PROJECT NAME:	Nevada Natural Heritage Program Sensitive Species Data Management
PROJECT NUMBER:	2005-NHP-557-P
REPORTING DATE:	1 October 2011
AGENCY CONTACTS:	Jennifer Newmark, Administrator Kim Williams, Biologist
DELIVERABLE:	Final Project Report

Executive Summary

Over the past two years, the Nevada Natural Heritage Program (NNHP) has been compiling new information and updating older records of rare species within Clark County. The source of information has been variable, coming from county, state, federal and private scientists and citizens. NNHP staff have tracked 11 species, adding or modifying a total of 1,214 records.

Introduction:

Description of Project:

The purpose of this project was to continue the development and update of the Nevada Natural Heritage Program (NNHP) biological datasets for sensitive species within Clark County. Funding was provided to NNHP to coordinate data management of sensitive species addressed under the MSHCP, coordinate data transactions in and out of NNHP's central repository directly with Federal, state, Clark County, and other MSHCP participants, to provide periodic data deliveries to the County in GIS format, and to create custom database or GIS data sets and deliver to County, as requested.

Background and Need:

Within Clark County, there are a number of rare and at-risk species that have been listed as covered by the MSHCP. These species have a variety of scientific work being conducted, both at present and in the past. Consequently, there are large but disparate sets of data, some of which the County has and some that it doesn't. Much of this data has yet to be quality-controlled or compiled into a single dataset that can then be utilized by the County.

For the past 20 years, the NNHP has collected, maintained and disseminated data on rare and at-risk species. The Program has extensive databases of information that include both historic and current survey information. The methodology of the Program is consistent and repeatable and allows for disparate data sets to be compiled into cohesive data records. This compiled

and quality-controlled data are then made available to land managers and scientists to aid in making conservation management decisions.

NNHP is a member program within the NatureServe network with similar programs in all 50 states, in Canada and in some Latin American countries.

Management Actions Addressed:

NNHP maintains a large dataset on many species and has provided the County such information that has importance for a broad number of conservation actions as addressed in the MSHCP. Items below refer to MSHCP-specific conservation actions, locations, species and ecosystems referenced in the MSHCP documents, found on the following website: http://www.co.clark.nv.us/daqem/epd/desert/dcp_mshcp.html .

Natural Heritage data compilation and mapping inventories contributed to Conservation Management Actions BLM (106), (111), (13), (15), (163), (17), (304), (32), and (33); NDOT (5); NDOW (32), (33), (35), (36), (7), and (9); NPS (10), (12), (13), (14), (15), (16), (17), (18), (5), and (7); USFS (19), (20), (25), and (26). See Appendix A for a list of these conservation management actions.

Comprehensive data compilation and GIS mapping inventories were performed on 11 priority species as decided upon in consultation with the County. Additionally, NNHP maintains data on an additional 118 species and these data were included in every quarterly database delivery. See Appendix B for a list of these species.

Heritage data compilation and GIS mapping actions contributed to reducing species threats (101), (102), (301), (302), (401), (402), (403), (405), (407), (410), (411), (504), (701), (702), (703), (801), (802), (901), (902), and (903) by contributing data to the prescriptive conservation action. See Appendix C for specific threats.

Goals and Objectives of the Project:

The goals of this project was to incorporate backlogged species data for Clark County in NNHP's Biotics database to allow for a more complete and comprehensive dataset to be available to both parties and other partners. Additional goals for this project include addressing the MSHCP elements as listed above and in Appendix A.

Methods and Materials:

The Nevada Natural Heritage Program will be mapping species occurrences using standard Heritage/NatureServe methodologies (for more extensive and detailed descriptions of Heritage methodology, please see http://www.natureserve.org/prodServices/standardsMethods.jsp). Data will be compiled from a variety of sources, including field surveys, museum records, and

published data sources, both from current surveys as well as backlogged data. Each location of species will be mapped into the Heritage's Biotics database as either a source feature and/or an element occurrence. A source feature is the actual observation of a species or subspecies (or element in Heritage Methodology) at a particular place on the landscape. This typically represents the specific data a surveyor reports such as the gps coordinates of a plants location or a trap site with a capture of a reptile, or other similar data. Source features are then rolled up into Element Occurrences (EOs). The EO is intended to represent an area of land and/or water in which a species or natural community is, or was, present. The EO represents a local population and therefore is more broad then a simple source feature. An EO must have at least one source feature associated with it, but because it represents a population rather than a single observation, an EO often may have many source features associated with it.

The EO record is a data management tool that has both spatial and tabular components associated with it. In this way, an extensive amount of biological data is captured in the databases. The Heritage Program is capable of not only recording the existence of a species at a particular place, but also tracking the condition of the species and how it changes over time. Typical mapping fields include but are not limited to directions, numbers and conditions of a source feature/EO (also called EO data), the date of the last survey, date of the last observation, management needs, threats, and the source of the information. Because the Biotics database has both spatial and tabular information stored within it, data is available both in a GIS and a report-based format.

