

Allen's big-eared bat

Idionycteris phyllotis

WAP 2012 species because of significant regional population declines as well as patchy distribution and low population numbers in Nevada.



Agency Status	
NV Natural Heritage	G4S1
USFWS	No Status
BLM-NV	Sensitive
State Prot	Protected Mammal NAC 503.030.1
CCVI	Presumed Stable

TREND: Although trend is not well documented, there is much anecdotal information that this species is severely declining. In the Spring Mountains where they were previously captured and recorded, this species has not been recently observed. In other parts of their range outside the state, this species is declining and numbers of individuals are probably much less than previously thought.

DISTRIBUTION: Restricted to Clark County although there is speculation this species could occur in some areas of Nye and Lincoln counties.

GENERAL HABITAT AND LIFE HISTORY:

Inhabits mountainous areas and uses a variety of habitats including Mojave Desert scrub, coniferous forests, and riparian woodlands. Roosts in rocks, cliffs, snags, and mines throughout its range but known roosts in Nevada consist only of snags and abandoned mines. Maternity colonies are generally found in mines. In the winter, they are thought to move from higher elevations to lower elevations but this is poorly understood.

Food items include a variety of insects but diet predominantly consists of moths, probably gleaned from vegetation or captured in flight. At least in some areas, this species demonstrates high roost fidelity with individuals flying 70-100 km roundtrip nightly between foraging grounds and the day roost (Brown and Berry 2004).

Winter ecology is poorly understood, but they presumably hibernate in mines and caves and are capable of periodic winter activity. Allen's big-eared bats form groups during the maternity season in hollow trees or abandoned mines. During this time, bats are particularly sensitive to disturbance and have been known to abandon sites, sometimes leaving their young behind.

CONSERVATION CHALLENGES:

Maternity roosts appear to be a critical limiting factor. Mine closure or renewed use could impact populations. Improper forest management can eliminate tree roosts, particularly large snags that this species relies on. Alteration of natural springs can also create serious impacts. Bats are very vulnerable to disturbance during hibernation and if disturbed often enough, can deplete their stored fat and starve to death.

NEEDS:

Research Needs: Current population status, delineating roosting preferences and requirements, and describing foraging and reproductive behavior are needed. Monitoring of known populations and surveying for new occurrences are also critical.

Monitoring and Existing Plans: Allen's big-eared bats are discussed in the Nevada Bat Conservation Plan (2006). This species is also a Watch List species under the Clark County MSHCP.

Approach: Any sites used as roosts should be protected from disturbance and damage. Identify and map winter, maternity, bachelor, lekking, and night roosts. Coordinate protection measures such as installation of bat gates or access restrictions with appropriate land management agencies. Coordinate mine inventories for significant bat colonies with mine closure programs of various agencies, including BLM, Forest Service, and NV Division of Minerals. Forest management should include maintenance of a variety of seral stages, including old growth and snags. This species should be monitored in mines and caves for evidence of white-nose syndrome.

Allen's chipmunk

Neotamias senex

WAP 2012 species because it has a very limited and patchy distribution within the state.



Agency Status	
NV Natural Heritage	G5S2S3
USFWS	No Status
CCVI	Presumed Stable

TREND: Trend is unknown.

DISTRIBUTION: NW US from north-central OR through the northern mountains of CA (between the Klamath and Eel rivers, east to the Warner Range at the CA-NV border, south to Yosemite, crossing the NV border east of Lake Tahoe); occurs above 1,500 m in the central Sierra Nevada (Gannon and Forbes 1995).

GENERAL HABITAT AND LIFE HISTORY:

Allen's chipmunk, sometimes referred to as the Shadow chipmunk, is a large mountain chipmunk that generally prefers mature coniferous forests and chaparral slopes dominated by ponderosa pine, Jeffrey pine, sugar pine, black oak, Douglas fir, white fir, red fir, incense cedar, and mountain hemlock. The shrub layer includes buckbrush, manzanita, blackberry, and chinquapin. A study in the Sierra Nevada found that Allen's chipmunk was most abundant in red fir, than in mixed conifers (Coppeto et al., 2006).

They feed on the fruits of forest trees and shrubs, ground-level herbs, grasses, fungi, and occasionally insects. Allen's chipmunk forages on log-strewn forest floors and in adjacent chaparral as well as in trees.

Nests are located among logs or brush and in hollow trees. During the winter, it undergoes deep hibernation periods, with little or no active periods.

CONSERVATION CHALLENGES:

Range restricted and in NV limited to a region north of Reno and in the Sierra Nevada.

NEEDS:

Research Needs: This species was incidentally observed during focused trapping studies conducted by NDOW for the northern flying squirrel. The status and distribution, habitat preferences, and responses to climate change need to be determined.

Monitoring and Existing Plans: This species is not currently monitored and does not occur within any other existing plans.

Approach: Conduct surveys and monitor known occurrences to determine status, trend, range, and habitat preferences of the species within Nevada. A project proposal to conduct focused studies for Allen's chipmunk is currently being prepared by NDOW and State Lands Nevada Tahoe Resource Team (NTRT).

American marten

Martes americana

WAP 2012 species because of limited and patchy occurrences and its preference for old-growth forests.



Agency Status	
NV Natural Heritage	G5S2S3
USFWS	No Status
State Prot	Fur-bearing Mammal NAC 503.025
CCVI	Presumed Stable

TREND: Rare and secretive; trend unknown.

DISTRIBUTION: Primarily found in the Sierra Nevada although there is some recent evidence for occurrence in the Jarbidge Mountains.

GENERAL HABITAT AND LIFE HISTORY:

In Nevada, martens occur in coniferous forest and may use rocky alpine areas. Use of habitat is related to food availability, especially in winters with deep snow. When inactive, they occupy holes in dead or live trees or stumps, abandoned squirrel nests, conifer crowns, rock piles, burrows, or snow cavities. In winter, much of a marten's activity occurs under the snow, often in coarse woody debris. Martens are active year-round.

Mostly carnivorous, but will supplement its diet with berries in the summer. Voles and mice are a major staple for martens. They hunt mainly on the ground but are fast enough to catch squirrels and birds in the forest canopy. Foraging activity is mostly nocturnal in winter, diurnal in summer in the Sierra Nevada, and apparently synchronous with activity of prey (Zielinski et al. 1983).

Except during breeding, martens are basically solitary and territorial. Activity may peak at dusk and dawn in summer while they have been observed by day in winter. Male and female home ranges differ in size; males occupy a home range of about one square mile while females may only have a home range size of a quarter of a square mile. Young may disperse 40 km (25 miles) or more. Martens are relatively long-lived, with a recorded lifespan of approximately 15 years.

CONSERVATION CHALLENGES:

This species has a limited distribution in Nevada and is primarily linked to mature forests with complex understory; however, has also been observed in second growth forest. Logging and fuels reduction projects without allowances for dead/down woody material degrade habitat suitability. Threatened by a potential increase in the frequency and intensity of wildfires in old-growth forest areas and by small fragmented habitats.

NEEDS:

Research Needs: Status, distribution, and population viability in NV, including verification of possible population in the Jarbidge Mountains, needs investigation.

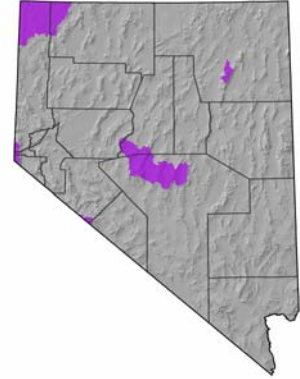
Monitoring and Existing Plans: Included in the Sierra Nevada Forest Plan Amendment as an old forest associated species and carnivore of special concern (USFS 2004). A northern flying squirrel study currently being conducted by NDOW will aid in a better understanding of the American marten's potential occupancy within the Tahoe basin since it preys upon the northern flying squirrel and snowshoe hare.

Approach: Determine population trends in Nevada and monitor known populations. Conduct systematic surveys within the Jarbidge mountains to determine presence/absence. Protect vulnerable populations as appropriate. Implement Forest Service standards and guidelines for forest furbearer management in suitable habitat.

American pika

Ochotona princeps

WAP 2012 species because it is moderately vulnerable to climate change, it requires a very specific thermal regime, its populations are isolated and fragmented throughout the state, and there are climate change concerns for its preferred alpine habitat.



Agency Status	
NV Natural Heritage	G5S2
USFWS	No Status
BLM-NV	Sensitive
State Prot	Protected Mammal NAC 503.030.1
CCVI	Moderately Vulnerable

TREND: In isolated areas, it appears that pikas are experiencing local extirpations, while at others they may be more stable. At least seven new populations were discovered by NDOW during 2009-2010 surveys within and around Sheldon NWR in the northwest corner of the state.

DISTRIBUTION: Occurs in isolated populations from the rimrocks of extreme northwestern Nevada to the alpine talus formations of the Sierra Nevada, several central mountain ranges (e.g., Toiyabe Range), east to the Ruby Mountains and East Humboldt Range in Elko County.

GENERAL HABITAT AND LIFE HISTORY:

Restricted to rocky talus slopes, or rimrocks with deep fissures and crevices, primarily the talus-meadow interface. The lower talus slopes at this interface (within the talus matrix below the surface rocks) has been shown to provide the coolest warm-season temperatures. They also maintain greater winter snow cover, insulating haypiles and reducing exposure to cold outside air (Millar 2011). Also occupy areas above the treeline up to limit of vegetation and lower elevations in rocky areas within forests or near lakes. Does not dig burrows but may enlarge den or nest site under rock. Recent surveys in CA and NV found pika at elevations between 1,827 and 3,887 meters (5,994-12,752 feet) (Millar and Westfall 2010).

Feeds primarily on grasses and sedges; also eats some flowering plants and shoots of woody vegetation.

Pikas are active year-round. In late summer and fall, they harvest and store food (forbs, grasses, marmot pellets) for winter consumption; stored food may be most important when winter is unusually harsh or long. They are relatively inactive on warm days; near their lower elevation limit they may be inactive at midday in hot weather (Smith and Weston 1990). Pikas are individually territorial, relatively long-lived (some can live up to 6 years of age), and vacant territories are scarce. Hence, an important factor in juvenile survival is their ability to find and colonize a vacant territory.

CONSERVATION CHALLENGES:

Possible direct anthropogenic influences on pikas include use of talus rock for road construction, recreational shooting, and unsustainable grazing by non-native herbivores along talus margins. Millar (2011) suggests that grazing at the base of talus communities (i.e. forefields) possibly removes preferred, high value forage and drives individual pikas upslope to poorer quality habitat, thereby impacting population health. Climate change is most likely to impact pikas through conversion of alpine vegetative communities to sagebrush or mixed conifer and the increase of temperatures at the highest elevations that may exceed a pika's thermoregulatory tolerances. Climate change appears more likely to affect populations in 5-20 years and beyond. Populations in marginal habitat have already significantly declined although the causes are unknown. On February 5, 2010 the USFWS determined that the American pika does not meet the criteria for protection under the ESA. The finding indicated that although potentially vulnerable to the impacts of climate change in portions of its range, the best available scientific information indicates the species will be able to survive despite higher temperatures in a majority of its range and is not in danger of extinction in the foreseeable future.

NEEDS:

Research Needs: Statewide species specific inventory; additional surveys need to be conducted to determine current distribution, both latitudinal and elevational. Local extinctions are hypothesized to be linked to large scale climatic fluctuations, but further evaluation is needed. Further investigation in metapopulation dynamics needs to be determined in order to fully understand the conservation challenges and opportunities for this species.

WAP HABITAT LINKS: Alpine and Tundra, Cliffs and Canyons, Grasslands and Meadows.

Monitoring and Existing Plans: NDOW species specific inventory survey effort in progress, along with temperature monitoring of occupied and unoccupied talus habitats throughout the state. At least seven new populations were discovered by NDOW during 2009-2010 surveys within and around Sheldon NWR in the northwest corner of the state. NDOW also confirmed pikas from Marlette Lake to the Mount Rose wilderness in the Carson Range and Lake Tahoe Basin in 2011. This species is not included in any other existing plans.

