project sites. On August 3, 2001, a tortoise was found crushed by a vehicle on a paved road. NNSA/NV reported this take to FWS law-enforcement officials as required under the Opinion.

Table 5. Parameters and threshold values for desert tortoise monitoring on the NTS

Monitored Parameter	Threshold Value	Adaptive Management Action	FY 2001 Value of Monitored Parameter
Number of tortoises accidentally injured or killed as a result of NTS activities per year	3	Re-initiate consultation with FWS	0
Number of tortoises captured and displaced from NTS project sites per year	10	Re-initiate consultation with FWS	0
Number of tortoises taken in form of injury or mortality on paved roads on the NTS by vehicles other than those is use during a project	Unlimited	Supplemental employee education and bulletins	1
Number of total acres of desert tortoise habitat disturbed during NTS project construction since 1992	3,015	Re-initiate consultation with FWS	205

[1]To "take" a threatened or endangered species, as defined by the ESA, is to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct.

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4.0 ECOSYSTEM MAPPING/DATA MANAGEMENT

In FY 1996 efforts were begun to map wildlife and plant habitats of the NTS. Field data were collected, analyzed, and preliminary maps created to show basic habitat features. Databases were developed and linked to geographic information system (GIS) maps to facilitate creation of habitat-physical feature maps.

Emphasis during FY 2001 was on publication of the report describing the classification of vegetation on the NTS and on the compilation of historical species-specific wildlife collection and sighting data from the NTS.

4.1 NTS Vegetation Classification Report

The topical report *Classification of Vegetation on the Nevada Test Site* (Ostler et al., 2000) was published and distributed this FY. Ten vegetation alliances and 20 associations were recognized as occurring on the NTS. Two major vegetation groups or ecoregions, Mojave Desert and Great Basin Desert, are identified along with the broad Transition Zone between these two ecoregions. Analysis of species diversity (richness or the number of species) of perennial trees and shrubs is presented. Species richness of woody species was greatest in the Great Basin Desert compared to associations in the Transition Zone and the Mojave Desert. Similar species diversity patterns were also observed for all combined perennial species on the NTS. Several appendices are presented that provide details of vegetation on the NTS, including lists of all species that have been recorded on the NTS and the vegetation alliances where they are commonly found, relative abundance and frequency values for species in vegetation alliances and associations, and species names and codes.

4.2 Compilation of Historical Wildlife Data

This year, work started on entering location coordinates into the Ecological Geographic Information Ssystem (EGIS) fauna database for historical animal sighting and specimen collection sites on the NTS. The data will be used to link animal distribution data to the vegetation classification data gathered from Ecological Landform Units (ELUs). A review of all published vertebrate and invertebrate inventories and research performed on the NTS was conducted to identify geographical information. Other sources searched included field notes from past and present researchers on the NTS and collection records for vertebrate specimens maintained at the Brigham Young University museum in Provo, Utah. Wildlife observations made by BN biologists or reported to Ecological Services by NTS workers are also maintained in the EGIS animal database, and new wildlife observations were entered into the EGIS database as well. To date, thousands of data entries have been made. This work will continue next FY and faunal distribution maps will begin to be produced.

4.4 Coordination With Ecosystem Management Agencies/Scientists

Collaboration with the U.S. Geological Survey Biological Services continued in FY2001. Data that is being gathered will be used to evaluate changes in vegetation originally sampled by Janice Beatley in the 1970s. Data show that significant changes to species and plant community composition have occurred in some areas. Studies will be useful to document changes due to climatic shifts (e.g., global warming) and direct and indirect effects of nuclear testing.

Data collected as part of the vegetation mapping efforts was used in support of studies to characterize potential biointrusion into buried waste at the NTS from ants and termites. BN scientists spent several days assisting scientists from Neptune and Company, Inc., of Los Alamos, New Mexico and scientists at the University of Toronto in Ontario, Canada in conducting their research efforts.

Copies of the *Classification of Vegetation on the Nevada Test Site* were provided to several government and state agencies, local universities and other interested parties. Nearly all of the 100 copies that were made have been distributed.

BN scientists completed and submitted a paper for the proceedings of the 11th Wildland Shrub Symposium held on June 13-15, 2001, at Brigham Young University in Provo, Utah. The paper describes biodiversity analysis of vegetation on the NTS. It emphasizes different measures of species diversity and their spatial patterning in the Mojave and Great Basin deserts and transition areas between these two deserts. The proceedings should be published by the end of the 2001.

5.0 SENSITIVE SPECIES AND HABITAT MONITORING

5.1 ESA-protected Species and Species of Concern

There are 26 species which occur on the NTS that are considered sensitive because they are either listed as threatened or endangered under the ESA, are current candidates for listing, or are species of concern (Table 1). The desert tortoise is the only threatened or endangered species which could be significantly impacted by NNSA/NV activities. EMAC tasks related to the desert tortoise are addressed in Section 3.0 of this report. As with the desert tortoise, the goal of species and habitat monitoring is to ensure the continued presence of all sensitive species on the NTS by protecting them from significant impacts due to NNSA/NV actions. A secondary goal is to gather sufficient information on these species' distribution and abundance on the NTS to determine if further protection under state or federal law is necessary. Sensitive species monitoring tasks include field surveys to identify species' distribution and abundance and monitoring of the known population locations, roost sites, and burrows of these species.

Some of the federally protected species and species of concern listed in Table 1 have been sighted on the NTS, however no site-wide surveys to determine their distribution or abundance have been conducted. They include the formerly endangered American peregrine falcon (*Falco peregrinus anatum*), the candidate mountain plover (*Charadrius montanus*), and three bird species of concern: the ferruginous hawk (*Buteo regalis*), western least bittern *(Ixobrychus exillis hesperis*), and white-faced ibis (*Plegadis chihi*). All of these birds are uncommon transients to the NTS and are not expected to be impacted by NTS activities. Records of all bird sightings that are made opportunistically by EMAC biologists and other NTS workers are maintained to provide some data on these species' occurrence on the NTS.

5.1.1 Candidate Plants and Plant Species of Concern

5.1.1.1 Long-term Monitoring

NTS supports 13 plant species considered sensitive because of their past or present status under the ESA and with the State of Nevada (Table 1). In 1998, NNSA/NV prepared a Resource Management Plan (RMP) which commits to protect and conserve these sensitive plant species and to minimize cumulative impacts to them (DOE/NV, 1998). This FY, BN published and distributed the *Adaptive Management Plan for Sensitive Plant Species on the Nevada Test Site* (BN, 2001t). This document presents the procedures of a long-term adaptive management plan which will ensure that the RMP goals are met. It identifies the parameters that are measured for all sensitive plant populations during long-term monitoring and the adaptive management actions which may be taken if significant threats to these populations are detected.

The management plan was implemented this year. A known population of the sensitive plant *Astragalus oophorus* var. *clokeyanus* was visited on June 6, 2001. Ten plants were found most of which were in a vegetative state although some had older fruits still attached. The health of the plants looked good but a dirt road went through the population and appeared to be getting

increased use. This same population was found within the proposed project area for the U12v Tunnel Seismic Lines project (Project 01-23) on June 26. Recommendations were made to reroute a portion of the seismic line to avoid the population. A post-activity survey will be conducted during the first quarter of next fiscal year to document land disturbance, if any, which occurred within the population.

The type population of *Astragalus beatleyae* on Pahute Mesa was observed this year in June. Plants had already completed flowering and many had set seed although on closer analysis most of the seed had been eaten by insects. Plants did look healthy and there was no evidence of any human disturbance or loss of the habitat (Figure 3).

Figure 3. *Astragalus beatleyae* in fruit at the type locality on Pahute Mesa (Photograph taken June 2001 by W. K. Ostler)

An area along Orange Blossom road that had a population of *Camissonia megalantha* in previous years was visited in July of this year. No plants of this species were observed. This is most likely a result of the low rainfall that occurred in 2001 and not because of any NNSA/NV activities. The road had very little use for the past several years and there was no evidence of new disturbances. It is not uncommon for annuals not to germinate in poor rainfall years such as this year. No other populations of sensitive plants were monitored this year.