Results:

NNHP comprehensively mapped and updated 1,214 observations of 11 species over the life of the project. In addition, other NNHP staff updated and maintained data for 118 species which the County received in our quarterly database deliverables. Species specifically addressed during the project include:

- *Athene cunicularia hypugaea*, Western Burrowing Owl
- *Heloderma suspectum cinctum*, banded Gila monster
- *Eriogonum viscidulum*, sticky buckwheat
- *Penstemon bicolor* ssp. *bicolor*, yellow two-toned beardtongue
- *Chaetodipus penicillatus*, desert pocket mouse
- *Dipodomys deserti*, desert kangaroo rat
- *Phainopepla nitens*, Phainopepla
- *Phacelia geraniifolia*, Jaeger phacelia
- *Imperata brevifolia*, satintail
- *Mentzelia polita*, polished blazingstar
- *Astragalus geyeri* var. *triquetrus*, threecorner milkvetch

This project was to compile data, rather than analyze data; therefore no further

scientific analyses was conducted beyond verifying the viability and accuracy of each record.

Evaluation/Discussion of Results:

This project was created to provide Clark County, and other MSHCP participants, with a more comprehensive, quality controlled, compilation of data for use in managing MSHCP driven projects. Due to the nature of the Heritage/NatureServe methodologies and Biotics program utilized for this project, results are not based as much on quantity as on quality. Quality control, such as, assessing viable location and projection, rectifying older data and/or sources with new data and ensuring data is 'mappable', may require more time, but provides for a more valuable product. Having access to appropriate data helps project managers more cost effectively and efficiently tackle MSHCP programs.

Conclusion:

The Nevada Natural Heritage Program is confident our project provided both cost effective and valuable information to our participants. Again, without viable data, it is difficult to accurately assess project goals. In addition, NNHP would be happy to collaborate or participate in any projects requiring data development and management in the future.

Recommendations:

The Nevada Natural Heritage Program would be pleased to see continued communication with Clark County and other MSHCP participants, in the event monies are available to help fund our continued contribution and support.

Appendix A

Conservation Action Number	Conservation Action	
BLM(106)	Take appropriate protective actions to maintain or improve springsnail habitat, including the reestablishment of populations of springsnails.	NNHP provided data on springsnails within Clark County as part of our quarterly data dumps although staff dedicated to the project did not specifically focus on springsnails.
BLM(111)	Prior to the disposal of identified public lands, an analysis will be conducted to determine their resource values, including the occurrence of Special Status Species and sensitive habitats such as riparian and aquatic habitats. Land disposal will be consistent with conservation of special status species unless there is an overriding public benefit.	NNHP's quarterly database dumps provided County access to current data on rare and at-risk species.
BLM(13)	Continue to conduct inventories as determined by the BLM and I & M Committee on special status plant species to determine their distribution, abundance, and potential threats and take appropriate actions to protect the habitat of these plant and animal species.	NNHP mapped and compiled data that contributes to this conservation action.
BLM(15)	BLM will cooperate with the Nevada Division of Wildlife and Clark County I & M Committee to implement surveys to determine the distribution, abundance, and potential threats on the southwestern willow flycatcher, phainopepla, summer tanager, Arizona Bell's vireo, yellow-billed cuckoo, and blue grosbeak and other species as necessary	NNHP mapped and compiled data that contributes to this conservation action.
BLM(163)	BLM will review their special status species list annually and update it as appropriate to include the MSHCP "covered" species , and where appropriate,"evaluation" species.	NNHP regularly contributes information and expertise to BLM and has been involved in review of the special status species list.

Conservation Action Number	Conservation Action	
BLM(17)	BLM will develop and maintain a digital data base for all inventory data collected and cooperate with other participants in establishing and maintaining a repository for digital biological data covering Clark County.	NNHP mapped and compiled data that contributes to this conservation action.
BLM(304)	Maintain and/or improve 45,750 acres of Las Vegas bearpoppy habitat in four bearpoppy management areas: Sunrise, Lovell Wash, Bitter Spring, and Gold Butte. Protect Las Vegas bearpoppy habitat within the Apex land sale area in cooperation with Clark County.	NNHP maintains current bearpoppy data within Clark County and delivered this to the County in our quarterly database dump.
BLM(32)	Develop and implement a monitoring program for the Las Vegas bearpoppy in cooperation with the Lake Mead National Recreation Area. The presence or absence of known pollinators will be documented as a part of the monitoring study	NNHP maintains current bearpoppy data within Clark County and delivered this to the County in our quarterly database dump.
BLM(33)	Develop and implement a monitoring program for BLM Special Status Plants such as the alkali mariposa lily, Blue Diamond cholla and covered and evaluation moss species in the Red Rock Canyon NCA.	NNHP mapped and compiled data that contributes to this conservation action.
NDOT(21)	To the maximum extent practicable, avoid construction and maintenance projects in habitats during sensitive times, such as breeding or nesting or overwintering (e.g., near bat hibernacula, mowing of potential butterfly habitat, or in rare plant habitat).	NNHP mapped and compiled data that contributes to this conservation action.
NDOT(5)	Compile an inventory of Covered Species and valuable habitat lands that occur on NDOT rights-of-way. This inventory will be accumulated on a project-byproject basis during NDOT’s environmental review process.	NNHP mapped and compiled data that contributes to this conservation action.