Approach: Determine population viability, demographic analysis, and confirm trend. Identify suitable unoccupied habitat and evaluate potential for reintroduction. Identify actual effects of livestock grazing on pika where grazing occurs adjacent to occupied talus habitat and adjust strategies if necessary.

American water shrew

Sorex palustris

WAP 2012 species because it is moderately vulnerable to climate change and its preferred habitat is sensitive and vulnerable to degradation.



Agency Status	
NV Natural Heritage	G5S2
USFWS	No Status
CCVI	Moderately Vulnerable

TREND: Trend is unknown.

DISTRIBUTION: Extreme western, and central through northeastern NV.

GENERAL HABITAT AND LIFE HISTORY:

Found in the vicinity of streams or other bodies of water. Water shrews require sufficient shelter such as dense vegetative cover, logs, rocks, crevices, etc. These areas provide overhead protection and high humidity. They use both terrestrial and aquatic habitat to find food and escape predators.

Primarily dependent upon aquatic insects; also eats various other invertebrates. May take small vertebrates (fishes, amphibians) when available. Hunts under and on top of water. May even be seen running across the water surface. Terrestrial food items include insects, snails, earthworms, fungi, and green plant material.

Water shrews, with their high metabolic rates, need to consume approximately their weight in food every day (Conaway 1952, Sorenson 1962). In the wild they seem unable to store significant body fat and can die of starvation within a few hours. When a surplus of food is available, it is often hoarded, the shrew sometimes defecating on it to keep other shrews away. Two major activity periods reported: sunset to four hours after and just before sunrise (van Zyll de Jong 1983). Generally active throughout the day and in every season, but secretive and seldom seen. Their lifespan is approximately 18 months.

CONSERVATION CHALLENGES:

Habitat has been fragmented since the retreat of the last glaciers making isolated populations vulnerable to extirpation. Water shrews are particularly vulnerable to the destruction of their aquatic habitats through pollution and drainage (Churchfield 1992). Montane stream water quality and the quality of associated riparian vegetation is the primary concern in Nevada.

NEEDS:

Research Needs: Research is needed on geographic variation in habitat requirements and on dispersion pattern and dispersal. The minimum population size needed to maintain genetic viability in a fragmented habitat should be investigated.

Monitoring and Existing Plans: This species is not currently monitored and is not within any other existing plans.

Approach: The water shrew is a boreal species, requires high quality water, preferably mountain streams, and abundant cover such as rocks, logs, or overhanging streambank. Suitable management consists primarily of maintaining these conditions. Guidelines should be developed for activities with potentially adverse impacts. Buffer strips should be maintained along potential water shrew habitat. Pesticide use that might impact aquatic/riparian invertebrate populations should be avoided whenever possible. In some cases it may be desirable to reintroduce shrews from nearby populations to restored habitat, although the difficulty and expense of such an action may be prohibitive. Occupied habitat should be mapped and a low impact monitoring program should be maintained.

bighorn sheep

Ovis canadensis

WAP 2012 species because it is moderately vulnerable to climate change; its patchily distributed, small, and isolated populations; as well as habitat vulnerability and disease concerns.



Agency Status	
NV Natural Heritage	G4S4
USFWS	No Status
BLM-NV	Sensitive
USFS-R4	Sensitive
State Prot	Game Mammal NAC 503.020
CCVI	Moderately Vulnerable

TREND: Trend is stable in some areas, declining in others primarily due to lung disease.

DISTRIBUTION: Occurs in suitable habitat in mountain ranges throughout the state.

GENERAL HABITAT AND LIFE HISTORY:

Bighorn sheep occur in mesic to xeric, alpine to desert grasslands or shrub-steppe in mountains, foothills, or river canyons (Shackleton et al. 1999, Krausman et al. 1999). Many of these grasslands are fire-maintained (Geist 1971, Erickson 1972). Escape terrain (cliffs, talus slopes, etc.) is an important feature. Dense forests and chaparral that restrict vision are avoided (Shackleton et al. 1999, Krausman et al. 1999). In the north, bighorn are not usually dependent on free-standing water, getting water instead from succulent vegetation in the summer and snow or ice in the winter (Van Dyke 1978). However, in the south, bighorn may be dependent on access to free water during summer (Turner 1979, Turner and Weaver 1980, Seegmiller and Ohmart 1981) and access to mineral licks may be important in spring (Shackleton et al. 1999, Krausman et al. 1999).

Bighorn sheep diets are diverse and variable. They are primarily grazers of grass and forbs, but diet can also include significant amounts of shrubs (Miller and Gaud 1989, Krausman et al. 1999, Shackleton et al. 1999). Their diet changes seasonally. During the day, feeding alternates with rest-rumination periods. There are peak feeding times in the early morning and at dusk. During the winter, bighorns increase the length of time spent actively feeding.

Populations other than those in low deserts typically migrate between an alpine or montane summer range and a lower elevation winter range (Shackleton et al. 1999).

CONSERVATION CHALLENGES:

Nevada has a high stewardship responsibility for desert bighorn. Small, isolated populations are at increased risk from predation and disease. Carrying capacity for bighorn can be reduced through unsustainable grazing by other ungulates. Disease transmission is believed to occur primarily via contact with domestic sheep. Lungworm infections weaken bighorns to the point of vulnerability to respiratory infection by opportunistic bacteria.

NEEDS:

Research Needs: Response and tolerance thresholds to exotic plant invasion into native habitats.

Monitoring and Existing Plans: NDOW annual big game population monitoring, NDOW Bighorn Sheep Management Plan (2001), Clark County MSHCP watch list species (ssp. nelsoni only).

Approach: Evaluate opportunities to expand the range of bighorn sheep through active water development and a trapping and transplanting program. Maintain migration corridors to enhance metapopulation dynamics and continue the active implementation of the NDOW Bighorn Sheep Management Plan (2001).

Botta's pocket gopher

Thomomys bottae

WAP 2012 species because of taxonomic isolates that are vulnerable due to habitat degradation and conversion. This species is also moderately vulnerable to climate change.



Agency Status	
NV Natural Heritage	G5SH
USFWS	No Status
BLM-NV	Sensitive
CCVI	Moderately Vulnerable

TREND: Status and trend are unknown for this species, particularly for isolated and potentially taxonomically distinct populations.

DISTRIBUTION: Can be found throughout the state in appropriate habitat. Two subspecies of priority interest are isolated to two valleys, *T. b. abstrusus* in Fish Spring valley (also known as Little Fish Lake Valley) in Nye County, and *T. b. curtatus* in Big Smoky Valley. A third isolate occurs near Eastgate (*T. b. lucrificus*).

GENERAL HABITAT AND LIFE HISTORY:

Pocket gophers are associated with a wide range of vegetation types, and a wide variety of soils from soft sands to friable loams and hard clays. They are residents of open habitats and meadows, where soils are deep enough to maintain permanent burrow systems. They can be highly variable in their morphological characteristics and generally live in small, local populations. This has led to a large number of isolated subspecies, of which the taxonomy is still not well understood.

Eats roots, bulbs, tubers, and other vegetable matter. Pocket gophers mainly feed underground, pulling plants into burrows by roots. Pocket gophers are the most efficiently adapted of any living North American rodent for utilizing underground roots. They probably store food in burrows. Common predators of pocket gophers include raptors, owls, snakes and carnivorous mammals.

Pocket gophers are intermittently active day and night throughout the year. They are fossorial and are rarely found above ground. When they are above ground, they are very vulnerable to predation, particularly by owls. They can efficiently burrow through snow to reach above-ground vegetation and, in some areas, this may be a dispersal mechanism. Dirt ridges from in tunnels in the snow can be evidence of pocket gophers in an area. Pocket gophers are characteristically of low mobility (often they are referred to as sedentary), philopatric, and with small effective population sizes (Daly and Patton 1990). Pocket gophers are ecologically important as prey items and in influencing soils, microtopography, habitat heterogeneity, diversity of plant species, and primary productivity (Huntly and Inouye 1988). Juvenile dispersal is largely aboveground and at night. Juvenile dispersal distance averages 400 meters with maximum distances of less than one kilometer recorded.

CONSERVATION CHALLENGES:

Pocket gophers are at risk because they occur in isolated populations that are vulnerable to extirpation and are threatened by habitat degradation and conversion, particularly from climate change.

NEEDS:

Research Needs: Continue to study distribution, status, and trend. It is particularly important for this species to conduct genetic work to determine subspecific taxa within isolated areas. Records for this species are generally historic, and Hall (1946) delineates multiple, isolated subspecies, of which status and trend are unknown. Basic life history information is needed, as is an understanding of the species ecology so that an informed management plan can be developed.

Monitoring and Existing Plans: Limited surveys have recently been conducted by NDOW with some genetic work, but much remains to be done.

Approach: Known, isolated subspecific populations need to be systematically inventoried, especially for the Fish Spring pocket gopher (*T. b. abstrusus*), the San Antonio pocket gopher (*T. b. curtatus*), and a potentially new isolate near Eastgate (*T. b. lucrificus*). Genetic work needs to be conducted to delineate subspecies and various populations. Once genetic work has been completed, rare and isolated populations should receive conservation planning attention. Possible conservation strategies include easements and private lands conservation funding assistance.

California leaf-nosed bat

Macrotus californicus

WAP 2012 species because it has a very restricted range within Nevada, has specific roost requirements that limit its distribution, and its preferred foraging habitat is vulnerable to conversion and/or degradation, especially with respect to climate change. This species is never very abundant and there are regional conservation concerns.



Agency Status	
NV Natural Heritage	G4S2
USFWS	No Status
BLM-NV	Sensitive
USFS-R5	Sensitive
State Prot	Sensitive Mammal NAC 503.030.3
CCVI	Presumed Stable

TREND: Status and trend unknown although some historic roosts have been lost due to closures of abandoned mines or destruction by vandals.

DISTRIBUTION: California leaf-nosed bats are only known from Clark County which seems to represent the northern-most limit of this species global range.

GENERAL HABITAT AND LIFE HISTORY:

California leaf-nosed bats day roost in caves and mines. Night roosting can occur in a variety of places, including buildings, cellars, porches, bridges, rock shelters, and mines. Because this species does not hibernate or migrate long distances, they will move to specific, warm winter roosts, which in Nevada are generally geothermally heated abandoned mines. Mines used as winter roosts must have internal temperatures greater than 29°C (84°F). This species can form large colonies of 600 or more individuals.

Food items include grasshoppers, cicadas, moths, butterflies, dragonflies, beetles, and caterpillars. Foraging generally commences 1 hour after sunset and occurs close to vegetation or the ground where prey items are gleaned from the surface.

Usually found roosting in groups (sometimes up to 600 bats) but individuals do not cluster. Maximum life expectancy is estimated at more than 10 years. Reproductive rates are generally low, with females having a single young per year. As with most bats, this species is very sensitive to disturbance and harassment.

CONSERVATION CHALLENGES:

This species is behaviorally sensitive to roost disturbance and limited in its distribution by specific winter roosting requirements (warm mines), making roost protection critical to the conservation of this species. Other threats include mine reclamation and renewed mining, and loss or conversion of desert wash riparian vegetation where this species seems to concentrate its foraging. Historic inundation of roosts and foraging areas by the formation of Lakes Mead and Mojave have contributed to the limited distribution and population size observed today.

NEEDS:

Research Needs: This species is thought to be most limited by its winter roosting requirements because California leaf-nosed bats cannot tolerate lowered body temperatures like other bats and requires warm and stable roosts. Research efforts should focus on surveys for new roosts, especially winter roosts, documenting roosting requirements, foraging habits, and delineating the status of this species.

Monitoring and Existing Plans: The California leaf-nosed bat is discussed in the Nevada Bat Conservation Plan and it is a Watch List species in the Clark County MSHCP.