5.1.1.2 Coordination With Natural Resource Agency Botanists

On April 3, 2001, the Northern Nevada Native Plant Society Rare Plant Committee held its annual meeting. This meeting provides an opportunity for resource agencies to coordinate their efforts to protect rare plant species and make recommendations regarding species that may need protection under state or federal laws and regulations. BN botanists attended this year's meeting, and discussed sensitive species monitoring efforts on the NTS and solicited input on how it might be improved. BN also provided copies of the vegetation report on the NTS to interested parties.

5.1.2 Animal Species of Concern

Site-wide surveys for eight animal species of concern were initiated in 1996 (Steen et al., 1997). The species included chuckwallas (*Sauromalus obesus*), western burrowing owls (*Athene cunicularia hypugaea*), and six species of bats (Table 1). For chuckwallas, presence/absence data were gathered from all potential habitats in the southern portion of the NTS. These data were considered sufficient to identify chuckwalla habitat on the NTS. Proposed activities on the NTS are primarily within valleys, on northern mesas, or on level or gently sloping terrain, and do not include rocky slopes that are typical chuckwalla habitat. NNSA/NV impacts on chuckwalla will be monitored over time by identifying all historic and new projects that have or will disturb chuckwalla habitat. This will be done through geospatial analysis using the GIS display and analysis software, ArcView. No new field surveys for chuckwalla were conducted this FY.

Collection of baseline data on western burrowing owls and bats continued this FY. Owl monitoring included visiting known burrows monthly to detect owl activity, using still cameras at burrows to detect reproductive activity, disturbance monitoring, and pellet analysis to determine the prey base. Bat monitoring this year included mist-netting at 31 NTS water sources; Anabat surveys (i.e., using an Anabat II recording system to document species-specific ultrasonic bat calls); and use of a night vision video camera.

5.1.2.1 Western Burrowing Owl

New Burrows - Eight new burrowing owl burrow sites were found opportunistically while conducting preactivity surveys, routine owl monitoring, and from a reported sighting. Two sites were natural burrows and six sites were man-made burrows. At each new owl burrow, the following data were recorded: Universal Transverse Mercator coordinates; burrow type

(e.g., predator-excavated burrow, culvert burrow); height, width, and aspect of burrow entrance; and the presence/absence and estimated age of owl sign. All survey data were entered into an Access database.

Figure 4 illustrates the distribution of the 77 known owl burrow sites on the NTS. Of the 77 known owl burrow sites, 50 are in disturbed habitat and 27 are in undisturbed habitat. It should be noted that there may be one or more burrows or burrow entrances at any given burrow site.

Monitoring of Known Burrows to Detect Owl Use - In order to identify the seasons of immigration, emigration, and breeding of owls within the three ecoregions of the NTS, known burrows were monitored on a monthly basis from October 2000 to September 2001. Burrows at 69 of the 77 known burrow sites were monitored at least once during this time period. Burrow sites not sampled were either in remote areas, in radiologically controlled areas, were found late in the year, or had been filled in over time. Each time a burrow was visited, all owl sign (i.e., pellets, scat, prey remains, feathers, and tracks) on and around the burrow apron and under perching sites near the burrow were documented and then removed. This enabled BN biologists to document monthly owl activity at each burrow. If sign was detected at just one burrow at a site where multiple burrows occurred, then the burrow site was considered active. The number of burrow sites visited within each region varied across sampling periods because new burrow sites were found during the sampling period and some burrows became filled-in during the sampling period.

As in the past three years, burrowing owls were present on the NTS during all months of the year (Table 6). An overall decrease in active burrows is observed within all three ecoregions from October through January. This decrease probably reflects the fall migration of some owls off the NTS.

Owls were noticeably absent in the Mojave Desert ecoregion during most of January and February. During late February through mid March an influx of owls occurred as evidenced by the increase in the number of active burrows. No active burrows were detected from late June through late August. Four active burrows were found in mid September. This increase in active burrows in September may be the result of burrowing owls dispersing from other burrow sites on the NTS or possibly owls migrating through from other regions.

The number of active and inactive burrows is highest within the Transition ecoregion of the NTS. Between February 22 and March 21, a large influx of owls occurred in this ecoregion. The number of active burrows was highest in this region from late February through late July. The number of active burrows dropped by half during late July to August. Changes in burrow use within this ecoregion this year suggest that immigration occurred in late February to mid March and emigration occurred during late July to August. In the Great Basin Desert ecoregion, owls were absent during the last half of December to early January and from mid April to the end of September. This is significant because no breeding occurred in the Great Basin Desert ecoregion this year, and because up until this point owls had been continuously present in this ecoregion since March 1999.

Figure 4. Known burrowing owl burrows on the NTS.

Table 6. Summary of burrow use by burrowing owls on the NTS during FY 2001

Sampling Period	Burrow Use* By Ecoregion		
	Mojave Desert	Transition	Great Basin
Sep 8 - Oct 4	2/14 (14)	11/36 (31)	2/7 (29)
Oct 5 - Nov 15	3/14 (21)	8/36 (22)	3/7 (43)
Nov 16 - Dec 11	2/15 (13)	6/36 (17)	1/7 (14)
Dec 12 - Jan 8	2/15 (13)	5/35 (14)	0/7 (0)
Jan 9 - Feb 21	0/15 (0)	5/35 (14)	1/7 (14)
Feb 22 - Mar 21	3/16 (19)	13/35 (37)	1/6 (17)
Mar 22 - Apr 18	3/16 (19)	13/35 (37)	1/6 (17)
Apr 19 - May 25	1/16 (6)	12/37 (32)	0/6 (0)
May 26 - Jun 26	2/17 (12)	13/37 (35)	0/7 (0)
Jun 27 - Jul 25	0/17 (0)	14/38 (37)	0/6 (0)
Jul 26 - Aug 29	0/17 (0)	7/38 (18)	0/6 (0)
Aug 30 - Sep 20	4/20 (20)	8/39 (21)	0/8 (0)
Average Percent Use	**11**	**26**	**11**
Average Number of Active	**2**	**10**	**1**
Total Burrow Sites Sampled	**20**	**40**	**9**

*Numerator - Number of burrow sites where sign was found
Denominator - Number of burrow sites sampled
( ) - Percent of sampled burrow sites where sign was found

Reproductive Activity - It is important to know when burrowing owls breed and when young fledglings are able to fly. This information will help ensure that burrows are avoided and owls are unharmed during construction activities for new projects on the NTS. It is also important to document trends in owl populations over time to determine if this species is being affected by NNSA/NV activities. A good parameter to measure owl population trends is the annual number of breeding pairs. An active infrared beam and camera system was used as a passive data collection method to record the presence of breeding owls and their young at selected burrows. Two Trailmaster TM1500s hooked to a still camera were used. The camera systems were set up at burrows where owls or abundant owl sign had been observed during burrow monitoring surveys. Camera setup and operation was the same as that described two years ago (BN, 1999).

Twenty-three burrow sites were monitored using the TM1500 systems between April 25 and August 20 (Table 7). A total of 55 young owls was detected from 11 breeding pairs. Forty-nine (89 percent) of the 55 young were from burrows in the Transition ecoregion. The largest number of young owls observed at a single nest burrow was eight (Figure 5).

Table 7. Summary of burrow use by pairs of owls on the NTS during FY 2001

Ecoregion	Sites Surveyed	Burrows With Non-breeding Pairs	Burrows With Breeding Pairs	Juvenile Owls
Mojave Desert	4	0	2	6 (3/burrow)
Transition	18	2	9	49 (1-8/burrow)
Great Basin Desert	1	0	0	0
Totals	**23**	**2**	**11**	**55**

Figure 5. One adult burrowing owl and eight juveniles at a culvert burrow in northern Yucca Flat, June 2001

Based on observations during burrow monitoring and the photographic data from the Trailmaster® TM1500 cameras, the breeding period this year was from late February through late August. The breeding period is defined as the time when adults began to form pairs until the time when adults and young were no longer observed together. Three nest burrows in one area of Yucca Flat were within a 140-meter (m) radius. This is the highest concentration of breeding burrowing owls documented on the Nevada Test Site.

Eleven breeding pairs were detected this year compared to seven in 1999 and eight in 2000. Statistical trends cannot be determined for the following reasons: (1) new nest burrow sites were found each year, (2) sampling time was not uniform, and (3) numbers of owls are inherently low on the NTS. However, data on the number of breeding pairs and young are useful as qualitative indicators of the status of burrowing owls on the NTS.