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Conservation Action Number	Conservation Action	
NDOW(32)	Participate in development of monitoring plans for Palmer's chipmunk and bats in the Spring Mountains NRA.	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NDOW(33)	Participate in monitoring of populations of Palmer's chipmunk and bats in the Spring Mountains NRA.	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NDOW(35)	Participate in inventories of NRA species of concern and habitats including Townsend's big-eared bat; bat roosts (Column and Pinnacle Cave); Allen's lappetbrowed bat; bat roosts (cliff climbing areas); bat water roosts (unsurveyed springs); neotropical migratory bird habitat (riparian areas); raptor inventory; fringed myotis.	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NDOW(36)	Participate in development of plan to protect bat roosts in mines and caves in the Spring Mountains NRA.	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NDOW(7)	Coordinate in efforts to inventory bat roosts (including mines prior to closure) and foraging areas to aid in the understanding of bat ecology in Clark County.	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NDOW(9)	Conduct and/or support life history and aquatic habitat assessments for native fish species in the Virgin and Muddy rivers, within constraints of budget allocations.	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NPS(10)	Develop information on the population distribution in the study area and the subspecific relationship of the southwestern willow flycatcher in southern Nevada. Survey in the spring to document breeding and nesting activity in southern Nevada.	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NPS(12)	Monitor peregrine falcon nest occupancy and production.	NNHP maintains current data on this species and has delivered this information to the County in our quarterly database dump.
NPS(13)	Monitor wintering bald eagle population trends.	NNHP maintains current data on this species and has delivered this information to the County in our quarterly database dump.

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Conservation Action Number	Conservation Action	
NPS(14)	Monitor populations of relict leopard frog and other amphibians, as time allows.	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NPS(15)	Monitor Las Vegas bearpoppy populations.	NNHP maintains current bearpoppy data within Clark County and delivered this to the County in our quarterly database dump.
NPS(16)	Manage Mojave poppy bee and other gypsiferous soil species consistent with Las Vegas bearpoppy populations. The relationship between pollinators and species should be monitored; the populations may be mutually dependent and both necessary for successful conservation management.	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NPS(17)	Develop and implement long-term population surveys to assess the trend of southwestern willow flycatcher and phainopepla populations and to develop population goals.	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NPS(18)	Monitor priority bat roosting and foraging sites and success of management actions targeted at bat protection.	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NPS(5)	Inventory populations of relic leopard frog and other amphibians, as time allows).	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
NPS(7)	Inventory bat populations in selected areas, with priority given to proposed project sites).	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
USFS(19)	Habitat requirements of Morand's checkerspot, Mt. Charleston blue, Spring Mountains acastus checkerspot, and dark blue, to determine why the taxa are not distributed across the range of their host plants. (CA6.2g)	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.

Appendix A

Conservation Action Number	Conservation Action	
USFS(19)	Winter habits of bats: Migration patterns and destinations, habits of bats that overwinter and hibernate in the NRA. (CA6.2i)	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
USFS(19)	Palmer's chipmunk: Features of movements and home ranges, dispersal patterns, and behavioral interactions between Palmer's chipmunk and golden mantled ground squirrel as related to habitat condition. (CA6.2j)	NNHP maintains current data on this species and has delivered this information to the County in our quarterly database dump.
USFS(19)	Seed germination and other habitat requirements of Clokey eggvetch, including analysis of factors such as seed caching and predation by rodents and insects, fire,and other perturbations (CA6.2a).	NNHP maintains current data on this species and has delivered this information to the County in our quarterly database dump.
USFS(19)	Autecology, spatial extent of population (particularly Kyle Canyon Wash), and larval host plant relations of the Spring Mountains acastus checkerspot. (CA6.2b)	NNHP maintains current data on this species and has delivered this information to the County in our quarterly database dump.
USFS(19)	Fire ecology and disturbance regimes of plant communities, particularly as pertaining to maintenance of populations and habitat for rare plants, butterflies and their host plants, Palmer's chipmunk, bats, and other species. (CA6.2c)	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
USFS(19)	Metapopulation dynamics of Mt. Charleston blue and Morand's checkerspot(including spatial limits of Wallace Canyon population), and genetic distinctiveness of three phenotypes of Morand's checkerspot. (CA6.2e)	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
USFS(19)	Relationships of ants and the larval stages of Bret's blue, Mt. Charleston blue, dark blue, and Spring Mountains icarioides blue. (CA6.2f)	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.

Appendix A

Conservation Action Number	Conservation Action	
USFS(20)	Inventory for populations of rare flora and fauna on an annual basis. A Native Species Site Survey Report will be used to record new records of species occurrence, and copies of this form will be provided to the Nevada Natural Heritage Program. Species and area priorities identified to date are as follows: (CA2.1)	NNHP Information storage
USFS(20)	Mojave bajada and wash plants - halfring milkvetch, Death Valley beardtongue, black wooly-pod, Spring Mountains milkvetch - very high priority (CA2.1a)	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
USFS(20)	Spring plants - upswept and dainty moonwort - very high priority (CA2.1b) Since 2000 have documented seven Botrychium species, with one being evaluated as potentially new to science. Slender moonwort has been added as a new "sensitive" species on the Regional Foresters species list. This leads to an additional monitoring Conservation Action under USFS(32).	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
USFS(20)	Townsend's big-eared bat - very high priority (CA2.1d)	NNHP maintains current data on this species and has delivered this information to the County in our quarterly database dump.
USFS(20)	Butterfly habitats - Foxtail Canyon, Mt. Potosi - very high priority (CA2.1e)	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
USFS(20)	Butterflies - Spring Mountains acastus checkerspot, dark blue butterfly, Morand's checkerspot, Mt. Charleston blue - high priority (CA2.1h)	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
USFS(20)	Bats – Allen's lappet-browed bat - high priority (CA2.1i)	NNHP maintains current data on this species and has delivered this information to the County in our quarterly database dump.
USFS(20)	Butterfly habitats - Mummy Mountain, Harris Mountain, Fletcher Peak, West side of Mount Stirling, Trail Canyon/North Loop intersection, Mud Springs, Wallace Canyon- high priority (CA2.1j)	NNHP maintains current data on rare Spring Mountains butterflies and has delivered this information to the County in our quarterly database dump.