Approach: Key winter, maternity, bachelor, lekking, and/or night roost sites should be identified, mapped, and monitored. Critical roosting sites in mines and caves should be conserved and protected by either installing appropriate bat gates, education of the public, road/trail closures or restrictions, and/or access restrictions. All mines that are proposed to be permanently closed should be properly evaluated for bat habitat prior to closure and should never be closed during the maternity and hibernation seasons. This species should be monitored for evidence of white-nose syndrome.

cave myotis

Myotis velifer

WAP 2012 species because of its limited population within the state and its apparently low population as compared with historic numbers. There are also regional population concerns for this species.



Agency Status	
NV Natural Heritage	G5S1B
USFWS	No Status
BLM-NV	Sensitive
CCVI	Presumed Stable

TREND: Apparently declining. Older large guano piles indicate that historically the only known NV population was much larger than the current population. Many maternity colonies of this species along the Colorado River have been disappearing due to habitat conversion indicating a downward trend for this species. Western populations in CA, NV, and AZ seem to be declining and more at risk than elsewhere in the species' range.

DISTRIBUTION: Only one known population (roost) near Lake Mead NRA in Clark County.

GENERAL HABITAT AND LIFE HISTORY:

As their name suggests, cave myotis day roost in caves and mines, although they are occasionally found in buildings in some areas. They are crevice dwellers, preferring cracks, pockets, and holes in the ceilings of mines and caves. Cave myotis show high roost fidelity from year to year and can tolerate summer roost temperatures as high as 37°C. This species night roosts in caves, mines, buildings, culverts, and bridges, generally close to the entrance or near open areas, and has been repeatedly found in swallow nests, particularly in the non-reproductive season. Maternity colonies can be very large (greater than ten thousand individuals), although males generally roost in groups of less than 100. This species hibernates, although it can periodically arouse to forage or drink. Winter ecology in Nevada is poorly understood.

Foraging for moths and beetles occurs in open areas near the edge or over vegetation. Unlike other bat species, cave myotis are never found more than a few miles from some type of water source. Cave myotis emerge from their roost well before dark and have a relatively short bout of foraging (approximately an hour) before night roosting. It is unclear if there is a defined second early morning foraging period as there is in some other species.

CONSERVATION CHALLENGES:

Very large roosts sizes, high sensitivity to disturbance and large-scale habitat conversion (at least along the Colorado River portion of its range) may be causes for the apparent decline of the species. In Nevada, guano deposits indicate this one known colony was much larger than it is currently; reasons for decline are unknown. The large guano pile also suggests that this was once a maternity colony whereas now it is strictly composed of bachelor males.

NEEDS:

Research Needs: The one colony of this species in the state needs to be monitored and surveyed for any evidence of reproduction. The current status of the species needs to be delineated. Despite the occurrence of numerous abandoned mines along the lower Colorado River, this species is found in only a few areas. Information is needed on roosting and foraging requirements, as well as use and acceptance of bat gates. The status of this species needs to be documented.

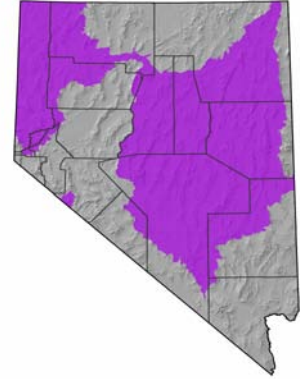
Monitoring and Existing Plans: Cave myotis are discussed in the Nevada Bat Conservation Plan (2006) and this species is listed as a Watch List species under the Clark County MSHCP.

Approach: Monitor species occurrences and protect the only known roosting site of the species with bat-friendly closures. Conduct additional surveys to search for new populations of the species including abandoned mines slated for closure. Delineate population status and trend. Cave myotis should be monitored for evidence of white-nose syndrome.

dark kangaroo mouse

Microdipodops megacephalus

WAP 2012 species because it is highly vulnerable to climate change, has uncertain population size and status, and Nevada has a large stewardship responsibility for the species as a whole.



Agency Status	
NV Natural Heritage	G4S2
USFWS	No Status
BLM-NV	Sensitive
State Prot	Protected Mammal NAC 503.030.1
CCVI	Highly Vulnerable

TREND: Declining trend but population numbers are unknown. *M. megacephalus* is among the least abundant of the nocturnal desert rodents and it now appears that they are even less abundant than they were 30 years ago (Hafner and Upham, 2011). Populations in the northern portion of the range are severely declining, many of which are locally extinct or in serious decline due to loss of habitat (Hafner and Upham, 2011).

DISTRIBUTION: Range centered on NV, extending to southeast OR, northeastern and central-eastern CA, southwestern ID, and west-central UT.

GENERAL HABITAT AND LIFE HISTORY:

Inhabits stabilized dunes and other sandy soils in valley bottoms and alluvial fans dominated by big sagebrush (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus* spp.), and horsebrush (*Tetradymia* spp.). Also occurs on fine gravelly soils where *M. pallidus* also occurs (Wilson & Ruff 1999). *M. megacephalus* typically occurs in sandy habitats below the elevation where pinyon-juniper occur and above those habitats where greasewood and saltbush predominate (Hafner, 2011). Although restricted to sand, it displays a broad tolerance for varying amounts of gravel.

Seeds are the primary food source although it will also eat some insects. It does not appear to use free-standing water and probably gets moisture from its food sources. It is believed to store food in seed caches within their burrow system (O'Farrell and Blaustein 1974).

Dark kangaroo mice are nocturnal rodents and show seasonally active periods from March through October. Individuals are underground in burrows when inactive and during hibernation in the winter. Peak nocturnal activity occurs in first 2 hours after sunset. Moonlight and ambient temperature influence activity (O'Farrell and Blaustein 1974), with individuals less active during brighter moon phases or temperatures above or below their optimum thermal zone. Predators include owls, foxes, and badgers. In west-central NV, mean yearly circular home range for males was 6,613 m² (1.6 acres); for female, 3,932 m² (0.97 acres) (O'Farrell and Blaustein 1974). Climate change concerns center on the predicted increase in fires and invasive grasses that will accelerate habitat loss. Hafner and Upham (2011) did not find evidence of a northward or an elevationally upward distributional change, which is consistent with patterns reported in other xeric-adapted mammals (Rowe et al. 2010).

CONSERVATION CHALLENGES:

Populations have always been patchy and rare across the landscape and it appears that habitat loss is increasing fragmentation and amplifying isolation effects. Populations in the northern portion of its range seem to be declining much more rapidly than populations in the southern part of its range. In general, populations in their lower ecological range are facing ever-increasing environmental threats and habitat loss from fires, invasive plants, and unsustainable livestock grazing, whereas populations in their upper ecological range are threatened by loss of sagebrush habitat due to encroachment from pinyon-juniper (Hafner and Upham 2011).

NEEDS:

Research Needs: Additional field work and monitoring are needed in northern portions of this species range to better understand the status and temporal stability of isolated populations (Hafner 2011). Also needed are response and tolerance thresholds to invasive grasses, weeds, and pinyon-juniper encroachment. In general, monitoring of the species as a whole is necessary to ascertain population status and overall trend.

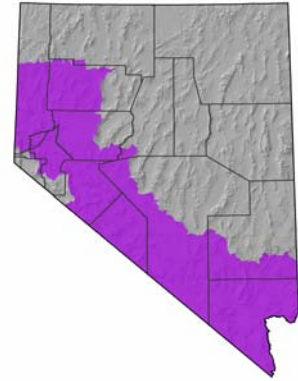
Monitoring and Existing Plans: Recent genetic work has been completed by Hafner and Upham (2011) and as part of this study, many known populations revisited. NDOW has focused on this species in recent years and reports of its occurrences are documented in statewide small mammal trapping projects, including the Wildlife Action Plan Performance Indicators Monitoring Project.

Approach: Monitoring and management of known populations is critical to understanding and maintaining current distributions of this rare species, especially in northern portions of its range. Presence/absence surveys should be conducted in areas with suitable habitat.

desert kangaroo rat

Dipodomys deserti

WAP 2012 species because it has a patchy distribution and is restricted to limited habitat that is vulnerable to degradation.



Agency Status	
NV Natural Heritage	G5S2S3
USFWS	No Status
CCVI	Presumed Stable

TREND: Trend is stable to declining.

DISTRIBUTION: Occurs in dunes and sandy areas from northwestern NV, through the southwestern part of the state, and southern NV.

GENERAL HABITAT AND LIFE HISTORY:

Desert kangaroo rats are found in low deserts, in sandy soil with sparse vegetation or in alkali sinks. They are found in shadscale scrub and creosote bush scrub, in the Lower and Upper Sonoran life zones. They are mostly restricted to deposits of deep wind-blown sand (sometimes including deposits formed as result of human activity) although there is one record from gravelly soil in an area of Arizona. They nest in burrows dug in mounds, usually under vegetation.

Feeds on seeds and green vegetation (Burt and Grossenheider 1964). Desert kangaroo rats store large quantities of seeds underground. They may also occasionally feed opportunistically on moths, beetles, and other insects (Rust 1989).

Burrow sites are usually under vegetation on wind-driven sand dunes. They may form widely spaced colonies comprising 6-12 large burrows. The maximum recorded density of desert kangaroo rats in one area was about 3/ha (3/2.5 acres). They are basically solitary except female with young (Best et al. 1989). Colonies may die out following successive years of drought.

CONSERVATION CHALLENGES:

Vulnerable to OHV use and development adjacent to dune habitats.

NEEDS:

Research Needs: A better understanding of population connectivity and potential effects of fragmentation is needed. As a component of this effort, genetic analysis of known populations to determine degree of population isolation could be helpful. Basic distribution, trend, and status information is also needed. Documentation of the northern range limit of this species in NV is needed.

Monitoring and Existing Plans: This species is not currently monitored. It is a Clark County MSHCP High Priority Evaluation Species.

Approach: Delineate status and trend for the species and monitor accordingly. Presence/absence surveys should be conducted in appropriate habitat to generate a better understanding of where the species occurs. Potential impacts from recreation and development should be evaluated as to the effects on the species as a whole and appropriate protective actions should be undertaken.

desert pocket mouse

Chaetodipus penicillatus

WAP 2012 species because it has a limited distribution in Nevada, is moderately vulnerable to climate change, and its preferred habitat is sensitive and vulnerable to degradation, especially with respect to climate change.



Agency Status	
NV Natural Heritage	G5S1S2
USFWS	No Status
CCVI	Moderately Vulnerable

TREND: Trend is unstable; known populations have become very disjunct and there are many threats to its habitat.

DISTRIBUTION: Known populations are restricted to the Muddy and Virgin River systems; however SW ReGAP has predicted a wider distribution within Clark County.

GENERAL HABITAT AND LIFE HISTORY:

The desert pocket mouse occurs on sparsely vegetated sandy desert floors. They have a strong affinity for areas with creosote bush and saltbush and seem to prefer level terrain with fine, sandy or light gravelly soils. They have been found on rock-free bottomland soils along rivers and streams (Hall 1946, Ingles 1965).

Feeds on seeds, including those of mesquite and creosote bush, and stores food in their underground burrow system. Foraging occurs under large bushes and in dense grasses, although this is not a requirement.

Desert pocket mice are nocturnal. They probably are not as active in winter as in summer and may become torpid for several days. They sleep and rear young in underground burrows. Home range size for adults and juveniles of both sexes probably is about 0.2 ha (½ acre). The annual population turnover is probably almost complete.

CONSERVATION CHALLENGES:

Threatened by habitat conversion and fragmentation, especially in consideration of changing climates. Restricted to a small area that is increasingly threatened by development, water diversions, non-native species, and recreation pressures.

NEEDS:

Research Needs: Status and trend for the species needs to be better understood. Our current understanding of the locations of populations is restricted compared to potential habitat modeled in the SW ReGAP analysis. Population connectivity and viability analysis are needed.

Monitoring and Existing Plans: Some surveys are periodically conducted. The desert pocket mouse is a High Priority Evaluation Species in the Clark County MSHCP.

Approach: Conduct surveys in areas predicted to have populations by SW ReGAP to better understand the range and trend of this species. Based on connectivity and viability analysis, protect vulnerable populations as appropriate. Monitor the species to delineate trend.

fringed myotis

Myotis thysanodes

WAP 2012 species because it has a patchy distribution across the landscape and is never very abundant; trends and population viability are uncertain and this species could be vulnerable to white-nose syndrome.