The number of young detected on the NTS this year (55) was 28 percent higher than the number detected last year (43). An average of 5.0 young per breeding pair was observed this year compared to 3.4 and 5.6 young per pair observed during 1999 and 2000, respectively.

Disturbance Monitoring - To develop reasonable mitigation recommendations for land-disturbing projects in burrowing owl habitat, it is important to know the level of disturbance owls tolerate without causing nest abandonment. Two methods were used to begin to determine this disturbance tolerance. One method involved setting traffic counters near active burrow nest sites and recording the number of vehicle passes and the distance from the nest burrow to the road. The second was measuring the distance at which owls flushed from observers as they approached the owl by foot or in a vehicle.

On April 19, 2001, traffic counters were set up near seven burrow sites that were occupied by owls. The traffic counters remained operational until August 29, except for the counters at M-27 and T2 Cannon East. The M-27 counter was pulled on June 18 because of impending road work, and the T2 Cannon counter malfunctioned and was replaced with a new one. The total number of vehicle passes recorded was divided by the total number of days the traffic counter was operational. This yielded the average number of vehicles per day which passed near a burrow. These data show that owls can breed successfully with several vehicles per day passing within 10 to 269 m of a nest burrow (Table 8). No correlation is evident between the number of vehicles per day or distance to road and the number of young detected.

When owl sightings occurred, the distance from the observer to the owl when the owl flushed (i.e., flew away) or ducked into the burrow was recorded. The average flushing distance while an observer was approaching a burrow on foot was 20 m (range 4 m to 70 m; [n=49]). The average flushing distance while an observer was approaching or stopped near a burrow in a vehicle was 24 m (range 5 m to 80 m; [n=41]). These data suggest that burrowing owls are fairly tolerant of human presence.

Table 8. Summary of traffic counter data collected at burrowing owl nest burrows during FY 2001

Burrow Site	Vehicles/Day	Distance to Nest Burrow (m)	Young Detected
M-27	487.8	65	3
T2 Cannon East	1.9	78	4
T2 Cannon West	1.8	11	4
T2 Cannon	1.2	10	1
9-01 Powerline Road	0.9	172	6
9G-11	0.9	75	7
8D Road Drill Pad (E)	0.4	196	6
8D Road Drill Pad (B)	0.4	269	6
8D-2 #2	0.4	120	8
2L-5 (L Road)	0.2	11	7

Pellet Analysis - Approximately 314 samples representing 1,800 pellets were analyzed by Oregon State University at the end of FY 2000. Results indicate that food habits differ regionally and seasonally on the NTS. Table 9 shows that Orthopterans, Coleopterans, Solifugids, rodents, and scorpions were the dominant prey of the burrowing owl across the NTS. Kangaroo rats (*Dipodomys*) were the dominant rodent eaten.

Differences among ecoregion are also evident. Percent frequency of scorpions, Hemipterans, other rodents, *Peromyscus*, and *Reithrodontomys* tends to be highest in the Great Basin Desert ecoregion; whereas percent frequency of Perognathinae and *Dipodomys* was highest in the Mojave Desert and transition ecoregions, respectively.

Table 10 shows the seasonal differences in prey items across the NTS. Percent frequency of Orthopterans, Coleopterans, Solifugids, and scorpions decreases from fall to winter, whereas percent frequency of rodents increases from fall to winter. These data suggest that a seasonal shift in prey from invertebrates to rodents from fall to winter occurs. This seems logical because many invertebrates are not active during the colder parts of the year. Also, reptiles, pocket gophers (*Thomomys*), sagebrush voles (*Lemmiscus*), and shrews (Soricidae) were only detected in pellets during spring and summer.

Coordination With Other Biologists - BN biologists prepared a poster presentation entitled "A Technique for Documenting Western Burrowing Owl Reproduction Using Trailmaster® Camera Systems on the Nevada Test Site, south-central Nevada" and an oral presentation entitled "Regional and Seasonal Food Habits of the Western Burrowing Owl on the Nevada Test Site, south-central Nevada." Both were presented at the 8th Annual Conference of The Wildlife Society in Reno in late September 2001. Also, a topical report summarizing the results of nearly four years of burrowing owl monitoring on the NTS will be written during FY 2002.

Table 9. Percent frequency of prey items across the NTS and by ecoregion

Taxon	Great Basin	Mojave	Transition	TOTAL
	n=62	n=50	n=202	n=314
Invertebrates				
Orthoptera	80.6	94.0	86.1	86.3
Coleoptera	87.1	76.0	83.2	82.8
Solifugae	74.2	78.0	61.4	66.6
Scorpion	77.4	56.0	48.0	55.1
Arachnida	21.0	18.0	26.2	23.9
Hemiptera	29.0	0.0	3.5	8.0
Chilopoda	1.6	0.0	0.5	0.6
Vertebrates				
Birds	0.0	6.0	5.4	4.5
Reptilia	27.4	16.0	6.9	12.4
Dipodomys	24.2	14.0	39.6	32.5
Perognathinae	8.1	40.0	18.3	19.7
Peromyscus	29.0	10.0	12.4	15.3
Other Rodents	29.0	4.0	10.9	13.4
Reithrodontomys	35.5	0.0	6.9	11.5
Thomomys	3.2	10.0	12.4	10.2
Muridae	8.1	6.0	3.0	4.5
Heteromyid	0.0	8.0	3.0	3.2
Microdipodops	0.0	0.0	4.0	2.5
Lemmiscus	0.0	0.0	1.5	1.0
Soricidae	1.6	0.0	1.0	1.0
Total Rodentia	74.2	62.0	58.9	62.4

Table 10. Percent frequency of prey items by season across the NTS.

Taxon	Fall (Sep-Nov)	Winter (Dec-Feb)	Spring (Mar-May)	Summer (Jun-Aug)
	n=41	n=66	n=117	n=68
Invertebrates				
Orthoptera	95.1	69.7	88.0	92.6
Coleoptera	92.7	74.2	85.5	76.5
Solifugae	73.2	33.3	70.1	86.8
Scorpion	63.4	19.7	58.1	75.0
Arachnida	24.4	15.2	27.4	23.5
Hemiptera	4.9	0.0	12.0	11.8
Chilopoda	0.0	0.0	1.7	0.0
Vertebrates				
Birds	9.8	6.1	4.3	1.5
Reptilia	0.0	0.0	16.2	26.5
Dipodomys	9.8	24.2	48.7	29.4
Perognathinae	2.4	15.2	27.4	13.2
Peromyscus	2.4	21.2	12.8	16.2
Other Rodents	9.8	6.1	17.9	10.3
Reithrodontomys	4.9	15.2	12.8	7.4
Thomomys	0.0	0.0	16.2	16.2
Muridae	0.0	7.6	4.3	2.9
Heteromyid	2.4	6.1	0.0	5.9
Microdipodops	0.0	4.5	2.6	2.9
Lemmiscus	0.0	0.0	0.9	2.9
Soricidae	0.0	0.0	0.9	1.5
Total Rodentia	26.8	62.1	75.2	61.8

5.1.2.2 Bat Species of Concern

Monitoring to identify the distribution of bat species of concern on the NTS continued this FY. Monitoring was primarily conducted at water sources, many of which had never been monitored for bats before. Only one mine or tunnel was monitored for bat activity this year. Three techniques were used to document bat activity during monitoring. These included using mistnets and a harp trap to capture bats, recording ultrasonic vocalizations of bats with the Anabat II system (Titley Electronics, Ballina, Australia), and observing and recording bat activity with a special night vision camera equipped with NightSight™ technology. A contract was made this FY with Dr. Michael O'Farrell of O'Farrell Biological Consulting to identify bat calls collected on the NTS. The calls are analyzed to determine which species emitted the call sequences based on known species-specific call parameters (O'Farrell, 1997; Corben et al., 1998).

Monitoring at NTS Water Sources - Monitoring was conducted at 31 individual water sources including natural springs, sewage lagoons, and man-made wells and sumps between April 30 and September 4, 2001. Some water sources were sampled multiple times for a total of 36 sampling events. These included 11 water sources in the Great Basin Desert ecoregion, 8 water sources in the Transition ecoregion, and 12 water sources in the Mojave Desert ecoregion (Figure 6).