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Conservation Action Number	Conservation Action	
USFS(20)	Bat roosts (cliff climbing areas) - Imagination Wall, Cathedral Rock, Echo Cliff, unnamed wall east of South Loop Trail, The Hood - high priority (CA2.1k)	NNHP maintains current data on rare bats and has delivered this information to the County in our quarterly database dump.
USFS(20)	Bat water sources - unsurveyed springs - high priority (CA2.1l)	NNHP maintains current data on rare bats and has delivered this information to the County in our quarterly database dump.
USFS(20)	Forest plants - Nevada willowherb and Charleston grounddaisy - medium to low priority (CA2.1o)	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.
USFS(20)	Fringed myotis - medium to low priority (CA2.1p)	NNHP maintains current data on rare bats and has delivered this information to the County in our quarterly database dump.
USFS(20)	NEW ACTION ITEM: Carry on Lichen Flora survey of the Spring Mountains. Since 2000, lichen surveys have documented an extraordinary rich flora, including rare species	NNHP maintains current data on rare lichens and has delivered this information to the County in our quarterly database dump.
USFS(25)	Conduct annual monitoring of (a) Clokey eggvetch and (b) rough angelica.Monitoring efforts will be in accordance with the protocol developed by TNC incooperation with USFWS and USFS (Nachlinger and Combs 1996a, 1996b). (CA3.1)	NNHP maintains current data on these species and has delivered this information to the County in our quarterly database dump.

Conservation Action Number	Conservation Action	
USFS(26)	Develop a butterfly monitoring plan, emphasizing population, host plant andhabitat monitoring. Frequency and intensity of monitoring identified in plan will be based on population status, abundance, and threats. Conduct annual monitoring for high priority butterfly species, using methods described in the butterfly monitoring plan. At present, Bret's blue, Morand's checkerspot, Mt. Charleston blue butterfly, Spring Mountains acastus checkerspot, and the dark blue are the highest priority species. Conduct periodic monitoring for medium priority butterfly species, using methods described in the butterfly monitoring plan. At present, Spring Mountains comma skipper, Nevada admiral, Spring Mountains icarioides blue, and Carole's silverspot are medium priority species. (CA3.2)	NNHP maintains current data on rare Spring Mountains butterflies and has delivered this information to the County in our quarterly database dump.

Species (common name)	**Species (scientific name)**	**Comment**
Relict leopard frog	Rana onca	NNHP regularly updates and maintains biological information on this species.
Yellow-billed cuckoo	Coccyzus americanus	NNHP regularly updates and maintains biological information on this species.
Southwestern willow flycatcher	Empidonax traillii extimus	NNHP regularly updates and maintains biological information on this species.
Phainopepla	Phainopepla nitens	NNHP compiled and updated records on this species under project 2005-NHP-557-P.
Spring Mountains springsnail	Pyrgulopsis deaconi	NNHP regularly updates and maintains biological information on this species.
Southern Nevada springsnail	Pyrgulopsis turbatrix	NNHP regularly updates and maintains biological information on this species.
Spring Mountains acastus checkerspot	Chlosyne acastus robusta	NNHP regularly updates and maintains biological information on this species.

Appendix B

Species (common name)	**Species (scientific name)**	**Comment**
Dark blue butterfly	Euphilotes enoptes ssp	NNHP regularly updates and maintains biological information on this species.
Morand's checkerspot butterfly	Euphydryas anicia morandi	NNHP regularly updates and maintains biological information on this species.
Spring Mountains comma skipper	Hesperia comma mojavensis	NNHP regularly updates and maintains biological information on this species.
Spring Mountains icarioides blue	Icaricia icarioides austinorum	NNHP regularly updates and maintains biological information on this species.
Mt. Charleston blue butterfly	Icaricia shasta charlestonensis	NNHP regularly updates and maintains biological information on this species.
Nevada admiral	Limenitus weidemeyerii nevadae	NNHP regularly updates and maintains biological information on this species.
Carole's silverspot butterfly	Speyeria zerene carolae	NNHP regularly updates and maintains biological information on this species.
Palmer's chipmunk	Tamias palmeri	NNHP regularly updates and maintains biological information on this species.
Silver-haired bat	Lasionycteris noctivagans	NNHP regularly updates and maintains biological information on this species.
Long-eared myotis	Myotis evotis	NNHP regularly updates and maintains biological information on this species.