Agency Status	
NV Natural Heritage	G4S2
USFWS	No Status
BLM-NV	Sensitive
State Prot	Protected Mammal NAC 503.030.1
CCVI	Increase Likely

TREND: Trend is unknown, but this species is considered rare and not commonly captured during surveys.

DISTRIBUTION: Found throughout central and southern Nevada in appropriate habitat, although it probably occurs in northern Nevada as well. Although widely distributed in Nevada, it is considered rare.

GENERAL HABITAT AND LIFE HISTORY:

Fringed myotis have been found day and night roosting in mines, caves, trees, and buildings. They are found in a wide range of habitats from low desert scrub to high elevation coniferous forests. This species hibernates in mines and caves, but is capable of periodic winter activity. Maternity colonies of females and their young can number into the hundreds whereas males often roost singly or in small groups. Both sexes hibernate together.

Foraging occurs in and among vegetation, with some gleaning activity. In some areas, there is evidence that fringed myotis use forest edges as well as over the forest canopy for foraging. Fringed myotis may fly moderate distances (13 km, one-way) to suitable foraging grounds.

CONSERVATION CHALLENGES:

Fringed myotis are especially sensitive to human presence. They are threatened by recreational caving, mine closures, renewed mining, timber harvest, indiscriminate pest control, and bridge replacements and building demolition that do not consider presence and use patterns. Bats are very vulnerable to disturbance during hibernation and if disturbed often enough, can deplete their stored fat and starve to death. Although widely distributed this species is rare and never abundant. If white-nose syndrome spreads to the west, this species could be negatively affected.

NEEDS:

Research Needs: Research studies should focus on current population status, delineating roosting preferences and requirements, and describing foraging and reproductive behavior. Presence/absence surveys are needed to establish its range and population size.

Monitoring and Existing Plans: Fringed myotis are addressed in the Revised Nevada Bat Conservation Plan (2006).

Approach: Key hibernation, maternity, bachelor, staging, lekking, and night roost sites should be identified, mapped, and monitored. Critical roosting sites in mines and caves should be conserved and protected by either installing appropriate bat gates, education of the public, road and trail closures or restrictions, and access restrictions. All mines that are proposed to be permanently closed should be evaluated for bat habitat prior to closure and should not be closed during the maternity and hibernation seasons. Determine species use of pinyon-juniper woodlands. Timber harvest projects, recreation expansion, road expansion, and other woodland activities should be evaluated as to their effects on forest-dwelling bats. Monitor this species for evidence of white-nose syndrome.

hoary bat

Lasiurus cinereus

WAP 2012 species because it has an uncertain trend and population status and is very vulnerable to population declines due to alternative energy development.



Agency Status	
NV Natural Heritage	G5S3N
USFWS	No Status
BLM-NV	Sensitive
CCVI	Increase Likely

TREND: Status and trend of species is unknown. Rigorous scientific study of this species is lacking as it can be difficult to capture and monitor.

DISTRIBUTION: Although widely distributed across the state where appropriate forested or riparian habitat is available, populations are patchy and mostly known from the capture of single animals while foraging. Roosting locations are not well known.

GENERAL HABITAT AND LIFE HISTORY:

Hoary bats are a tree-roosting species, found primarily in forested upland habitats such as pinyon-juniper and conifers, as well as in gallery forest riparian zones (e.g., in cottonwoods along the Colorado river drainage). Current Nevada records indicate this species is distributed between 570-2,520m. Hoary bats day roost in trees 3-12 m above ground and are protected by good leaf cover, but open below to facilitate flying in/out of the roost. They are basically solitary, except for mother-young association; however, during migration, groups of up to hundreds of individuals may form. Some mother-young groups will often change roosts whereas others do not; movements generally are less than 100 m from the previous roost. It is generally assumed that this species migrates from the state during winter, but wintering habits are not confirmed. Elsewhere hibernating individuals have been found on tree trunks, in a tree cavity, in a squirrel's nest, and in a clump of Spanish moss.

Food items include a variety of insects but moths, dragonflies, and beetles feature prominently. Foraging is generally high altitude and occurs over the tree canopy. In the open, rapid descending arcs are exhibited. Also, hoary bats will follow watercourses for foraging and drinking. They are capable of foraging over long distances, up to 40 km (25 miles) from its roost (Altenbach et. al. 2002).

CONSERVATION CHALLENGES:

Impacts from wind farms and alternative energy development along with loss of roosting habitat due to timber harvest, fire, and other forest issues are the primary concerns for this species. Hoary bats are being killed by wind turbines more than any other bat species, although dead silver-haired and free-tailed bats are also often reported. Although it is still unclear exactly how wind turbines induce mortality, it has been proposed that bats are dying from barotrauma, the result of a rapid drop in pressure near moving blades. Mortality is seasonal and coincides with migration periods. As alternative energy continues to be developed, this could contribute significantly to a declining trend in this species.

NEEDS:

Research Needs: Survey work is needed to establish population sizes, range and status for this species. Research is lacking in the basic ecology, distribution, seasonal movement patterns and habitat requirements of the hoary bat. Population impacts from mortality at wind farms needs to be researched and addressed.

Monitoring and Existing Plans: Hoary bats are addressed in the Nevada Bat Conservation Plan (2006).

Approach: Monitor and survey species to determine impacts of alternative energy development on Nevada populations. Basic survey work for key roosting and foraging sites needs investigation. Determine trend and distribution for this species and monitor for evidence of white-nose syndrome.

Humboldt yellow-pine chipmunk

Neotamias amoenus celeris

WAP 2012 species because it is a disjunct, isolated endemic that is restricted to a single mountain range and is moderately vulnerable to climate change.



Agency Status	
NV Natural Heritage	G5T2S2
USFWS	No Status
CCVI	Moderately Vulnerable

TREND: Trend is unknown.

DISTRIBUTION: Restricted to the Pine Forest Range in Northern Humboldt County, NV.

GENERAL HABITAT AND LIFE HISTORY:

The Humboldt yellow-pine chipmunk is an isolated remnant forest subspecies left by the retreat of pine forest northward with glacial icemelt at the end of the Pleistocene. They generally occur in brushy areas interspersed with herbaceous vegetation and open conifer stands; shrubs typically present include snowberry, chinquapin, mountain mahogany, bitterbrush, currant, and ceanothus (Sutton 1992). They are found among logs, brush, and rocky outcrops, as well as in brushy areas between subalpine forest and alpine tundra, and sometimes in alpine areas themselves.

Diet consists of seeds, fruits, green foliage, flowers, roots, buds, bulbs, tubers, fungi, and small animals. Caches food in burrows and in scattered pits dug into the soil surface. Humboldt yellow-pine chipmunks forage in open areas where trees and bushes are widely spaced and where half-rotten logs, stumps, or rocks are adjacent to food plants.

This chipmunk digs burrows 0.17-.53 m (7-21 inches) deep. Their home range is a few acres, parts of which may be used seasonally (Sutton 1992). Competitive interactions with other chipmunk species may limit habitat use. They intermittently hibernate from late fall through early spring, with frequent periods of activity. During these active periods, they eat stored seeds rather than using built up body fat reserves to last through the winter. Chipmunks may become lethargic during cold summer weather (Banfield 1974, Sutton 1992).

CONSERVATION CHALLENGES:

Isolated endemic subspecies occurring on one mountain range. Could be vulnerable to any activities or changes in climate that would decrease or decimate the limber/whitebark pine forest of the Pine Forest Range.

NEEDS:

Research Needs: Design and implement specific trapping grids to determine distribution. Genetic work is needed to clarify the taxonomic status of this subspecies. Population status and trend, in addition to habitat requirements of the species should be researched.

Monitoring and Existing Plans: This species is not currently monitored.

Approach: Determine viability, distribution, and basic demographics of the species. Conduct genetic work to confirm subspecific taxonomy. Monitor populations to determine trend and protect vulnerable populations as appropriate.

WAP 2012 species because of range-wide population status uncertainty.

Agency Status	
NV Natural Heritage	G4S2
USFWS	No Status
CCVI	Presumed Stable



TREND: Trend is unknown as is distribution.

DISTRIBUTION: Formerly only known from western and southwestern NV, but Rickart et al (2004) captured an individual at Great Basin National Park, extending the range by 300km.

GENERAL HABITAT AND LIFE HISTORY:

In NV, primarily known as a montane species found in coniferous forest along streams in canyon bottoms. Burt (1934) captured all specimens on Mt. Charleston 300 yards or less from water near decaying logs and along bases of vertical cliffs in shaded, damp situations. However, this species was also collected near the Walker River where the dominant plant species were *Artemisia tridentata*, *Ephedra*, and *Chrysothamnus* (Hall 1946).

Inyo shrews are voracious hunters. They feed primarily on insects and other small invertebrates (worms, molluscs, centipedes, etc.). They may also feed on bodies of wind-borne insects deposited at higher elevations.

No reproductive information is available (Hoffmann and Owen 1980). Inyo shrews are active throughout the year and are not entirely nocturnal, but part crepuscular. Shrews are seldom captured in conventional small mammal traps which may be the reason they are thought of as rare. They are more commonly captured using pitfall traps.

CONSERVATION CHALLENGES:

The distribution and status of this species is poorly understood. Records are patchy and fragmented and it is not clear how populations interact with each other, how close they are, or to what degree the species may be experiencing threats. In general, this species occupies montane areas and could be found in other isolated mountains within the Great Basin.

NEEDS:

Research Needs: Distribution and status of this species needs investigation. Concentrated survey efforts would yield a much clearer picture of species' occurrences and would provide critical habitat information.

Monitoring and Existing Plans: This species is a Medium Priority Evaluation species in the Clark County MSHCP, but otherwise is not currently monitored.

Approach: Determine population status, distribution, and management needs. Conduct presence/absence pit-fall trapping to delineate the range of the species and monitor known locations appropriately. The occurrence record in Great Basin National Park is 300 km northeast of the closest other record; the area in between these records needs to be surveyed, particularly in and around other isolated mountain ranges.

little brown myotis

Myotis lucifugus

WAP 2012 species because it has a patchy distribution across the landscape and is never very abundant. In the east, little brown bats are the most critically effected by white-nose syndrome with over 95% mortality in some areas; should the disease spread to the west, it would be a significant threat to the overall viability of the species.



Agency Status	
NV Natural Heritage	G5S3
USFWS	No Status
BLM-NV	Sensitive
CCVI	Increase Likely

TREND: The trend of this species is unknown. The species is never commonly captured and does not seem to be overly abundant in Nevada.

DISTRIBUTION: All known records in Nevada are from the Great Basin. No individuals have been captured or acoustically recorded in the Mojave Desert.

GENERAL HABITAT AND LIFE HISTORY:

Throughout its range, little brown bats have adapted to using human-made structures for resting and maternity sites but will also uses caves, hollow trees, and rock outcrops. This species hibernates in the state, presumably in mines and caves. Elsewhere in its range, very large groups of hibernating bats have been found but no such large aggregations of little brown bats have been discovered in Nevada. Likewise, during maternity season, this species often forms very large maternity colonies. As with most cave and mine bats, suitable maternity sites are thought to be a limiting factor. Little brown bats feed heavily on aquatic insects such as caddis flies, midges, and mayflies, although a variety of other terrestrial insects may be eaten. Foraging occurs in open areas among vegetation, along water margins and sometimes a few feet above the water surface. When young begin to fly, the adults move to more cluttered habitats and leave open foraging areas to juveniles.

CONSERVATION CHALLENGES:

Bats are very vulnerable to disturbance during hibernation, and if disturbed often enough, can deplete their stored fat and starve to death. During the maternity season, bats are particularly sensitive to disturbance and have been known to abandon sites, sometimes leaving their young behind. This species is more tolerant of human disturbance than most bat species, but pinyon-juniper conversion, pesticide spraying, building demolition, pest control, mine reclamation, renewed mining, and cyanide ponds may pose a threat. In the eastern U.S., little brown bats are gravely impacted by white-nose syndrome, with some populations showing greater than 95% mortality. If white-nose syndrome spreads to the west, this could be an especially significant threat to this species.