A total of 292 bats representing 10 of the 16 species known to occur on the NTS were captured (Table 11). Of these, 78 individuals were species of concern including the Townsend's big-eared bat (*Corynorhinus townsendii*), long-legged myotis (*Myotis volans*), small-footed myotis (*M. ciliolabrum*), fringed myotis (*M. thysanodes*), and long-eared myotis (*M. evotis*). Audible calls of another bat species of concern, presumably the spotted bat (*Euderma maculatum*), were also documented at three sites. Additionally, over 15,000 computer files were recorded during monitoring this . Analysis and identification of these calls was completed by O'Farrell Biological Consulting in late September. These results will be reported in next year's annual report. Preliminary results indicate the presence of a new bat species, the Yuma myotis (*M. yumanensis*) at Gate 100 Sewage Lagoon. This species commonly roosts in buildings and is a federal species of concern.

Two female Townsend's big-eared bats were captured at Ammonia Tanks, and one of the females had prominent nipples, suggesting that it was lactating and that a maternity colony may be located nearby. This is significant because this species has the highest likelihood of being listed under the ESA as threatened. Also, the Nevada Division of Wildlife has petitioned the Nevada legislature to protect this species and give it the status of "State Sensitive: Threatened". More work is needed to locate roosting sites for this species on the NTS.

Vocal signatures from hand-released bats of known species were recorded with the Anabat II system from nine of the ten species captured in mist nets. Several California myotis (*M. californicus*) and small-footed myotis were captured this year. Comparisons of the tail extension lengths were made between the two species. Species were verified by hand-releasing individuals of both species and looking at their distinct vocal signatures. The small-footed

Figure 6

Table 11. Number of bats by species, gender, and location captured during FY 2001 in three ecoregions of the NTS

Water Source	Date	Ecoregion	ANPA	COTO*	EPFU	EUMA*	LACI	MYCA	MYCI*	MYEV*	MYTH*	MYVO*	PIHE
Gate 100 Sewage	4/30/01	Mojave	2F										2F,1U
Mercury Sewage	5/1/01	Mojave											
French. Flat Playa Ponds	5/7/01	Mojave						2F					2U
DAF Sewage Lagoon	5/9/01	Mojave											1F
Reactor Con. Point Sewage	5/22/01	Mojave	1F					1M?				1F?	3F
Well J13	5/29/01	Mojave											8F,1M,1U
Well 5B**	6/13/01	Mojave											
Mercury Sewage	6/18/01	Mojave	2F										7F,1M
Area 5 RWMS Sewage	6/26/01	Mojave						3F					3F
Well J-11 or Wilson's Pond	7/24/01	Mojave											79F,10M
Central Support Sewage	7/25/01	Mojave	1F										3F
ER 5-4	8/22/01	Mojave											
ER 5-3	8/23/01	Mojave											
Gate 100 Sewage	9/4/01	Mojave						2F,1M					5F,3M
Cane Spring**	5/2/01	Transition											
Wahmonie Seep #4	6/5/01	Transition											
Tippipah Spring**	6/6/01	Transition											
Area 12 Sewage	6/11/01	Transition	1F		1F				3F,5M,1U				1F,1M
Area 6 LANL Sewage	7/16/01	Transition											13F,1M
Reitmann Seep	7/19/01	Transition											
Yucca Lake Sewage	8/27/01	Transition											
LANL Area 6 Pond	8/29/01	Transition						1M					
ER 18-2	5/8/01	Great Basin											
Topopah Spring	5/24/01	Great Basin							2F,2M		2M		
Ammonia Tanks	5/30/01	Great Basin		2F					6F,2M				
Little Wildhorse Seep	5/31/01	Great Basin							1F,1M		1F		
Pahute Mesa Pond	6/4/01	Great Basin			3M	Audible?	1U		2M			1F,3M	
Captain Jack Spring	6/12/01	Great Basin							1M				
ER 20-6**	6/19/01	Great Basin											
Ammonia Tanks	6/20/01	Great Basin	1F						1F		1M		
ER 20-5**	6/25/01	Great Basin											
Gold Meadows Spring	7/17/01	Great Basin	1F	1M	12F,9M	Audible?			4F,2M	4M		3F,4M	1F
Camp 17 Pond	7/23/01	Great Basin				Audible?			1M	1F		1F,1M	2F
Ammonia Tanks	7/31/01	Great Basin						2F	3F,1M		2F	1F	12F
John's Spring**	8/1/01	Great Basin											
Gold Meadows Spring	8/28/01	Great Basin			2F	Audible?			3F,5M			2F,1M	4F
		TOTAL	9	3	27		1	12	46	5	6	18	165

*=Species of Concern **=No mist nets used, Anabat survey only ANPA=*Antrozous pallidus*, COTO=*Corynorhinus townsendii,*
EPFU=*Eptesicus fuscus*, EUMA=*Euderma maculatum*, LACI=*Lasiurus cinereus*, MYCA=*Myotis californicus*, MYCI=*M. ciliolabrum*
MYEV=*M. evotis*, MYTH=*M. thysanodes*, MYVO=*M. volans*, and PIHE=*Pipistrellus hesperus*.

myotis tended to have a 1.5 to 2.0 millimeter (mm) tail extension while the California myotis tended to have a 0.0 to 1.0 mm tail extension. A few small-footed myotis individuals had no tail extension but no California myotis individuals had a tail extension exceeding 1.0 mm.

Mine and Tunnel Exit Surveys - Mines and tunnels are important or even critical habitats for some bat species, including the Townsend's big-eared bat. These man-made excavations can be used as day and night roosts, maternity colonies, and hibernacula. Only one exit survey was conducted this FY, and this was conducted at G Tunnel. Very little bat activity was detected. No bats were captured and only eight computer files were recorded with the Anabat system. A few bats were also detected with the NightSight™ camera flying around the portal entrance. Preliminary results indicate that only the small-footed myotis was detected at G Tunnel.

Use of the Night Vision Camera - The NightSight™ camera worked well during both mist-netting and the exit survey. Bats were easily seen flying over the water and around the tunnel entrance. This allowed biologists to count the relative number of bats flying from a tunnel or over a water source. Much of the bat activity was also recorded onto videotape using a handheld video camera. However, it is difficult to recognize individual bats, and therefore the total number of individual bats is impossible to determine.

FY 2000 Call Results - The red bat (*Lasiurus blossevillii*) was detected acoustically at Gold Meadows Spring during June of 1999 and 2000. Very few records of this species have been documented in Nevada so this is a significant finding.

Coordination with Other Biologists - A BN biologist attended a meeting of the Nevada Bat Working Group in February 2001. The Nevada Bat Working Group discussed the format and content of the Nevada Bat Conservation Plan that is being written to address the status and conservation strategies for all bat species occurring in Nevada. Input was provided to the Nevada Bat Conservation Plan based on information collected during bat monitoring on the NTS.

5.2 Other Federally Protected/State-managed Species

Other federally protected and/or state-managed species monitored this FY included wild horses (*Equus caballus*) and raptors (birds of prey) (see Table 1). These species are visible and their welfare on the NTS is important to NNSA/NV stakeholders and NTS personnel. Some NTS activities could impact these species. For example, man-made water sources used by horses can be created or removed, affecting herd size and distribution, and potential raptor nest sites (e.g., Joshua trees, power poles) can be disturbed or removed. Although performed in past years, census surveys of mule deer, a state game species, were not conducted this year.

5.2.1 Wild Horses

Cattle and other livestock were removed from the NTS prior to testing of nuclear weapons in 1951, but a small herd of horses was not removed (Greger and Romney, 1994a). There were no

efforts to monitor the size of that herd from 1951 through the 1970s, although O'Farrell and Emory (1976) reported that "A band of about 20 mustangs is located in the vicinity of Rainier Mesa…. Their numbers have not increased markedly over the last few years." In 1989, a program was initiated to estimate the abundance of horses annually by identifying and photographing all horses seen during systematic surveys. That monitoring has continued through 2001 and has provided excellent information on the abundance, recruitment (i.e., survival of horses to reproductive age), and distribution of the horse population on the NTS. Information on abundance and recruitment during 1990-1998 is summarized in Greger and Romney (1999). In FY 2001, BN biologists determined horse abundance and recorded horse sign along roads. Also, selected natural and man-made water sources were visited in the summer to determine their influence on horse distribution and movements and to determine the impact horses are having on NTS wetlands.