Species (common name)	Species (scientific name)	Comment
Long-legged myotis	Myotis volans	NNHP regularly updates and maintains biological information on this species.
Western red-tailed skink	Eumeces gilberti rubricaudatus	NNHP regularly updates and maintains biological information on this species.
Rough Angelica	Angelica scabrida	NNHP regularly updates and maintains biological information on this species.
Charleston pussytoes	Antennaria soliceps	NNHP regularly updates and maintains biological information on this species.
Sticky Ringstem	Anulocaulis leisolenus	NNHP regularly updates and maintains biological information on this species.
Las Vegas bearpoppy	Arctomecon californica	NNHP regularly updates and maintains biological information on this species.
White bearpoppy	Arctomecon merriamii	NNHP regularly updates and maintains biological information on this species.
Rosy King sandwort	Arenaria kingii ssp. rosea	NNHP regularly updates and maintains biological information on this species.
Clokey milkvetch	Astragalus aequalis	NNHP compiled and updated records on this species under project 2005-NHP-557-P.
Threecorner milkvetch	Astragalus geyeri var. triquetrus	NNHP compiled and updated records on this species under project 2005-NHP-557-P.
Clokey eggvetch	Astragalus oophorus var. clokeyanus	NNHP regularly updates and maintains biological information on this species.
Spring Mountain milkvetch	Astragalus remotus	NNHP regularly updates and maintains biological information on this species.
Alkali mariposa lily	Calochortus striatus	NNHP regularly updates and maintains biological information on this species.
Clokey paintbrush	Castelleja martinii var. clokeyi	NNHP regularly updates and maintains biological information on this species.

Species (common name)	**Species (scientific name)**	**Comment**
Clokey thistle	Cirsium clokeyi	NNHP regularly updates and maintains biological information on this species.
Jaeger whitlowgrass	Draba jaegeri	NNHP regularly updates and maintains biological information on this species.
Charleston draba	Draba paucifructa	NNHP regularly updates and maintains biological information on this species.
Forked (Pahrump Valley) buckwheat	Eriogonum bifurcatum	NNHP regularly updates and maintains biological information on this species.
Sticky buckwheat	Eriogonum viscidulum	NNHP compiled and updated records on this species under project 2005-NHP-557-P.
Clokey greasebush	Glossopetalon clokeyi	NNHP regularly updates and maintains biological information on this species.
Smooth pungent greasebush	Glossopetalon pungens var. glabra	NNHP regularly updates and maintains biological information on this species.
Pungent dwarf greasebush	Glossopetalon pungens var. pungens	NNHP regularly updates and maintains biological information on this species.
Red Rock Canyon aster	Ionactis caelestis	NNHP regularly updates and maintains biological information on this species.
Hidden ivesia	Ivesia cryptocaulis	NNHP regularly updates and maintains biological information on this species.
Jaeger ivesia	Ivesia jaegeri	NNHP regularly updates and maintains biological information on this species.
Hitchcock bladderpod	Lesquerella hitchcockii	NNHP regularly updates and maintains biological information on this species.
Blue diamond cholla	Opuntia whipplei var. multigeniculata	NNHP regularly updates and maintains biological information on this species.
White-margined beardtongue	Penstemon albomarginatus	NNHP regularly updates and maintains biological information on this species.

Species (common name)	Species (scientific name)	Comment
Charleston beardtongue	Penstemon leiophyllus var. keckii	NNHP regularly updates and maintains biological information on this species.
Jaeger beardtongue	Penstemon thompsoneae var. jaegeri	NNHP regularly updates and maintains biological information on this species.
Parish's phacelia	Phacelia parishii	NNHP regularly updates and maintains biological information on this species.
Clokey mountain sage	Salvia dorrii var. clokeyi	NNHP regularly updates and maintains biological information on this species.
Clokey catchfly	Silene clokeyi	NNHP regularly updates and maintains biological information on this species.
Charleston tansy	Sphaeromeria compacta	NNHP regularly updates and maintains biological information on this species.
Charleston kittentails	Synthyris ranunculina	NNHP regularly updates and maintains biological information on this species.
Charleston grounddaisy	Townsendia jonesii var. tumulosa	NNHP regularly updates and maintains biological information on this species.
Limestone violet	Viola purpurea var. charlestonensis	NNHP regularly updates and maintains biological information on this species.
western burrowing owl	Speotyto cunicularia hypugea (Athene cunicularia)	NNHP compiled and updated records on this species under project 2005-NHP-557-P.
flannelmouth sucker	Catostomus latipinnis	NNHP regularly updates and maintains biological information on this species.
Moapa White River springfish	Crenichthys baileyi moapae	NNHP regularly updates and maintains biological information on this species.
Virgin River chub	Gila seminuda	NNHP regularly updates and maintains biological information on this species.