NEEDS:

Research Needs: Although this is one of the better studied species of bat in the U.S., little is known about specific preferences of the little brown myotis in Nevada, including foraging behavior, reproductive biology, roosting requirements, and population dynamics. Information is needed on the current distribution and status of the species. Particular attention should be focused on locations and characteristics of winter hibernacula.

Monitoring and Existing Plans: Little brown bats are addressed in the Revised Nevada Bat Conservation Plan (2006).

Approach: Key hibernation, maternity, bachelor, staging, lekking, and night roost sites should be identified, mapped, and monitored. Critical roosting sites in mines and caves should be conserved and protected by either installing appropriate bat gates, education of the public, road/trail closures or restrictions, or access restrictions. All mines that are proposed to be permanently closed should be properly evaluated for bat habitat prior to closure and should never be closed during the maternity and hibernation seasons. Determine species use of pinyon-juniper woodlands; evaluate impacts of pinyon-juniper woodland conversion. Forest management should include efforts to maintain a variety of seral stages, including old growth and snags. All bats should be monitored for evidence of white-nose syndrome, but for this species, it is especially important.

WAP HABITAT LINKS: Intermountain Riparian, Aspen, Lower Montane Woodlands and Chaparral, Intermountain Coniferous Forests and Woodlands, Sierra Coniferous Forests and Woodlands, Caves and Mines, Cliffs and Canyons, Developed Landscapes.

long-eared myotis

Myotis evotis

WAP 2012 species because it has a patchy distribution across the landscape and is never very abundant; trends and population viability are uncertain and this species could be vulnerable to white-nose syndrome.



Agency Status	
NV Natural Heritage	G5S4
USFWS	No Status
BLM-NV	Sensitive
CCVI	Increase Likely

TREND: Trend is unknown and presumed to be stable in most areas although declines have been reported in the Spring Mountains.

DISTRIBUTION: Long-eared myotis are found throughout the state but are generally considered uncommon.

GENERAL HABITAT AND LIFE HISTORY:

Long-eared myotis are usually associated with coniferous forests. Individuals roost under exfoliating tree bark, and in hollow trees, and occasionally in caves, mines, cliff crevices, sink-holes, and rocky outcrops on the ground. As is typical of most bats, long-eared myotis are long-lived for their small size and are capable of living longer than 20 years. The reproductive rate for this species is low with individuals producing zero to only a single pup per year. This species hibernates in the state. Winter habits of long-eared myotis are unknown in Nevada. Long-eared myotis generally form small maternity colonies of perhaps 12-30 individuals.

This species is well adapted for flight and foraging in dense vegetated habitats and is capable of slow, maneuverable flight that is especially suitable for gleaning insects. It eats moths and small beetles, as well as flies, lacewings, wasps, and true bugs. It is often described as a hovering gleaner that feeds by eating prey off foliage, tree trunks, rocks, and from the ground. It has been reported that long-eared myotis "turn off" their echolocation to listen to their prey, rather than the usual method of constant and then very rapid echolocating when nearing a target.

CONSERVATION CHALLENGES:

There is long term concern for this species due to habitat loss or alteration (mine closures, forest management practices, etc). The lack of knowledge about roosting requirements, especially during the winter, hampers effective management of the species. Bats are very vulnerable to disturbance during hibernation and if disturbed often enough, can burn through their stored fat and starve to death.

NEEDS:

Research Needs: More information is needed about population trends, winter roost requirements, winter range, importance of snags, foraging requirements, and use and acceptance of bat gates.

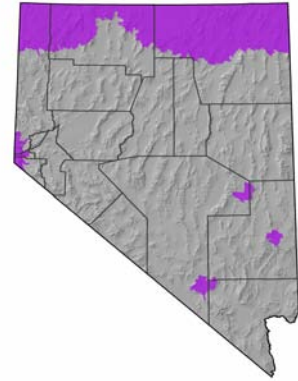
Monitoring and Existing Plans: Long-eared myotis are addressed in the Revised Nevada Bat Conservation Plan (2006) and is a covered species under the Clark County MSHCP.

Approach: Continue monitoring and mapping key habitat for the species, especially hibernating sites. Delineate range more precisely and initiate research to study key aspects of the species' biology. Critical roosting areas should be appropriately protected as knowledge of such sites becomes known. As with all bats, this species should be monitored for white-nose syndrome.

Merriam's shrew

Sorex merriami

WAP 2012 species because of range-wide status uncertainty and scarce historic records.



Agency Status	
NV Natural Heritage	G5S3
USFWS	No Status
CCVI	Presumed Stable

TREND: Trend unknown. Although widespread, they appear to be uncommon.

DISTRIBUTION: Found throughout the Great Basin and Columbia Plateau regions in appropriate habitat.

GENERAL HABITAT AND LIFE HISTORY:

Merriam's shrews occurs in the arid Upper Sonoran and Lower Transition life zones, primarily in various grassland habitats, including grasses in sagebrush scrub/pinyon-juniper habitat, and also in mountain-mahogany and mixed woodlands (Clark and Stromberg 1987, Benedict et al. 1999).

Feeds primarily on lepidopteran caterpillars, beetles, cave crickets (*Ceuthophilus* spp.), ichneumon wasps (*Ichneumonidae*), and spiders, as well as other arthropods (Johnson and Clanton 1954, cited in Verts and Carraway 1998; Clark and Stromberg 1987). Merriam's shrews have the highest relative bite force of all western shrews studied, indicating that it is adapted to forage on relatively large, hard-bodied prey (Verts and Carraway 1998).

This shrew seems to prefer drier habitat than do other shrews. They may utilize burrows and runways of other animals (Wilson and Ruff 1999) and are active throughout the year. There are some recognized subspecies, some of which may be isolated. For example, *S. m. leucogenys* is apparently restricted to the Great Basin-Mojave Desert transition zone in Tikaboo Valley in western Lincoln County.

CONSERVATION CHALLENGES:

Merriam's shrews are not thought to be abundant anywhere; at known sites, several hundred trap-nights are needed to capture one animal (Verts and Carraway 1998). Threats to the species are poorly understood, but it is likely that conversion of grassland and shrub steppe habitat due to wildfires and conversion to invasive annual grasses threatens the species. Responses to grazing pressure are unknown (Verts and Carraway 1998).

NEEDS:

Research Needs: This species is poorly understood. Basic information on habitat, current distribution, and status are lacking. Need study of impacts of unsustainable grazing practices, responses and tolerance thresholds to annual grass invasion, transition to rabbitbrush, and pinyon-juniper encroachment.

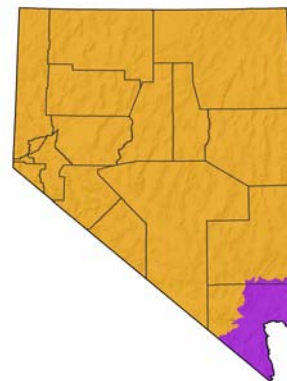
Monitoring and Existing Plans: Not currently monitored and not within any other existing plans.

Approach: Conduct surveys to delineate current habitat status and range as part of a statewide shrew inventory. Research efforts should focus on the responses to habitat change and basic habitat and life history requirements.

Mexican free-tailed bat

Tadarida brasiliensis

WAP 2012 species because of this species habit of roosting in exceptionally large colonies and because of its vulnerability to decline due to alternative energy development.



Agency Status	
NV Natural Heritage	G5S3S4B
USFWS	No Status
BLM-NV	Sensitive
State Prot	Protected Mammal NAC 503.030.1
CCVI	Presumed Stable

TREND: Appears to be stable on a statewide basis, although localized population declines have been observed. There is some evidence that although this species is still considered abundant, numbers may be well below what they were historically.

DISTRIBUTION: This species is found throughout the state in small colonies. Additionally, two very large colonies exist that probably make up the bulk of the state's population.

GENERAL HABITAT AND LIFE HISTORY:

This species is found in a variety of habitats, from low desert to high mountains. It roosts in a variety of sites including cliff faces, mines, caves, buildings, bridges, and hollow trees. It forms very large colonies (in Nevada up to 70,000-100,000; elsewhere in the millions), although many smaller colonies of hundreds exist throughout the state. Mexican free-tailed bats do not hibernate. They migrate from the state in early fall and it is thought that some caves are used as staging roosts during the migration period. It is possible that in some warmer areas of southern NV, Mexican free-tailed bats may be year-round residents.

Mexican free-tailed bats are opportunistic feeders; diet includes moths, flying ants, beetles, bugs, and other insects. They often prey on densely swarming insects and are an important predator of night-flying moths and other insects, particularly of agricultural pests. Mexican free-tailed bats can fly considerable distances (150 miles) to favorite feeding areas, but typically fly within a 50 mile radius of the day roost. This species is also capable of feeding at very high altitudes (up to 10,000 ft).

CONSERVATION CHALLENGES:

Threatened by human disturbance and habitat destruction. Because this species tends to roost in such large colonies, single disturbance events can have very significant impacts to the species as a whole. Mortality of Mexican free-tailed bats is frequently reported at wind farms and the resulting effects on the larger population are not known. Although it is still unclear exactly how wind turbines induce mortality, it has been proposed that bats are dying from barotrauma, the result of a rapid drop in pressure near moving blades. Mortality is seasonal and coincides with migration periods.

NEEDS:

Research Needs: Large colonies of this species need to be monitored annually. It is thought that perhaps in the eastern part of the state, there are important migration corridors; these should be investigated. In general, more information is needed on seasonal distribution and use patterns.

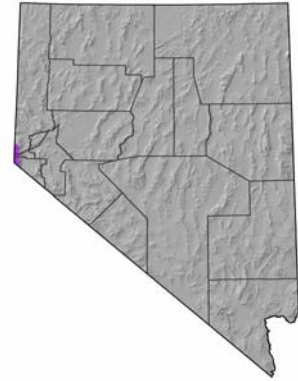
Monitoring and Existing Plans: Mexican free-tailed bats are addressed in the Nevada Bat Conservation Plan (2006).

Approach: Monitor and protect large colonies of the species. Monitor and survey species to determine impacts of alternative energy development on Nevada populations. This species should also be monitored for evidence of white-nose syndrome.

Mono Basin mountain beaver

Aplodontia rufa californica

WAP 2012 species because it is highly vulnerable to climate change, has a limited and patchy distribution with uncertain population connectivity, and is sensitive to disturbance.



Agency Status	
NV Natural Heritage	G5T3T4S1
USFWS	No Status
State Prot	Sensitive Mammal NAC 503.030.3
CCVI	Highly Vulnerable

TREND: Possibly declining in areas close to developing communities and with heavy recreation pressures. Populations apparently stable in more remote areas recently surveyed by NDOW.

DISTRIBUTION: Restricted to wet meadows and brushy riparian zones in the Lake Tahoe Basin and east side of the Carson Range.

GENERAL HABITAT AND LIFE HISTORY:

Restricted to moist environments with moderate to dense vegetation. Surveys along the Truckee River and its tributaries (Deer Creek to Verdi) observed mountain beavers most often on reaches with steeper gradients; narrower and shallower streams; higher elevation; a greater abundance of alder, willow, fir, and aspen; and a lesser abundance of cottonwood and yellow pine (*Pinus ponderosa*, *P. jeffreyi*, *P. washoensis*, and hybrids) than unused reaches. Mountain beaver probably choose habitat based on a cool thermal regime, adequate soil drainage, and abundant food supply (Beier 1989).

Feeds on a wide variety of vegetation; consumes ferns, forbs, and deciduous plants in summer; conifer foliage in fall/winter if other plants are unavailable (Banfield 1974). Forages mainly above ground (Epple et al. 1993). Requires free surface water or succulent vegetation on a daily basis. Caches grasses and forbs for winter food.