5.2.1.1 Abundance Survey

A count of individual horses was taken to estimate abundance on the NTS. The count was conducted during 15 nonconsecutive days between April and August. A standard road course on the NTS was driven to locate and identify horses (Figure 7). Individuals were identified by their unique physical features. The direct population count in FY 2001 was 37 individuals (Table 12), and does not include foals. Eleven foals were observed with their mares, of which two were missing by the end of the summer, and one was removed from the NTS by the U.S. Bureau of Land Management after its mother was found dead of unknown causes. All four foals observed in 2000 survived to yearlings. Two adult males (> 3 years old) that were observed on the NTS last year were not observed this year. One adult female horse with a foal died of unknown causes in May.

From 1995 to 1998, the feral horse population declined 31 percent, from 54 to 37 adult individuals (Table 12). The population currently appears to be stable. Six of the 16 foals observed in 1999 and 2000 survived to yearlings during the past two years. This resulted in stabilizing the horse population decline from the previous five years (1995-99). The addition of younger horses increases the herd's viability. The past population decline appeared to be the result of (1) low recruitment due to very poor foaling rates and foal survival and (2) moderate adult mortality.

Greger and Romney (1999) suggest that low foal survival is due in part to mountain lion predation. One foal and one adult were found killed by a lion and two others were observed with bite marks or wounds. Horses on the NTS live in rugged terrain, much of it in pinyon-juniper woodlands during summer when most foal losses are noted. Horses and foals may be more vulnerable to predation by mountain lions or other carnivores when in rugged canyons than horses living in more open, lower-elevation habitat. Low foaling rates (26-50 percent) also may contribute to poor recruitment, although foaling rates are underestimated if foals die very soon after birth. Other factors may also be responsible for or have contributed to the decline in abundance of horses. A decrease in the availability of water sources, or the unwillingness of

figure 7

Table 12. Number of horse individuals observed on the NTS by age class, gender, and year since 1995

Age Class	Number of Individuals Observed													
	1995		1996		1997		1998		1999		2000		2001	
Foals	1		1		3		8		5		11		11	
Yearlings	3		0		0		0		0		4		2	
Adults	M*	F	M	F	M	F	M	F	M	F	M	F	M	F
2 Year Olds	0	0	0	1	0	0	0	0	0	0	(2)**	0	1	3
3 Year Olds	0	0	0	0	0	1	0	0	0	0	0	0	0	0
> 3 Year Olds	22	29	21	24	19	20	16	21	11	20	13	21	11	20
Total (excluding foals)	54		46		40		37		31		38		37	

*M=male; F=female ** dead

females to drink from the remaining sources because of fear of predation (resulting in dehydration), may be resulting in poor milk production and malnourished foals. A lack of alternate water sources may make the movements of horses more predictable and, therefore, make them more vulnerable to predation. It is also possible that some horses in this population are past their prime reproductive age, resulting in lower foal production and more adults dying of causes related to old age.

Over the past ten years, the causes of mortality among adults have included predation (four observed), collisions with vehicles (two observed), and drownings (one observed). An additional four adult horses have been found dead from unknown causes.

5.2.1.2 Annual Range Survey

The annual population census of horses has routinely been conducted in the summer when horses are nearer to water sources and thus easier to find. These census surveys provide an adequate estimate of the summer range of horses on the NTS but does not totally describe their annual range (winter and summer). During FY 2001, selected roads were driven within and along the boundaries of the suspected annual horse range and all fresh sign (estimated to be < 1 year old) located on and adjacent to the roads were recorded. Five days of effort were expended for the road surveys.

Horse sign data collected during the road surveys and horse use at natural and man-made water sources indicate that the FY 2001 NTS horse range includes Kawich Canyon, Gold Meadows, Yucca Flat, southwest foothills of the Eleana Range, and southeast Pahute Mesa (Figure 7). Overall, the annual horse range appears not to have changed greatly from last year. During the summer, horses are dependent on Captain Jack Spring, the only known water source in the Eleana Range (Figure 7). Man-made water sources on Yucca Flat have been removed in past years, and the increased distances horses must travel back and forth to Captain Jack Spring probably limits the herd's grazing range to the north.

As in previous years, the NTS horse herd appears to consist of two components, one larger group of horses (about 25 individuals) that spends summers west of the Eleana Range and one smaller group (12-13 individuals) that summers east of the Eleana Range on Yucca Flat. These groups of horses probably intermix during the winter in the Eleana Range. Approximately 30 horses were observed during the winter season (December-February) in the southern Eleana Range and in lower elevation areas west of the Eleana Range in Areas 18 and 30. This strongly suggests that horses do not move off the NTS during the winter.

5.2.1.3 Horse Use of NTS Water Sources

The NTS horse population is dependent on several natural and man-made water sources in Areas 18, 12, and 30 (Figure 7) during different seasons (see Table 16). Man-made water source availability has not changed greatly on the NTS over the last four to five years. Wildhorse and Little Wildhorse seeps, both located in Area 30, are important winter-spring water sources. Two

other natural water sources (Captain Jack Spring in Area 12, Gold Meadows Spring in Area 12) and one man-made pond (Camp 17 Pond in Area 18) were used by horses this summer, as in past years. Overall, Captain Jack Spring, Gold Meadows Spring, and Camp 17 Pond were the most important summer-fall water sources for horses based on the presence and quantity of horse sign and trampled and grazed vegetation. Horses often use ephemeral water sources in winter such as rock tanks and natural pools that collect water from rain and snowmelt. They appear to be much less dependent on man-made sources in winter.

Wildhorse and Little Wildhorse seeps were used heavily by several bands of horses (numbering about 20-26 individuals) during the spring of 2001 (as in previous years) when their water flow was greater. Horse usage declined during June-July as the springs dried up (see Table 18). In June, horses moved to higher elevations and were dependent on Camp 17 Pond for the remainder of the summer. Gold Meadows Spring had ample water during July- September, 2001 due to ample summer rainfall in the area.

There are presently six man-made water sources within or on the edge of the annual horse range and none of them were used by horses in FY 2001. Only two of these six water sources are permanent year-round: the E-Tunnel Containment Ponds and Area 12 Sewage Ponds. The other water sources are semipermanent, plastic-lined sumps that occur at ER 19-1, ER 12-1, U10j, and U2gg (see Figure 10); they contain water only in the winter and spring. No horse sign have ever been found at the E-Tunnel Containment Ponds or the Area 12 Sewage Ponds, strongly suggesting that horses do not drink from them.

5.2.2 Raptors

Several raptors occur and breed on the NTS which are not protected under the ESA and are not species of concern. They are, however, protected by the federal government under the Migratory Bird Treaty Act and by the state of Nevada. Raptors include all vultures, hawks, kites, eagles, ospreys, falcons, and owls. Because these birds occupy high trophic levels of the food chain, they are regarded as sensitive indicators of ecosystem stability and health. Including the burrowing owl (see Section 5.1.2.1), there are eight raptors (Table 13) which are known to breed on the NTS (Greger and Romney, 1994b). Surveys to locate raptor nests and the number of breeding pairs of raptors began on the NTS in FY 1998 and were continued this FY.

Table 13. Raptor species that are known to breed on the NTS

Raptor Species	Common Name
Aquila chrysaetos	Golden eagle
Asio otus	Long-eared owl
Bubo virginianus	Great-horned owl
Buteo jamaicensis	Red-tailed hawk
Buteo swainsoni	Swainson's hawk
Falco mexicanus	Prairie falcon
Falco sparverius	American kestrel
Speotyto cuniculaia	Western burrowing owl
Tyto alba	Barn owl

5.2.2.1 Ground Surveys for Nest Sites

Twelve known raptor nests were visited from April through July to check for reproduction. Two of these twelve nests were active this year, and five new nests were found in buildings (Table 14 Figure 8). Only the Yucca Flat area was searched for new nests due to schedule constraints. Most of the effort this year was directed at monitoring owl nests found in old buildings slated for demolition.

Two active Great-horned owl nests were found in buildings in Yucca Flat and represent the first breeding record for this species on the NTS. These buildings were not scheduled to be demolished this year.

Three barn owl nests were found and monitored; one in Building 210 in Mercury, Area 23 and two in the R-MAD Decon Building, Area 25. These two buildings were demolished this year. At the R-MAD building, one pair of barn owls produced two clutches of young. The first clutch of birds fledged in June and the second clutch fledged by mid July from a nest 2-3 m from the first nest. Both nests were in a ventilation duct (Table 14). This building was also known to be used last year by breeding barn owls. In Building 210 in Mercury, four chicks fledged, one chick fell out of its nest and later died, and one fledged young apparently became entrapped in a small room within the abandoned building and died. Both buildings were demolished only after BN biologists ensured that the barn owl nests contained no eggs, all chicks were fledged, and owls were not in the buildings.