Species (common name)	**Species (scientific name)**	**Comment**
Virgin River chub (Muddy River population)	Gila seminuda (Muddy River Population)	NNHP regularly updates and maintains biological information on this species.
Moapa dace	Moapa coriacea	NNHP regularly updates and maintains biological information on this species.
woundfin	Plagopterus argentissimus	NNHP regularly updates and maintains biological information on this species.
Spring Mountain ant	Lasius nevadensis	NNHP regularly updates and maintains biological information on this species.
Amargosa (Pahranagat) naucorid	Pelocoris shoshone	NNHP regularly updates and maintains biological information on this species.
Moapa riffle beetle	Microcylloepus moapus moapus	NNHP regularly updates and maintains biological information on this species.
Moapa pebblesnail	Pyrgulopsis avernalis	NNHP regularly updates and maintains biological information on this species.
Moapa turban snail	Pyrgulopsis carinefera	NNHP regularly updates and maintains biological information on this species.
Moapa speckled dace	Rhinichthys osculus	NNHP regularly updates and maintains biological information on this species.
Grated tyronia	Tyronia clathrata	NNHP regularly updates and maintains biological information on this species.
naucorid bug	Usingerina moapensis (Limnocoris moapensis)	NNHP regularly updates and maintains biological information on this species.
Mojave gypsum bee	Andrena balsamorhizae	NNHP regularly updates and maintains biological information on this species.
Red-tailed blazing star bee	Megandrena mentzeliae	NNHP regularly updates and maintains biological information on this species.
Virgin River perdita	Perdita crotonis	NNHP regularly updates and maintains biological information on this species.
spurge-loving perdita	Perdita euphorbiana	NNHP regularly updates and maintains biological information on this species.
Moapa perdita	Perdita fulvescens	NNHP regularly updates and maintains biological information on this species.

Species (common name)	Species (scientific name)	Comment
unadorned perdita	Perdita inornata	NNHP regularly updates and maintains biological information on this species.
Mojave poppy bee	Perdita meconis	NNHP regularly updates and maintains biological information on this species.
Mojave Mountain perdita	Perdita vicina	NNHP regularly updates and maintains biological information on this species.
desert-loving perdita	Perdita xerophila	NNHP regularly updates and maintains biological information on this species.
Bret's blue butterfly	Euphilotes battoides ssp	NNHP regularly updates and maintains biological information on this species.
MacNeil sooty wing skipper	Hesperopsis gracielae	NNHP regularly updates and maintains biological information on this species.
Desert pocket mouse	Chaetodipus penicillatus sobrinus	NNHP compiled and updated records on this species under project 2005-NHP-557-P.
Desert kangaroo rat	Dipodomys deserti	NNHP compiled and updated records on this species under project 2005-NHP-557-P.
Townsend's big-eared bat	Corynorhinus townsendii	NNHP regularly updates and maintains biological information on this species.
Trichostomum moss	Trichostomum sweetii	NNHP regularly updates and maintains biological information on this species.
Banded Gila monster	Heloderma suspectum cinctum	NNHP compiled and updated records on this species under project 2005-NHP-557-P.
Black wooly-pod	Astragalus funereus	NNHP regularly updates and maintains biological information on this species.
Curve-podded Mojave (halfring) milkvetch	Astragalus mohavensis var. hemigyrus	NNHP regularly updates and maintains biological information on this species.
Mokiak milkvetch	Astragalus mokiacensis	NNHP regularly updates and maintains biological information on this species.
triangle lobe moonwort	Botrychium ascendens	NNHP regularly updates and maintains biological information on this species.
Dainty moonwort	Botrychium crenulatum	NNHP regularly updates and maintains biological information on this species.
Virgin River thistle	Cirsium virginense	NNHP regularly updates and maintains biological information on this species.

Species (common name)	**Species (scientific name)**	**Comment**
Unusual catseye	Cypantha insolita	NNHP regularly updates and maintains biological information on this species.
silverleaf sunray	Enceliopsis argophylla	NNHP regularly updates and maintains biological information on this species.
Nevada willowherb	Epilobium nevadense	NNHP regularly updates and maintains biological information on this species.
Las Vegas Valley buckwheat	Eriogonum corymbosum var. aureum	NNHP regularly updates and maintains biological information on this species.
Clokey buckwheat	Eriogonum heermannii var. clokeyi	NNHP regularly updates and maintains biological information on this species.
yellow twotone beardtongue	Penstemon bicolor ssp. bicolor	NNHP compiled and updated records on this species under project 2005-NHP-557-P.
Amargosa beardtongue	Penstemon fruticiformis ssp. amargosae	NNHP regularly updates and maintains biological information on this species.
Meadow Valley sandwort	*Arenaria stenomeres*	NNHP regularly updates and maintains biological information on this species.
Ackerman milkvetch	*Astragalus ackermanii*	NNHP regularly updates and maintains biological information on this species.
Sheep Mountain milkvetch	*Astragalus amphioxys var. musimonum*	NNHP regularly updates and maintains biological information on this species.
remote rabbitbrush	*Chrysothamnus eremobius*	NNHP regularly updates and maintains biological information on this species.
Crossidium moss	*Crossidium seriatum*	NNHP regularly updates and maintains biological information on this species.
Ripley's biscuitroot	*Cymopterus ripleyi var. saniculoides*	NNHP regularly updates and maintains biological information on this species.
Gold Butte moss	*Didymodon nevadensis*	NNHP regularly updates and maintains biological information on this species.
sheep fleabane	*Erigeron ovinus*	NNHP regularly updates and maintains biological information on this species.
American grimmia	*Grimmia americana*	NNHP regularly updates and maintains biological information on this species.