Mountain beavers are restricted to moist environments because they have a poor ability to concentrate urine and consequently they require free surface water or succulent vegetation on a daily basis. They are primarily fossorial but can climb trees and swims well (but not arboreal or aquatic). Mountain beavers are active during winter, but remain mostly underground. They are usually solitary but may live in loose colonies. Population density estimates generally range from 4-8 per ha (4-8/2.6 acres), but up to 15-20/ha (15-20/2.6 acres) (see Carraway and Verts 1993). The home range of 10 adults radiotracked for 3-19 months ranged from 0.03 to 0.20 ha (0.07-0.49 acres) (mean 0.12 ha). Juveniles were reported to have moved up to 43 m (141 ft) from the nest (see Carraway and Verts 1993). Significant predators of mountain beavers include coyotes and bobcats.

CONSERVATION CHALLENGES:

In some areas, populations are vulnerable to development, recreation, and habitat alteration. In more remote areas, threats are largely unknown. Habitat availability is patchy and species status is not completely understood.

NEEDS:

Research Needs: Many aspects of biology have been studied, but more information on dispersal and demography is needed. Comprehensive inventories are needed in more remote areas to establish the extent and status of the subspecies found in Nevada. Some genetic work has been conducted but with a limited sample size. Population viability and connectivity need to be assessed.

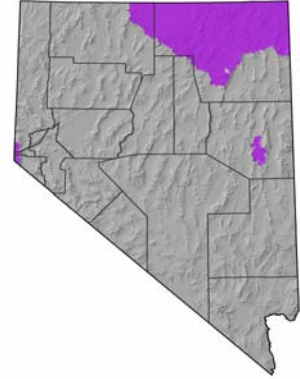
Monitoring and Existing Plans: As of October 2011, NDOW had completed a three-year project and one-year extensive survey effort for this species. Fifty-one new occupied sites were found, and surveys will continue into 2012, including the collection of tissue samples to conduct genetic studies. This species is not within any other existing plans.

Approach: Continue surveys, especially in remote areas where threats are poorly understood. Population status and severity of threats needs to be addressed, as well as connectivity questions between individual locations. Manage known locations with species' long-term persistence as a goal. Recent studies have allowed NDOW to create a more comprehensive map of occupied sites, which facilitates the development of more effective protection zones from recreational impacts.

montane shrew

Sorex monticolus

WAP 2012 species because they are moderately vulnerable to climate change and because they occur in isolated and disjunct populations that are restricted to sensitive, high elevation riparian areas.



Agency Status	
NV Natural Heritage	G5S3
USFWS	No Status
CCVI	Moderately Vulnerable

TREND: Trend is unknown.

DISTRIBUTION: Known from the Tahoe Basin (records exist for Marlette Lake), Ruby Mountains, Eureka County (Evans Range), and Humboldt Counties (Mahogany Creek). Likely to also occur in the Santa Rosas and in the Jarbidge area.

GENERAL HABITAT AND LIFE HISTORY:

Montane shrews occur in boreal and coastal coniferous forest and alpine areas. Various habitats including damp meadows surrounded by coniferous forest, in grass among spruce-fir, mid-elevation fir-larch, along streams and rivers in high prairie, mossy banks of small streams, alpine tundra, and sphagnum bogs have all been reported.

Feeds primarily on insects and other small invertebrates (worms, sowbugs, molluscs, etc.). Also consumes some vegetable matter.

Most individuals probably do not live longer than 18 months. Mean home range estimates are 1,227 sq m (0.3 acre) for nonbreeders and 4,020 sq m (1.0 acre) for breeders (van Zyll de Jong 1983). Montane shrews are apparently not territorial in breeding season and may move widely (van Zyll de Jong 1983).

CONSERVATION CHALLENGES:

Populations are disjunct and patchy, leaving the species vulnerable to isolation and extirpation. Their preferred riparian meadow habitat is sensitive and vulnerable to degradation and conversion, especially from climate change.

NEEDS:

Research Needs: As with most shrews, little is known about the species, including range, viability of subpopulations, and responses to habitat change and isolation. Basic habitat and life history information is lacking and trend of the species needs to be investigated. Presence/absence surveys need to be conducted.

Monitoring and Existing Plans: Not currently monitored.

Approach: Conduct surveys to delineate current habitat status and range as part of a statewide shrew inventory. Research efforts should focus on basic habitat and life history requirements. Protect at-risk populations as appropriate.

mountain pocket gopher

Thomomys monticola

WAP 2012 species because it is a range-restricted species with limited distribution in Nevada and its preferred habitat is sensitive and vulnerable to degradation.



Agency Status	
NV Natural Heritage	G5S3
USFWS	No Status
CCVI	Presumed Stable

TREND: Trend is unknown.

DISTRIBUTION: Sierra Nevada of central and northern CA and extreme west-central NV.

GENERAL HABITAT AND LIFE HISTORY:

Mountain pocket gophers occur in mountain meadows and rocky slopes in pine, fir, and spruce (Wilson and Ruff 1999); in rich moist soil, as well as gravelly or rocky ground. They can generally be found on open forest floor and at the edge of meadows. Mountain pocket gophers are found at high altitudes where temperatures are lower than the habitat of other pocket gopher species.

Eats roots, tubers, and some surface vegetation. Mostly forages within their underground burrow system, but occasionally forages on the surface of the ground. During this period, they are at significant risk of predation. Food is collected in external cheek pouches and stored in underground chambers.

Mountain pocket gophers are active throughout the year. They are fossorial and solitary, except during the breeding season. Their underground burrow system may cover 18.6 m² (200 sq ft) for young animals to 186 m² (2000 sq ft) for old females. Population density can be 10-35/ha (4-14/acre) and individuals may live up to 4 years in the wild. Overground dispersal is difficult for pocket gophers due to heavy predation. Mountain pocket gophers probably rely on deep snow to allow animals to disperse to new territories. Pocket gophers are ecologically important as prey items and in influencing soils, microtopography, habitat heterogeneity, diversity of plant species, and primary productivity (Huntly and Inouye 1988).

CONSERVATION CHALLENGES:

Mountain pocket gophers are a range restricted species, found only in the Sierra Nevada in the Nevada portion of its range. Its preferred riparian habitat is vulnerable to degradation, especially from climate change.

NEEDS:

Research Needs: Status and trend for this species are unknown. Pocket gopher specific trapping needs to be initiated to help determine microclimate requirements, distribution of the species, and population viability.

Monitoring and Existing Plans: May be monitored by the Tahoe Basin multi-species monitoring program.

Approach: Determine species status and distribution and monitor on a periodic basis.

mule deer

Odocoileus hemionus

WAP 2012 species because of significant population declines in conjunction with large-scale habitat degradation and loss.



Agency Status	
NV Natural Heritage	G5S5
USFWS	No Status
State Prot	Game Mammal NAC 503.020
CCVI	Presumed Stable

TREND: Populations have been stable near the long-term average since 2002 and remain significantly higher than historic levels.

DISTRIBUTION: Mule deer are found statewide in appropriate habitat.

GENERAL HABITAT AND LIFE HISTORY:

Mule deer occur in a diversity of habitat types throughout Nevada but occur in highest densities in montane shrub dominated communities. They are often associated with successional vegetation. They are often found on open south-facing slopes in winter. Mule deer browse on a wide variety of woody plants and graze on grasses and forbs. Throughout the year, most activity occurs at dawn and dusk, though nocturnal and daytime activity is common.

Mule deer are a secondary successional species, taking advantage of plant species that are often the result of some type of disturbance. They have a high degree of selectivity, not only for the plant species they choose to eat, but also for the specific parts of the plant and the time of year that a particular plant may be eaten. Browse species include sagebrush, bitterbrush, serviceberry, snowbrush, and snowberry. When deer are feeding on browse, they prefer the most tender parts, the new shoots and tips or leaders. Leaders are the most nutritious, most easily bitten off, most flavorful, and most easily digested part of the browse.

Seasonally, home range size is extremely variable and may be 30-240 ha (74-593 acres) or more and is directly correlated with the availability of food, water and cover. In mountainous regions, mule deer tend to migrate (up to 200+ km (120 miles) from high summer range to lower winter range. In the intermountain west, deer often migrate in response to snowfall patterns. They exhibit high fidelity to individual seasonal ranges (e.g., see Kucera 1992).

CONSERVATION CHALLENGES:

Mule deer populations were estimated at all-time highs in the late 1980s. Habitat loss and degradation are the primary concerns for this species. Invasive weeds, increase in number and frequency of large-scale fires, pinyon-juniper encroachment, decline and loss of montane shrubland, urban development and expansion, and drought all contribute to habitat degradation and loss. Decreases in quality of summer range and loss of critical wintering habitat in particular has been the biggest challenges to the species.

NEEDS:

Research Needs: Delineation of mule deer movement corridors in order to maintain habitat connectivity; develop restoration techniques for montane shrub habitats.

Monitoring and Existing Plans: Mule deer are monitored through annual aerial surveys (NDOW) and managed under the Mule Deer Species Policy Plan (NDOW).

Approach: Collaborative, multi-agency approach to improve/restore mule deer range. Continue to address issues of habitat degradation, pinyon-juniper encroachment, improper livestock and wild horse overgrazing, wildfire, invasive annual grasses and weeds, habitat type conversion, predators, and migration disruption by fences and roads.

northern flying squirrel

Glaucomys sabrinus

WAP 2012 species because of its preference for old-growth forests.



Agency Status	
NV Natural Heritage	G5S3
USFWS	No Status
State Prot	Protected Mammal NAC 503.030.1
CCVI	Presumed Stable

TREND: Trend unknown.

DISTRIBUTION: This species is limited to the Sierra Nevada's in the western portion of the state. Northern flying squirrels have not recently been observed in the northwestern corner of the state (Washoe County north of Gerlach) despite the suggestion of certain information sources and extensive survey efforts.

GENERAL HABITAT AND LIFE HISTORY:

Prefers coniferous and mixed forest, but will utilize deciduous woods and riparian woods. Optimal conditions have been reported as cool, moist, mature forest with abundant standing and downed snags. One study in Plumas National Forest in California captured northern flying squirrels exclusively in red fir forests (Coppeto et al. 2006). Although thought to be dependent on old-growth habitat types, NDOW surveys have found that flying squirrels readily use and nest in second-growth forest habitat types (where snags exist as an important habitat component), and Coppeto et al. (2006) reports that this species tolerates some logging disturbance. Occupies tree cavities, leaf nests, witch's broom, and underground burrows. Prefers cavities in mature trees as den sites. Small outside twig nests sometimes are used for den sites. Sometimes uses bluebird boxes.

Flying squirrels forage in tree-tops. Their diet consists largely of fungi and lichens plus plant and animal material (insects, nuts, buds, seeds, fruit). Apparently they can subsist on lichens and fungi for extended periods, and may depend on having these food items available. They also spend considerable time foraging on the ground and will also feed on carrion.

This species is best known for their ability to glide between trees. The apparently live in family groups of adults and juveniles. Flying squirrels are highly social, especially in winter when nests may be shared. Active throughout the year and most active at night.

CONSERVATION CHALLENGES:

This species has a very limited distribution in the state. It tends to be more abundant in old-growth forest and is subject to a number of disturbances associated with forest management. Forestry practices that create openings wider than approximately 120 feet probably have a negative effect on locomotion (Verner et al. 1992).

NEEDS:

Research Needs: A three-year trapping, collaring, tracking, and vegetation community analysis study is currently in progress. The results of this study will also provide nesting requirements and the results of tissue sample analysis.

Monitoring and Existing Plans: This species is not within any other existing plans. NDOW surveys currently in progress with the use of nocturnal camera stations, live-trapping, and tracking collars.

Approach: Focus on old-growth forest conservation and incorporate species' need for downed and dead woody debris into forest management planning (especially for fire management activities). Coppeto et al. (2006) noted that the most cost effective approach to gather data is at the macrohabitat scale (e.g., forest type); however, coarse-scale assessment of the understory structure of forested habitats should also be emphasized.

northern river otter

Lontra canadensis

WAP 2012 species because it is moderately vulnerable to climate change, has a limited distribution, and its preferred habitat is sensitive and vulnerable to degradation.