An active red-tailed hawk nest was found on the outside structure of another building at the R-MAD facility. It was reported to BN biologists that a Red-tailed Hawk was nesting in Area 27 on a powerline pole nest. This nest (A27-PP1) has been used for three consecutive years. One

Table 14. Status of raptor nests monitored on the NTS in FY 2001

Nest ID	Species	Nest Type	Nest Use Status				Number of Young Observed			
			FY 1998	FY 1999	FY 2000	FY 2001	FY 1998	FY 1999	FY 2000	FY 2001
A12-C1	Golden Eagle	Cliff stick nest	Active	Active	I*	I	1	3	0	0
A16-C1	Golden Eagle	Cliff stick nest	-**	Active	I	I	-	1	0	0
A4-Y1	Red-tailed Hawk	Joshua tree nest	Active	I	I	I	3	0	0	0
A6-Y1	Red-tailed Hawk	Joshua tree nest	Active	I	I	I	2	0	0	0
A6-Y2	Red-tailed Hawk	Joshua tree nest	Active	I	I	I, collapsed	1	0	0	0
A6-C1	Red-tailed Hawk	Cliff stick nest	Active	I	I	I	1	0	0	0
A3-Y1	Red-tailed Hawk	Joshua tree nest	-	Active	I	I	-	3	0	0
A3-PP1	Red-tailed Hawk	Powerline pole nest	-	-	Active	I, collapsed	-	-	1	0
A5-W1	Red-tailed hawk	Willow tree nest	-	-	Active	I	-	-	1	0
A6-Y3	Red-tailed hawk	Joshua tree nest	-	-	Active	Active	-	-	3	3
A27-PP1	Red-tailed hawk	Powerline pole nest	-	Active	Active	Active	-	-	2	3
A4-Y2	Swainson's hawk	Joshua tree nest	Active	I	I	I	2	0	0	0
A25-B1	Barn Owl	Building cavity nest	-[1]	-	Active	Active	-	-	NV	8
A23-B1	Barn Owl	Building cavity nest	-	-	-	Active	-	-	-	4
A6-B1	Great-horned Owl	Building stick nest	-	-	-	Active	-	-	-	3
A3-B1	Great-horned Owl	Building stick nest	-	-	-	Active	-	-	-	1
A25-B2	Red-tailed Hawk	Building stick nest	-	-	-	Active	-	-	-	1

I*= Inactive -** = Unknown, nest found in subsequent years

Figure 8 Known raptor nests

other known Joshua tree nest in southeast Yucca Flat (A6-Y3) was used again this year by a breeding pair of Red-tailed Hawks (Table 14, Figure 8).

5.2.2.2 Raptor Mortality

Few raptor mortalities have been recorded at the NTS. Wildlife observations, made opportunistically by BN biologists and other NTS workers, are maintained by BN biologists in a computerized database. Accounts of injured and dead animals are also usually reported to BN biologists and are stored in the same database. Over the last 11 years, from 1990-2001, 25 incidents of dead raptors have been recorded on the NTS (Table 15). The known causes of death include seven roadkills, three electrocutions, two suspected drownings, three predator kills, and one entrapment in a building. Also, four chicks have been found dead in or at the base of a nest.

5.3 Wetlands and Wildlife Water Sources

Natural wetlands and man-made water sources on the NTS provide unique habitats for mesic and aquatic plants and animals and attract a variety of other wildlife. Natural NTS wetlands may qualify as jurisdictional wetlands under the Clean Water Act (CWA). Characterization of these mesic habitats to determine their status under the CWA and periodic monitoring of their hydrologic and biotic parameters as components of the EMAC program which were started in FY 1997. Periodic wetlands monitoring may help identify annual fluctuations in measured parameters that are natural and unrelated to NNSA/NV activities. Also, if a spring classified as a jurisdictional wetland were to be unavoidably impacted by a NNSA/NV project, mitigation for the loss of wetland habitat would be required under the CWA. Under these circumstances, wetland hydrology, habitat quality, and wildlife usage data collected at the impacted spring over several previous years can help to develop a viable mitigation plan and demonstrate successful wetland mitigation.

Man-made excavations constructed to contain water occur on the NTS and also attract wildlife. Along with natural water sources, these man-made sources can affect the movement patterns of some species (e.g., wild horses). However, they can also cause accidental wildlife mortalities from entrapment and drowning if not properly constructed or maintained. Quarterly visits to these water sources were conducted in FY 2001 to document wildlife use and mortality.

5.3.1 Wetlands Monitoring

Monitoring of selected NTS wetlands continued this FY to characterize seasonal baselines and trends in physical and biological parameters. Twelve wetlands (Figure 9) were visited at least once during the year to record the presence/absence of land disturbance, water flow rates, and surface area of standing water (Table 16). Wildlife use data collected at these water sources are shown in Table 17.

Table 15. Summary of NTS raptor mortality records from 1990-2001

Species	Roadkill	Electro-cution	Suspected Drowning	Predation	Entrapment	Chick Mortality	Unknown	Totals
American Kestrel				1			2	**3**
Barn Owl	1			1	1	3	1	**7**
Golden Eagle	1	1						**2**
Great-horned Owl	3	1				1		**5**
Prairie Falcon				1				**1**
Red-tailed Hawk	2	1	1				1	**5**
Turkey Vulture							1	**1**
Western Burrowing Owl			1					**1**
Totals	**7**	**3**	**2**	**3**	**1**	**4**	**5**	**25**

Figure 9

Table 16. Seasonal data from selected natural water sources on the NTS collected during FY 2001

Water Source	Date	Surface Area of Water (m^2)[a]	Surface Flow Rate (L/Min)[b]	Disturbance at Spring
Cane Spring	8/12	13	1.0	None
Captain Jack Spring	9/13	20	1.0	Horse grazing and trampling
Gold Meadows Spring	7/16	240	NM[c]	Horse grazing and trampling
Gold Meadows Spring	8/28	600	NM	Horse grazing and trampling
Little Wildhorse Seep	5/31	3	NM	Horse grazing and trampling
Little Wildhorse Seep	8/28	0	0	Horse grazing and trampling
Pahute Mesa Pond	6/04	800	0	None
Pahute Mesa Pond	8/15	0	0	None
Reitmann Seep	8/15	0.5	0	None
Tippipah Spring	8/08	200	0.35	None
Topopah Spring	8/10	1.5	0.15	None
Wahmonie Seep No. 1	6/05	0	0	None
Wahmonie Seep No. 3	6/05	0	0	None
Whiterock Spring	8/15	10	3.0	None
Wildhorse Seep	5/31	15	NM	Horse grazing and trampling
Wildhorse Seep	8/28	0	0	Horse grazing and trampling

[a] m^2 - Square meters
[b] L/min - Liters per minute
[c] NM - Not measurable due to diffused flow.