Species (common name)	**Species (scientific name)**	**Comment**
small-footed myotis	*Myotis ciliolabrum*	NNHP regularly updates and maintains biological information on this species.
fringed myotis	*Myotis thysanodes*	NNHP regularly updates and maintains biological information on this species.
pygmy poreleaf	*Porophyllum pygmaeum*	NNHP regularly updates and maintains biological information on this species.
Pseudocrossidium moss	*Pseudocrossidium crinitum*	NNHP regularly updates and maintains biological information on this species.
Inyo shrew	*Sorex tenellus*	NNHP regularly updates and maintains biological information on this species.
Hidden Forest Uinta chipmunk	*Tamias umbrinus nevadensis*	NNHP regularly updates and maintains biological information on this species.
Moapa Warm Spring riffle beetle	Stenelmis calida moapa	NNHP regularly updates and maintains biological information on this species.
Yuma clapper rail	Rallus longirostrus yumanensis	NNHP regularly updates and maintains biological information on this species.
Virgin spinedace	Lepidomeda mollispinis mollispinis	NNHP regularly updates and maintains biological information on this species.
Spotted bat	Euderma maculatum	NNHP regularly updates and maintains biological information on this species.
Greater western mastiff bat	Eumops perotis californicus	NNHP regularly updates and maintains biological information on this species.
Allen's big-eared bat	Idionycteris phyllotis	NNHP regularly updates and maintains biological information on this species.
California leaf-nosed bat	Macrotus californicus	NNHP regularly updates and maintains biological information on this species.
cave myotis	Myotis velifer	NNHP regularly updates and maintains biological information on this species.
Yuma myotis	Myotis yumanensis	NNHP regularly updates and maintains biological information on this species.
Big free-tailed bat	Nyctinomops macrotis	NNHP regularly updates and maintains biological information on this species.
One-leaf Torrey milkvetch	Astragalus calycosus var. monophyllidius	NNHP regularly updates and maintains biological information on this species.

Appendix B

Species (common name)	**Species (scientific name)**	**Comment**
Clokey fleabane	Erigeron clokeyi	NNHP regularly updates and maintains biological information on this species.
Rosy twotone beardtongue	Penstemon bicolor ssp. roseus	NNHP regularly updates and maintains biological information on this species.
Jaeger phacelia	Phacelia geraniifolia	NNHP compiled and updated records on this species under project 2005-NHP-557-P.
polished blazingstar	Mentzelia polita	NNHP compiled and updated records on this species under project 2005-NHP-557-P.
satintail	Imperata brevifolia	NNHP compiled and updated records on this species under project 2005-NHP-557-P.

Appendix C

	Threat No.	Threat Description	Perscriptive Conservation Action Description	
(1) Population Dynamics/Life History				
	Threat 101	susceptibility to stochastic events of narrow endemics and limited distribution species (those with limited habitat or low relative densities)	monitor key populations or habitat area conditions; provide for adaptive management responses to adverse changes; establish refugia where appropriate; collect seeds for storage in seed banks; conduct germination research for nursery propagation	NNHP contributes to identifying key sensitive populations
	Threat 102	unknown population trends	monitor key populations or habitat area conditions; provide for adaptive management responses to adverse changes	NNHP contributes to identifying key sensitive populations
(2) Commercial Collection and Collection by Hobbyists				
(3) Fire Management				
	Threat 301	habitat degradation and modification due to fire suppression and fuels management, post fire suppression and fuels management, historical fire management, fire	identify key sensitive populations and habitats; develop fire management program that provides protection for sensitive resources; provide for adaptive management responses to adverse changes	NNHP contributes to identifying key sensitive populations
	Threat 302	vegetation community conversion to fire regime due to introduction of exotic annuals	identify key habitat areas potentially susceptible to fire and manage to minimize conversion; remove or manage species from key susceptible habitat areas; provide for adaptive management responses to adverse changes	NNHP contributes to identifying key sensitive populations
(4) Recreation				

Threat 401	direct wildlife mortality and habitat degradation and loss from dispersed recreational activities (legal and illegal) such as by hunters, hikers, equestrians, campers, casual mountain bikers, and casual OHV users; from impacts associated with dispersed recreational activities such as littering, traveling and parking off designated roads and trails, removing and trampling of plants, and disturbing natural surfaces and soil-holding crusts; and travel through key areas to get to areas of concentrated recreational activities	identify key areas (sensitive populations or habitats); relocate trails away from key areas; site new trails away from key areas; ensure adequate law enforcement presence; enforce speed limits; eliminate or mitigate causes of impacts in key areas that result from the attraction of the public to concentrated events outside but adjacent to key areas; educate the public (with special attention to the casual OHV rider) regarding the potential and cumulative nature of impacts from casual use, the importance of the resource, and of staying on designated roads and trails; enlist users' cooperation; manage the use of plant litter or dead or apparently dead wood for burning in or the moving of rocks to surround campfires, where they are permitted; manage the collection of plants and plant parts (dead or alive, attached or detached from the plants) or soil and rock for decorative or other purposes unless authorized; increase the number of tip-proof trash receptacles and establish pick-up schedules adequate to prevent overflow; develop trail maintenance protocols that avoid or minimize impacts to key populations or habitat areas; provide for adaptive	NNHP contributes to identifying key sensitive populations
Threat 402	direct wildlife mortality, habitat degradation and loss from development or expansion of concentrated recreation facilities, and their maintenance and use (camping, ski areas, parking)	identify key areas (sensitive populations and habitats); manage existing facilities to minimize adverse effects on biological resources; site new facilities away from key populations or habitat areas; provide for adaptive management responses to adverse changes	NNHP contributes to identifying key sensitive populations