Agency Status	
NV Natural Heritage	G5S2
USFWS	No Status
State Prot	Fur-bearing Mammal NAC 503.025
CCVI	Moderately Vulnerable

TREND: Trend is unknown.

DISTRIBUTION: Currently known from the Humboldt River system in northern NV. Historically found in western and southern NV (Hall 1946).

GENERAL HABITAT AND LIFE HISTORY:

Inhabits streams, lakes, ponds, swamps, marshes, and beaver workings. When inactive, occupies hollow log, space under roots, log, overhang, abandoned beaver lodge, dense thicket near water, or burrow of another animal; such sites also are used for rearing young. Uses traditional haul-out sites along the banks of aquatic habitats.

Feeds opportunistically on aquatic animals, particularly fishes (mostly slow-moving, mid-size species), frogs, crayfish, turtles, insects, etc., sometimes birds and small mammals. May hunt over as much as 80-100 km (50-62 miles) of stream during the course of one year.

Home range typically is linear; 32-48 km (20-30 miles) for a pair or male; less for females with young (Jackson 1961). May travel long distances overland, particularly in snow. Active in winter, even in fresh deep snow. More nocturnal in summer. May be active at any time of day. All den sites in NV were originally constructed by beaver, which suggests a strong otter-beaver commensal relationship (Bradley 1986).

CONSERVATION CHALLENGES:

This species is sparsely distributed where it occurs. Concerns for this species are generally linked to riparian community health. Mechanical stream channelization, herbicidal willow removal, unsustainable grazing pressure on flood plains and stream banks, and flood plain gravel mining could negatively impact river otter populations.

NEEDS:

Research Needs: Determine status and distribution of populations in the state (both northern and southern), with particular emphasis on the Truckee and Carson rivers. Research habitat preferences.

Monitoring and Existing Plans: NDOW previously conducted the Humboldt River Study; however, no current surveys or monitoring are in progress. This species is not within any other existing plans.

Approach: Use status and distribution data obtained from research to develop conservation and management needs/strategies for this species. Maintaining productive aquatic habitats may protect extant populations. Explore the possibility of otter reintroduction and habitat restoration efforts.

Pahrnagat Valley montane vole

Microtus montanus fucosus

WAP 2012 species because it is an endemic species and Nevada has high stewardship responsibility and its preferred habitat is sensitive and vulnerable to degradation.



Agency Status	
NV Natural Heritage	G5T2S1S2
USFWS	No Status
BLM-NV	Sensitive
State Prot	Sensitive Mammal NAC 503.030.3
CCVI	Presumed Stable

TREND: Trend is unknown.

DISTRIBUTION: Range is less than 40 square miles in the White River Valley, NV.

GENERAL HABITAT AND LIFE HISTORY:

Found in wet meadows; croplands, especially fields and pastures of grass and legumes along fence rows; and, grassy areas by streams and lakes.

Eats grasses and sedges; leaves, stems, and roots of a wide variety of forbs.

This species is active throughout the year. It occupies shallow burrows and surface runways.

CONSERVATION CHALLENGES:

Isolated endemic subspecies occurring in one drainage. Loss and degradation of habitat due to unsustainable management practices, substantial changes in hydrology, or climate change could threaten this subspecies with extinction.

NEEDS:

Research Needs: Need to confirm current population status and conduct a population viability analysis. Survey historical sites to determine if range can be expanded. Continue genetic analyses to confirm range of this subspecies and relationship to nearby populations.

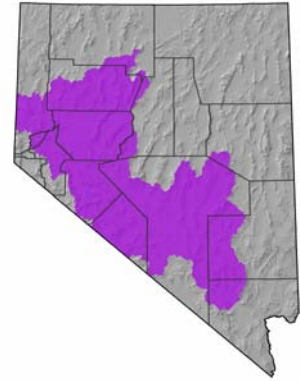
Monitoring and Existing Plans: Recent genetic analyses conducted; however, no current monitoring is being conducted. This species is not within any other existing plans.

Approach: Work with private land owners through USFWS species conservation tools to secure contiguous habitat sufficient to ensure population viability. Work with academic partners (e.g., graduate students from UNR or UNLV) to monitor existing populations annually or at scheduled intervals (not to exceed five years) through live trapping.

pale kangaroo mouse

Microdipodops pallidus

WAP 2012 species because it is moderately vulnerable to climate change and Nevada has high stewardship responsibility for this species.



Agency Status	
NV Natural Heritage	G3S2
USFWS	No Status
BLM-NV	Sensitive
State Prot	Protected Mammal NAC 503.030.1
CCVI	Moderately Vulnerable

TREND: Some populations in decline; population size unknown.

DISTRIBUTION: West and west-central NV and extreme eastern CA.

GENERAL HABITAT AND LIFE HISTORY:

This species is a highly specialized sand-obligate. It is typically restricted to fine, loose, sandy soils (with little or no gravel overlay) in valley bottoms dominated by saltbush and greasewood. It may also be found near sagebrush at its higher elevation range. Elevations range between 1,189 and 1,829 meters.

Primarily granivorous; eats Indian rice grass and a variety of forbs. Summer diet is supplemented with insects including beetles, centipedes, and moth pupae. Seeds may be stored and conserved during periods of food shortage.

Trapping results show that pale kangaroo mouse is among the least abundant of the nocturnal desert rodents in sandy habitats of the Great Basin (Hafner et al. 2008). Hafner et al. 2008 also documented that the geographical distribution of this species has remained remarkably unchanged over the last 75 years (i.e., since Hall's work). However, there is evidence of some populations that may be extirpated near urban areas such as near Dayton, NV (G. Baumgartner, pers. comm., 2011). Despite climate change concerns, no evidence was noted for any natural, systematic distributional changes. This species may undergo periods torpor. Spring/summer torpor is brief and employed only when starving, and multi-day torpor may occur in winter (French 1989). Pale kangaroo mouse is active just after sundown and is active throughout the night.

CONSERVATION CHALLENGES:

Stressors include fire, invasion of exotic species, development, and improper livestock grazing (Hafner et al. 2008).

NEEDS:

Research Needs: Conduct population abundance and trend studies to determine the population status. Perform movement/dispersal studies to learn this species tolerance for unsuitable habitat. Conduct trapping studies at historic capture sites (e.g., Dayton, intersection of Hwy. 50 and Alt. 50).

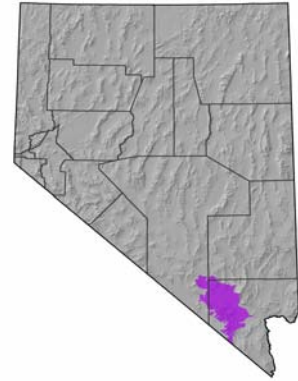
Monitoring and Existing Plans: This species is monitored through a statewide small mammal inventory and trapping network. It is not covered under any other existing plans.

Approach: Implement research needs; monitor via statewide small mammal network; and develop a conservation plan if there is a demonstrated need.

Palmer's chipmunk

Neotamias palmeri

WAP 2012 species because this is an endemic species and Nevada has high stewardship responsibility, its populations are fragmented and isolated to one mountain range, its preferred habitat is of concern, and it is highly vulnerable to climate change.



Agency Status	
NV Natural Heritage	G2S2
USFWS	No Status
State Prot	Sensitive Mammal NAC 503.030.3
IUCN	Endangered
CCVI	Highly Vulnerable

TREND: Palmer's chipmunk is the most abundant diurnal mammal in the Spring Mountains (Lowrey and Longshore 2010); however, according to the Clark County MSHCP, it appears that populations are either locally increasing or decreasing depending on the uses and disturbances (particularly recreational) occurring in specific areas.

DISTRIBUTION: This species is endemic to the Spring Mountains, Clark County, NV.

GENERAL HABITAT AND LIFE HISTORY:

Recent studies consider this species a habitat generalist within relatively mature coniferous forests. It is primarily associated with white-fir/limber/mixed conifer associations between 2,600 and 2,900 meters but has also been observed from the upper elevations of pinyon/juniper (2,080 m) to above the Bristlecone timber line (3,290 m). Habitat modeling determined that decreasing understory tree density and increasing currant berry shrub density increased the numbers of Palmer's chipmunks. Other important habitat characteristics that increase the likelihood of occurrence include lower slopes, nearness to permanent water sources, and northern aspects (Lowrey and Longshore 2010).

The primary food source is conifer seeds (Lowrey and Longshore 2010). Currant berries provide food resources in the late summer. This species may also eat other seeds, fruits, fleshy fungi, green vegetation, and insects.

Palmer's chipmunk has a narrow thermoneutral zone (32-34° C) and develops hyperthermia at temperatures above 34° C. It digs deep burrows to survive cold winter periods. It typically occurs on north-facing slopes where vegetation cover is greater (Lowrey and Longshore 2010).

CONSERVATION CHALLENGES:

This species is a Spring Mountains endemic. Threats include competition with recreationists for spring and stream areas, urban development, feral cats, and increased human-caused fires (Lowrey and Longshore 2010). Other threats include fire suppression and fuels management, dispersed and concentrated recreational activities, trail construction and maintenance, and wood removal.

NEEDS:

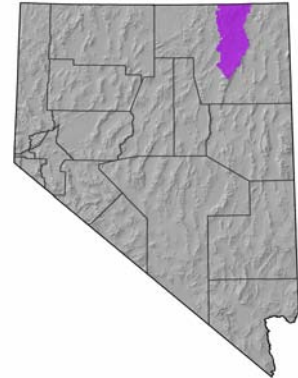
Research Needs: Research, using a grid-based approach, population dynamics, habitat relationships, and this species' ability to reproduce related to its habitat. Understand the effects of human-caused disturbance (e.g., recreation, feral cats, suburban development) and gain knowledge on source-sink and predator-prey dynamics and density dependent processes. Movement, home range, dispersal patterns and behavioral interactions between Palmer's chipmunk and golden mantled ground squirrel should also be studied as well as the effects of fire ecology and other natural disturbance regimes on populations.

Monitoring and Existing Plans: Annual surveys for this species are conducted by NDOW. This is a Covered Species under the Clark County MSHCP.

Approach: Habitat modeling conducted by Lowrey and Longshore (2010) suggest that Lee, Macks, MacFarland, and Deer Creek Canyons be incorporated into conservation planning actions. Long-term monitoring should include population abundance, survival rates, and recruitment rates or juvenile survival. Continue monitoring threats to habitat, conserve areas important to long-term persistence, and focus on protecting this species from the detrimental effects of human activity. Continue integrating management recommendations, guidelines, and strategies set forth in the Clark County MSHCP.

WAP HABITAT LINKS: Intermountain Coniferous Forests and Woodlands, Lower Montane Woodlands and Chaparral.

WAP 2012 species because of range-wide population status uncertainty.



Agency Status	
NV Natural Heritage	G4S1S2
USFWS	No Status
BLM-NV	Sensitive
CCVI	Presumed Stable

TREND: Trend unknown.

DISTRIBUTION: Found in Elko Co, near Sheep Creek in the Independence Mountains, and along Mary's River. Also collected at Sheldon National Antelope Refuge.

GENERAL HABITAT AND LIFE HISTORY:

Likely habitat is ephemeral and perennial streams dominated by shrubs, primarily below 2500 m. Recorded habitats include arid and semiarid shrub-grass associations, openings in montane coniferous forests dominated by sagebrush (WA), willow-fringed creeks, marshes (OR), bunchgrass associations, sagebrush-aspen associations (CA), sagebrush-grass associations (NV), and alkaline shrubland (UT) (Hoffman et al. 1969, Williams 1984, Cornely et al. 1992).

Preble's shrew is an invertivore. Feeding habits probably resembles other shrews in that they primarily feed on insects and other small invertebrates (worms, molluscs, centipedes, etc.).

They are active throughout the year and can be active at any time throughout the day or night, but probably most active during morning and evening hours.

CONSERVATION CHALLENGES:

Rarity may be a reflection of a lack of intensive sampling effort. Little is known about this species, although general concerns related to sagebrush/riparian habitat quality apply.