Table 17. Seasonal wildlife use at selected springs on the NTS during FY 2001. P = species present, inferred from sign

Wildlife Observed	Cane Spring		Captain Jack Spring		Gold Meadows Spring		Little Wildhorse Seep		Pahute Mesa Pond	Reitmann Seep	
Mammals	5/2	8/12	6/12	912	7/15	8/28	5/31	8/28	7/13	7/19	8/15
Coyote (*Canus latrans*)		**P**						**P**	**P**	**P**	**P**
Feral horse (*Equus caballus*)			**P**	**P**	**P**	**P**	**P**	**P**			
Mule deer (*Odocoileus hemionus*)		**P**	**P**	**P**	**P**	**4**	**P**	**P**	**P**	**P**	**P**
Mountain lion (*Felis concolor*)		**P**									
Birds											
Black-throated sparrow (*Amphispiza bilineata*)		**3**									
Brown-headed cowbird (*Molothrus ater*)					**5**						
Chipping sparrow					**3**	**5**					
Chukar (*Alectoris chukar*)							**>1**			**8**	
Common raven (*Corvus corax*)					**3**						
Gambel's quail (*Calipepla gambelii*)											
House finch (*Carpodacus mexicanus*)		**5**			**1**						
Long-eared owl (*Asio otus*)	**1**										
Lesser Nighthawk(*Chordeiles acutipennis*)					**10**	**2**			**12**		
Mourning dove (*Zenaida macroura*)	**5**	**>20**	**>4**	**>5**						**4**	**3**
Red-tailed hawk (*Buteo jamaicensis*)		**1**									
Rufose-sided towhee (*Pipilo erythrophthalmus*)					**1**						
Say's phoebe (*Saya saya*)											
White-crowned sparrow (*Zonotrichia leucophyrs*)					**1**	**1**					

Table 17. (Continued)

Wildlife Observed	Tippipah Spring		Topopah Spring	Wahmonie Seep #1	Wahmonie Seep #3	Wildhorse Seep		Whiterock Spring
Mammals	8/8	9/11	5/23	6/26	6/26	5/31	8/28	8/15
Coyote (*Canus latrans*)	**P**	**P**	**P**	**P**	**P**		**P**	**P**
Feral horse (*Equus caballus*)						**P**		
Mule deer (*Odocoileus hemionus*)	**P**	**P**	**P**			**P**	**P**	**P**
Mountain lion (*Felis concolor*)	**P**		**P**					
Birds								
Black-throated sparrow *(Amphispiza bilineata)*	**3**				**3**			
Brown-headed cowbird *(Molothrus ater)*								
Chukar *(Alectoris chukar)*	**>60**		**>2**					
Common raven *(Corvus corax)*	**1**							
Gambel's quail *(Calipepla gambelii)*				**40**	**20**			**5**
House finch *(Carpodacus mexicanus)*	**5**		**>10**					
Long-eared owl *(Asio otus)*								
Mourning dove *(Zenaida macroura)*	**20**		**>20**	**2**	**20**			**>150**
Red-tailed hawk *(Buteo jamaicensis)*			**1**					
Rufose-sided towhee *(Pipilo erythrophthalmus)*								
Say's phoebe *(Saya saya)*	**1**							
White-crowned sparrow *(Zonotrichia leucophyrs)*	**1**							

[a] m^2 - Square meters
[b] L/min - Liters per minute
[c] NM - Not measurable due to diffused flow.

No jurisdictional or nonjurisdictional wetlands on the NTS were disturbed during FY 2001 and no U.S. Army Corps of Engineers 404 Permit was required.

5.3.2 Monitoring of Man-made Water Sources

BN biologists conducted quarterly monitoring of man-made water sources. These sources, located throughout the NTS (Figure 10), include 35 plastic-lined sumps, 39 sewage treatment ponds, 13 unlined well ponds, and 4 radioactive containment ponds. Several ponds or sumps are located next to each other at the same project site. Many NTS animals rely on these man-made structures as sources of free water. Wildlife and migratory birds may drown in steep-sided or plastic-lined sumps as a result of entrapment, or ingest contaminants in drill-fluid sumps or evaporative ponds. Mitigation measures, required under the Mitigation Action Plan for the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DOE/NV, 1996), include placing flag lines, fencing, or coverings over contaminated water sources to repel birds. Ponds are monitored to assess their use by wildlife and to develop and implement mitigation measures to prevent them from causing significant harm to wildlife.

Man-made water sources were visited during four quarterly sampling periods: November, February, May, and September 2001. Sewage ponds and well reservoirs were visited once annually. At each site, a BN biologist recorded the presence or absence of standing water and the presence of animals or their sign around the water source. At plastic-lined sumps, the biologist also estimated the surface area of water and the presence, absence, and condition of fences and flag lines. The presence of ramps or ladders, which allow animals to escape if they fall in, have also been installed at many plastic-lined sumps, and the presence, absence, and condition of these structures were also noted. All dead animals (or any remains of an animal) in or adjacent to a man-made water source were recorded. All survey observations were summarized in quarterly reports (BN, 2001u,v,w).

During FY 2001, use of unlined sumps and ponds by waterfowl (ducks, shorebirds), passerine birds (ravens, horned larks, house finches), and mammals, such as coyotes and deer, was common. Only one man-made pond (Camp 17 Pond in Area 18) was used this year by wild horses. The fences installed around the plastic-lined sumps do not exclude coyotes or deer as their tracks were observed commonly inside many of the fences. Birds were observed much less at the plastic-lined sumps compared to the unlined ponds.

No dead animals were recorded in any plastic-lined sumps during FY 2001. A sediment mound was constructed in Sump # 3 at ER-20-6 this year to prevent deer drownings. This sediment ramp appears to be working well as deer sign have been recorded at this site, yet no additional deer drownings have occurred. No functional flag lines have been present at any plastic-lined ponds on the NTS for the last three years. No mortality of birds have occurred, however, in these sumps since the flag lines have been absent. This indicates that flag lines presently are not necessary to prevent bird mortality. Flag line conditions will not be monitored in the future unless conditions require their reinstallation.
Figure 10

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6.0 MONITORING OF THE HAZMAT SPILL CENTER

6.1 Task Description

Biological monitoring at the HAZMAT Spill Center on the playa of Frenchman Lake in Area 5 is required for certain types of chemicals under the center's programmatic Environmental Assessment. These chemicals have either not been tested before, have not been tested in large quantities, or have uncertain modeling predictions of downwind air concentrations. In addition, ESHD has requested that BN monitor (downwind) any test which may impact plants or animals off the playa.

A document entitled *Biological Monitoring Plan for Hazardous Materials Testing at the Liquefied Gaseous Fuels Spill Test Facility on the Nevada Test Site* was prepared in FY 1996 (BN, 1996). It describes how field surveys will be conducted to determine test impacts on plants and animals and to verify that the spill program complies with pertinent state and federal environmental protection legislation. The design of the monitoring plan calls for the establishment of three control transects and three treatment transects at three distances from the chemical release point which have similar environmental and vegetational characteristics. BN biologists are tasked to review spill test plans to determine if field monitoring along the treatment transects is required for each test as per the monitoring plan criteria. All test-specific field monitoring is funded through the HAZMAT Spill Center.

6.2 Task Progress Summary

BN reviewed chemical spill test plans for four experiments: REOP-DIVINE INVADER, REOP-DIVINE INVADER 01-01, REOP-DIVINE INVADER 01-02, and REOP-Remote Sensor Test Range, Pronghorn Episode. The letters documenting that review was submitted to ESHD as specified (BN, 2001x,y,z,aa).

Biota monitoring was not conducted for any of the chemical tests at the HAZMAT Spill Center during FY 2001. No baseline monitoring was conducted at established control-treatment transects near the HAZMAT Spill Center due to insufficient funding.

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7.0 LITERATURE CITED

BN (Bechtel Nevada), 1996. *Biological Monitoring Plan for Hazardous Materials Testing at the Liquefied Gaseous Fuels Spill Test Facility on the Nevada Test Site.* Submitted to U.S. Department of Energy, Nevada Operations Office, Letter from J. R. Kannard to R. C. Furlow, Correspondence No. E100-JRK-96-004, January 25, 1996.

———, 1999. *Ecological Monitoring and Compliance Program Fiscal Year 1999 Report.* DOE/NV/11718--387, Bechtel Nevada, Las Vegas, NV, December 1999.

———, 2000. *Biological Survey Report for Outlet Ditch and Access Road at ER-5-4 (#01-02).* Letter from C. A. Wills to P. K. Ortego, Correspondence No. 2154-WKO-01-0007, November 20, 2000.

———, 2001a. *Biological Survey Report for Upper U-12V Tunnel Access Road (#01-03).* Letter from C. A. Wills to S. M. Williams, Correspondence No. 2154-WKO-01-0009, January 11, 2001.

———, 2001b. *Biological Survey Report for Corrective Action Unit 335 -Area 6 Injection Well and Drain Pit261 (#01-04).* Letter from C. A. Wills to J. G. Nelson, Correspondence No. 2154-WKO-01-0010, January 11, 2001.

———, 2001c. *Biological Survey Report for Corrective Action Unit 321- Area 22 Weather Station Fuel Storage (#01-05).* Letter from C. A. Wills to J. G. Nelson, Correspondence No. 2154-WKO-01-0011, January 11, 2001.

———, 2001d. *Biological Survey Report for Corrective Action Units 230/320 (#01-09).* Letter from C. A. Wills to J. G. Nelson, Correspondence No. 2154-WO-01-0018, January 29, 2001.