Threat 403	habitat modification and degradation and wildlife mortality from concentrated recreation including OHV events by organized groups (speed, non-speed, competitive, non-competitive, commercial, and non-commercial events); competitive OHV races that by number of vehicles or participants, speed of travel, or presence of spectators (authorized or not) constitute concentrated recreation with potential adverse effect; equestrian trail rides; dog field trials; flying machine events (remote control and piloted); skydiving; the parking of vehicles for these events	provide opportunities, as appropriate, in less sensitive areas; identify sensitive populations and habitat areas; enlist the support of OHV participants to discourage inappropriate OHV use; inform OHV participants of impacts to wildlife and habitats of unmanaged OHV activities; provide for adaptive management responses to adverse changes; limit number of participants; enforce appropriate seasonal restrictions on events; control and manage spectators to avoid impacts; limit the number of events in any sensitive areas; prohibit, regulate, or manage competitive races in key areas	NNHP contributes to identifying key sensitive populations
Threat 405	habitat modification and degradation, individual displacement by rock climbing	identify key populations and habitat areas, prohibit rock climbing in key areas; provide climbing opportunities in less sensitive areas; inform rock climbers of conservation impacts of rock climbing; consider seasonal restrictions on rock climbing in sensitive areas	NNHP contributes to identifying key sensitive populations
Threat 407	habitat degradation, population displacement from spelunking	identify key cave and mine dependent populations; protect key caves and mines through signage, fencing, or closure; inform spelunkers of conservation impacts of spelunking; allow seasonal closure of caves to avoid disturbance of bat hibernacula and roosts	NNHP contributes to identifying key sensitive populations
Threat 410	direct wildlife mortality, and habitat degradation and loss from trail construction and maintenance	identify key areas (sensitive populations or habitats); where possible, relocate trails away from sensitive populations or habitats; site new trails in less sensitive areas or away from key populations or habitat areas; develop trail maintenance protocols that avoid or minimize impacts to key populations or habitat areas; provide for adaptive management responses to adverse changes; encourage public involvement in trail projects; public education	NNHP contributes to identifying key sensitive populations
Threat 411	direct and indirect impacts from vehicles traveling in wash beds	avoid designating roads and trails in washes in sensitive or key areas; prohibit vehicular traffic along wash beds or on wash banks; confine travel in washes to crossing them in the shortest possible distance, if rerouting them is not feasible	NNHP contributes to identifying key sensitive populations

(5) Highways, Roads, and Trails			
Threat 504	habitat degradation from highway and road construction, improvement, and maintenance (including vegetation control and salting)	site new highway construction to avoid key populations and habitat areas; develop appropriate construction and maintenance management programs to avoid, minimize, or mitigate effects to key populations and habitat areas	NNHP contributes to identifying key sensitive populations
(6) Pest Control (7) Grazing			
Threat 701	habitat degradation by wild horse and burro grazing and trampling	protect key populations and habitat areas by fencing or other appropriate measures; implement wild horse and burro management plans; provide selected forage and water locations	NNHP contributes to identifying key sensitive populations
Threat 702	competition of herbivores with cattle and equids	protect key populations and habitat areas by fencing or other appropriate measures; remove, regulate, or manage cattle and equids in key habitat areas; manage herds to minimize competition with key populations; purchase allotments on a willing-seller, willing-buyer basis	NNHP contributes to identifying key sensitive populations
Threat 703	habitat degradation by livestock grazing and trampling	protect key populations and habitat areas by fencing or other appropriate measures; remove cattle and equids from key habitat areas; manage herds to minimize impacts to key habitat areas; purchase allotments on a willing-seller, willingbuyer basis	NNHP contributes to identifying key sensitive populations
(8) USAF Military Activities			
Threat 801	habitat degradation at target sites, on roads, or other military access locations	site activities away from key populations and habitat areas; provide measures to avoid, minimize, or mitigate effects of these activities; provide protection for populations and habitat areas not affected by these activities	NNHP contributes to identifying key sensitive populations
Threat 802	habitat modification from facilities construction and maintenance activities	site new facilities away from key populations and habitat areas; provide measures to avoid, minimize, or mitigate effects of these activities; provide protection for populations and habitat areas not affected by existing facilities	NNHP contributes to identifying key sensitive populations
(9) Mineral Extraction			

Threat 901	habitat degradation from locatable, leasable, and saleable mineral development	site leasable and saleable mineral development away from key populations or habitat areas to the extent feasible; provide measures to avoid, minimize, or mitigate effects of these activities; close IMAs and LIMAs to mineral exploration and mining, subject to prior existing rights	NNHP contributes to identifying key sensitive populations
Threat 902	habitat degradation and wildlife displacement from extraction of minerals	site mining activities away from key populations or habitat areas; provide measures to avoid, minimize, or mitigate effects of these activities	NNHP contributes to identifying key sensitive populations
Threat 903	toxic waste ponds	site toxic ponds associated with mining activities away from key populations or habitat areas; provide measures to discourage wildlife from using ponds (fencing, cover) as required by state law	NNHP contributes to identifying key sensitive populations
(10) Woodcutting and Collection (11) Development (12) Utility Lines (13) Aquatic Resources (14) Springs (15) Exotic, Subsidized, and Parasitic Species (16) Feral Animals (17) Illegal or Unauthorized Activities			