———, 2001e. *Biological Survey Report for Corrective Action Unit 261 (#01-07).* Letter from C. A. Wills to J. G. Nelson, Correspondence No. 2154-WKO-01-0019, January 29, 2001.

———, 2001f. *Biological Survey Report for Soil Sampling with Truck-Mounted Drill at Corrective Action Unit 321-Area 22 Weather Station Fuel Storage (#01-08).* Letter from C. A. Wills to J. G. Nelson, Correspondence No. 2154-WO-01-0020, January 29, 2001.

———, 2001g. *Biological Survey for U12G Tunnel Study (#01-10).* Letter from C. A. Wills to S. M. Williams, Correspondence No. 2154-WO-01-0021, January 30, 2001.

———, 2001h. *Biological Survey Report for Lost Link Aerial Operations Facility (#01-11)*. Letter from C. A. Wills to C. A. Stowell, Correspondence No. 2150-WKO-01-0025, February 20, 2001.

———, 2001i. *Biological Survey Report for Areas 2 and 8 Borrow Pits (#01-12).* Letter from C. A. Wills to C. Threats, Correspondence No. 2154-WO-01-0026, March 5, 2001.

———, 2001j. *Biological Survey Report for Area 27 Landfill Erosion Control (#00-13).* Letter from C. A. Wills to K. E. Williams, Correspondence No. 2154-WO-01-0032, April 10, 2001.

———, 2001k. *Biological Survey Report for the Radioactive Waste Management Site (RWMS) Expansion (#01-14)*. Letter from C. A. Wills to B. D. Becker, Correspondence No. 2154-WO-01-0034, May 3, 2001.

———, 2001l. *Biological Survey Report for the Lost Link Aerial Operations Facility (#01-11B).* Letter from C. A. Wills to C. A. Stowell, Correspondence No. 2154-WO-01-0036, May 16, 2001.

———, 2001m. *Biological Survey Report for Corrective Action Unit 392 (#01-15).* Letter from C. A. Wills to S. G. Musick, Correspondence No. 2154-WO-01-0039, June 25, 2001.

———, 2001n. *Biological Survey Report for Frenchman Flat Geo-Seismic Study on Nellis Air Force Range (#01-21).* Letter from C. A. Wills to R. C. Furlow, Correspondence No. 2154-WO-01-0042, July 12, 2001.

———, 2001o. *Biological Survey for Corrective Action Unit 322 (#01-20).* Letter from C. A. Wills to D. H. Cox, Correspondence No. 2154-WO-01-0047, September 17, 2001.

———, 2001p. *Biological Survey Report for Corrective Action Unit 392 (#01-22).* Letter from C. A. Wills to P. F. Brown, Correspondence No. 2154-WO-01-0049, September 17, 2001.

———, 2001q. *Biological Survey Report for Frenchman Flat Geo-Seismic Study Area (#01-21B).* Letter from C. A. Wills to R. C. Furlow, Correspondence No. 2154-WO-01-0048, September 17, 2001.

———, 2001r. *Biological Survey Report for Corrective Action Unit 392 (#01-23).* Letter from C. A. Wills to P. F. Brown, Correspondence No. 2154-WO-01-0049, September 17, 2001.

———, 2001s. *U.S. Department of Energy, Nevada Operations Office 2000 Annual Report of Actions Taken Under Authorization of the Biological Opinion on Nevada Test Site Activities.* Submitted to U.S. Department of Energy, Nevada Operations Office, Letter from W. K. Ostler to R. C. Furlow, Correspondence No. 2154-WO-01-012, January 18, 2001.

———, 2001t. *Adaptive Management Plan for Sensitive Plant Species on the Nevada Test Site.* DOE/NV/11718--507. U.S. Department of Energy, NNSA, Nevada Operations Office, Las Vegas, NV. 8 p.

———, 2001u. *First Quarter Fiscal Year 2001 Monitoring of Manmade Water Sources on the Nevada Test Site.* Submitted to U.S. Department of Energy, Nevada Operations Office, Letter from W. K. Ostler to R. C. Furlow, Correspondence Number 2150-WO-00-0008, January 10, 2001.

———, 2001v. *Second Quarter Fiscal Year 2001 Monitoring of Manmade Water Sources on the Nevada Test Site.* Submitted to U.S. Department of Energy, Nevada Operations Office, Letter from W. K. Ostler to R. C. Furlow, Correspondence No. 2154-WO-00-0024, April 12, 2001.

———, 2001w. *Third Quarter Fiscal Year 2001 Monitoring of Manmade Water Sources on the Nevada Test Site.* Submitted to U. S. Department of Energy, Nevada Operations Office, Letter from W. K. Ostler to R. C. Furlow, Correspondence No. 2154-WO-00-0036, July 20, 2001.

———, 2001x. Review of Remote Sensor Test Range, Pronghorn Episode. Letter from W. K. Ostler to J. F. Spahn, Correspondence No. 2154-WO-01-0029, April 4, 2001.

———, 2001y. Review of REOP-DEVINE INVADER. Letter from W. K. Ostler to J. F. Spahn, Correspondence No. 2154-WO-01-0037, June 7, 2001.

———, 2001z. Review of REOP-DEVINE INVADER 01-01. Letter from W. K. Ostler to J. F. Spahn, Correspondence No. 2150-WO-01-0040, June 25, 2001.

———, 2001aa. Review of REOP-DEVINE INVADER 01-02. Letter from W. K. Ostler to J. F. Spahn, Correspondence No. 2154-WO-01-0045, September 24, 2001.

Corben, C., Gannon, L. W., and M. J. O'Farrell, 1998. Techniques for the Effective Use of Anabat in Identifying Free-Flying Bat Species, Anabat Workshop Course Booklet. Bat Conservation International, Fort Collins, CO, May 19-20, 1998.

DOE/NV (U.S. Department of Energy Nevada Operations Office), 1996. *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada, Volume 1, Chapters 1-9*. DOE/EIS 0243, U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV, August 1996.

———, 1998. *Nevada Test Site Resource Management Plan*, DOE/NV–518, U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV, December 1998.

FWS (U.S. Fish and Wildlife Service), 1996. *Final Programmatic Biological Opinion for Nevada Test Site Activities*. File No. 1-5-96-F-33, August 22, 1996, U.S. Fish and Wildlife Service, Reno, NV.

Greger, P. D. and E. M. Romney, 1994a. Feral horse monitoring at the Nevada Test Site from 1989-91. In: *Status of the Flora and Fauna on the Nevada Test Site 1989-91*. Compiled by R. B. Hunter, DOE/NV/11432-57, Reynolds Electrical & Engineering Co., Inc., Las Vegas, NV.

Greger, P. D. and E. M. Romney, 1994b. Trends in Wildlife Utilization of Water Source and Adjacent Habitats at the Nevada Test Site 1989-91. In: *Status of the Flora and Fauna on the Nevada Test Site 1989-91*. Compiled by R. B. Hunter, DOE/NV/11432-57, Reynolds Electrical & Engineering Co., Inc., Las Vegas, NV.

Greger, P. D. and E. M. Romney, 1999. High foal mortality limits growth of a desert feral horse population in Nevada. Great Basin Naturalist 59:374-379.

Hayward, C. L., M. L. Killpack, and G. L. Richards, 1963. *Birds of the Nevada Test Site*. Brigham Young University Science Bulletin, Vol. 3, No. 1, 27 pp.

O'Farrell, M. J., 1997. Use of echolocation calls for the identification of free-flying bats. Transactions of the Western Section of the Wildlife Society, 33:1-8.

O'Farrell, T. P., and L. A. Emery, 1976. *Ecology of the Nevada Test Site: A Narrative Summary and Annotated Bibliography*. NVO-167. Desert Research Institute, Las Vegas, NV.

Ostler, W.K., D. J. Hansen, D.C. Anderson and D.B. Hall. 2000. Classification of Vegetation on the Nevada Test Site. DOE/NV/11718--477, Bechtel Nevada Ecological Services, Las Vegas, NV.

Steen, D. C., D. B. Hall, P. D. Greger, and C. A. Wills, 1997. *Distribution of the Chuckwalla, Western Burrowing Owl, and Six Bat Species on the Nevada Test Site*. DOE/NV/11718-149, Bechtel Nevada, Las Vegas, NV, May 1, 1997.

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