NEEDS:

Research Needs: As with most shrews, little is known about the species, including range, viability of subpopulations, and responses to habitat threats and isolation. Basic habitat and life history information is lacking and trend of the species needs to be investigated. Presence/absence surveys need to be conducted.

Monitoring and Existing Plans: NDOW has conducted recent surveys on the Marys and upper Humboldt River watersheds. Otherwise the species is not monitored.

Approach: Conduct surveys to delineate current habitat status and range as part of a statewide shrew inventory. Research efforts should focus on basic habitat and life history requirements. Careful consideration should be given to research methods and the risks/benefits evaluated since the best ways to capture this species are typically lethal (pitfall or sticky traps). Protect at-risk populations as appropriate.

pygmy rabbit

Brachylagus idahoensis

WAP 2012 species because of the potential for large-scale sagebrush habitat conversion and loss, perceived population declines, extreme vulnerability to climate change, and chronic listing concerns.



Agency Status	
NV Natural Heritage	G4S3
USFWS	No Status
BLM-NV	Sensitive
USFS-R4	Sensitive
State Prot	Game Mammal NAC 503.020
CCVI	Extremely Vulnerable

TREND: Trend unknown.

DISTRIBUTION: Range includes central and northern NV, corresponding to sagebrush distribution. Recent surveys have increased our knowledge of the range of this species in NV (USFWS 2010b).

GENERAL HABITAT AND LIFE HISTORY:

Found primarily on big sagebrush dominated plains, and alluvial fans where plants occur in tall, dense clumps (Green and Flinders 1980). Deep, friable, loamy-type soils are required for burrow excavation. They may occasionally use burrows excavated by other species (e.g., yellow-bellied marmot), therefore, may occur in areas that support shallower, more compact soils as long as sufficient shrub cover is available (USFWS 2010b). Dense stands of sage growing adjacent to permanent and intermittent streams, along fence rows, and ditches may be avenues of dispersal (Green and Flinders 1980). Cover and height of woody vegetation appear to be critical habitat features (Green and Flinders 1980); however, Larrucea and Brussard (2008) found that pygmy rabbits occupied clusters of sagebrush that were taller/higher than the sagebrush shrubs in the surrounding area (i.e., sagebrush islands which ranged from 12-117cm in height).

Big sagebrush is the primary food which may comprise up to 99% of food taken in winter and 51% in the summer. Wheatgrass and bluegrass were highly preferred foods in the summer, while forbs were eaten only occasionally (Green and Flinders 1980).

This is the only native leporid in NV to excavate its own burrows (Weiss and Verts 1984; Janson 1946). Dispersal abilities are limited; this species is reluctant to cross open areas such as roads or areas cleared of sagebrush (Weiss and Verts 1984). The size of pygmy rabbit home ranges fluctuate with the seasons; they tend to have smaller home ranges during winter and larger home ranges during the spring and summer. Individuals generally remain near their burrows during the winter (one study noted within 30 m and another within 80-100 m). One study found that annual home ranges in southeastern Oregon and northwestern Nevada differed between the sexes and ranged from 1.2 to 25.8 ac (0.49 to 10.46 ha) for males and 0.27 to 18.7 ac (0.11 to 7.55 ha) for females. Male home ranges tend to be larger than females during the spring and summer as males travel further among a number of females. In the southeastern Oregon and northwestern Nevada study, home ranges for males ranged from 0.27 to 18.5 ac (0.11 to 7.49 ha) and from 0.15 to 17.5 ac (0.06 to 7.10 ha) for females during the breeding season. Juvenile dispersal in Nevada and Oregon was reported greater than 0.3 mi (0.5 km) with a maximum long-distance movement of 5.3 mi (8.5 km) recorded by a juvenile female.

CONSERVATION CHALLENGES:

Livestock grazing at unsustainable levels can result in the degradation of sagebrush habitat. Recent studies show that grazing was compatible with pygmy rabbits if grazing occurs at levels that left sagebrush plants in tact and soils not overly compacted. Fire was found to be the strongest predictor of loss of pygmy rabbits from a site in Nevada and California. Cheatgrass invasion is detrimental to pygmy rabbits. Shrub cover is necessary for protection during dispersal and cheatgrass monocultures may provide a barrier to dispersal. Pinyon-juniper encroachment decreases understory species and, in turn, decreases suitable pygmy rabbit habitat. Climate change has been attributed to an upward elevational shift in pygmy rabbit occurrences. Extant historical pygmy rabbit sites averaged 515 ft (157 m) higher than extirpated sites. With local downward shift effect accounted for, overall upward elevation shift of extant sites was 721.8 ft (220 m); the researchers attributed this to climate (USFWS 2010b).

WAP HABITAT LINKS: Sagebrush.

NEEDS:

Research Needs: Conduct a statewide pygmy rabbit inventory. Determine thresholds for habitat requirements. Gain a better understanding of dispersal ability and connectivity among habitat areas. Increase our understanding of how sagebrush treatments and pinyon-juniper removal conducted to benefit Greater Sage-Grouse may affect pygmy rabbits. Preliminary research indicates that a buffer of at least 40 m (131.2 ft) should be established between pygmy rabbit burrows and sagebrush treatment areas. Study the recolonization of previously disturbed sites that are now exhibiting suitable habitat features post restoration.

Monitoring and Existing Plans: Species investigation being conducted by NDOW. Pygmy rabbit is not covered within any other existing plans. A recent 12-month finding published by the USFWS (2010b) determined that protection of this species as endangered or threatened was not warranted.

Approach: Protection of sagebrush is critical, particularly in areas where deep soils occur, or on flood plains where high water tables allow the growth of tall, dense stands of Wyoming sagebrush. Monitor populations in order to determine response to habitat changes.

sagebrush vole

Lemmiscus curtatus

WAP 2012 species because it is highly vulnerable to climate change and due to potential large-scale sagebrush habitat conversion and loss.



Agency Status	
NV Natural Heritage	G5S3
USFWS	No Status
CCVI	Highly Vulnerable

TREND: Generally abundant in suitable habitat; trend unknown; habitat loss to fire has been extensive.

DISTRIBUTION: Statewide, excluding Mojave Desert and Sierra Nevada regions.

GENERAL HABITAT AND LIFE HISTORY:

Live in semiarid habitats on well-drained or rock-covered soils. Vegetation usually dominated by sagebrush or rabbitbrush mixed with bunchgrass. Small mammal live trapping conducted in the late 1990's incidentally observed that the highest densities of sagebrush voles were found in higher elevation mountain sage areas (e.g., Mt. Grant) (J. Boone, unpub. data). This species is known to occur up to 12,500 feet in elevation in other states, but their elevational range in Nevada is unknown.

Entirely vegetarian and eats almost any green plant material including grasses, leaves, green seed heads and pods, flowers and stalks of buckwheat, and some sagebrush leaves. They do not store food but occasionally pull fresh food into their burrow to prevent its drying out.

Occurs in colonies. Active essentially throughout day, year round, but main activity period is 2-3 hours before sunset to 2-3 hours after full darkness, and a similar period around sunrise.

CONSERVATION CHALLENGES:

There is concern over the stability of its sagebrush habitat, particularly the transitioning of sagebrush classes into uncharacteristic classes invaded by annual grasses and weeds and pinyon-juniper encroachment caused by unsustainable grazing, wildfire, and climate change.

NEEDS:

Research Needs: Conduct inventories and determine distribution, upper elevation range limits, population status, and trend. Increase our understanding of how habitat change affects population densities and habitat use.

Monitoring and Existing Plans: This species is monitored by the Wildlife Action Plan Performance Indicators Project but is not addressed by any other existing plans.

Approach: Include this species in a statewide small mammal inventory and trapping network. Develop a habitat suitability model. Conserve and restore sagebrush.

Sierra Nevada snowshoe hare

Lepus americanus tahoensis

WAP 2012 species because it is an isolated subpopulation with limited habitat connectivity and shared stewardship with California.



Agency Status	
NV Natural Heritage	G5T3T4QS3
USFWS	No Status
State Prot	Game Mammal NAC 503.020
CCVI	Presumed Stable

TREND: Trend is unknown.

DISTRIBUTION: Sierra Nevada in the vicinity of Lake Tahoe.

GENERAL HABITAT AND LIFE HISTORY:

Typically occur in dense deciduous streamside vegetation, forest undergrowth, dense thickets of young conifers, especially firs where the branches droop to the ground, and patches of chaparral composed of ceanothus and manzanita. During the summer, snowshoe hares in the Lake Tahoe area are associated with brush situated close to meadows or deciduous riparian vegetation rather than on ridgetops or brush-covered upper slopes (Collins 1998). Recent studies conducted by NDOW detected snowshoe hares in young fir communities adjacent to larger aspen communities, and within newly treated aspen stands with moderate to heavy understory return.

In the summer, snowshoe hares feed on various green succulent plants, grasses, sedges, ferns, and forbs. In the winter, their diet changes to bark and twigs of conifers, evergreen shrubs, and deciduous trees such as aspen, alder, and willow (Collins 1998).

This species is nocturnal and secretive. They do not excavate burrows. Home ranges typically fixed for an adult's life; however, home range shifts in excess of 400 m have been documented. Populations can move seasonally from winter to summer home ranges based on snow accumulation and habitat changes (Feldhamer et al. 2003).

CONSERVATION CHALLENGES:

Vulnerable to loss and degradation of riparian habitat due to logging activities, grazing, wildfires, development, and any other activities that remove or alter areas of brushy cover (Collins 1998).

NEEDS:

Research Needs: NDOW field studies are ongoing to determine this species' distribution, abundance, population status, habitat requirements, home range size, etc.

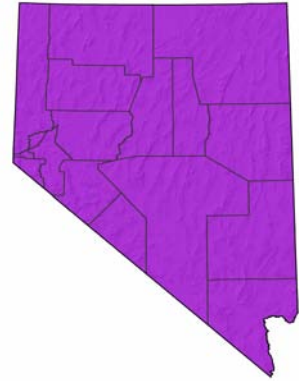
Monitoring and Existing Plans: This species is not within any other existing plans. NDOW began monitoring this species in 2006 and extensive studies will continue for several years. Occupied sites observed will be monitored using pellet count grids. Trapping studies are planned to determine habitat requirements, home range, and connectivity.

Approach: Protection of brush and alder/willow riparian habitats is the most important element to ensuring their survival (Collins 1998).

silver-haired bat

Lasionycteris noctivagans

WAP 2012 species because of regional population concerns and is very vulnerable to decline due to alternative energy development.



Agency Status	
NV Natural Heritage	G5S3B
USFWS	No Status
BLM-NV	Sensitive
CCVI	Presumed Stable

TREND: Status and trend is unknown. In some areas, they can be locally common during the summer.

DISTRIBUTION: Can be found throughout the state, especially during migration. Roosting habitat is limited primarily to forested habitats.

GENERAL HABITAT AND LIFE HISTORY:

Silver-haired bats are a forest-associated species and are more commonly found in mature forests. They are found primarily at higher latitudes and altitudes in coniferous and mixed deciduous/coniferous forests of pinyon-juniper, subalpine fir, white fir, limber pine, aspen, cottonwood, and, willow. In southern Nevada, they are usually found at lower elevations in association with riparian corridors. Current Nevada records indicate this species is distributed between 480-2,520 m. In some areas there appears to be summer segregation of the sexes. Silver-haired bats migrate from the state during winter, and only recently have been documented to breed here. It was previously thought they only migrated through each year.

Forages for a wide variety of insects, including chironomids, although moths appear to be a major portion of its dietary prey. Foraging is generally above the canopy layer in or near wooded areas and along edges of roads, streams or water bodies. Silver-haired bats can travel considerable distances (up to 15 km) to preferred foraging areas.

CONSERVATION CHALLENGES:

Threatened by loss of roosting habitat due to logging practices that eliminate clusters of large snags and by loss of foraging habitat in riparian areas. Mortality of silver-haired bats is frequently reported at wind farms and the resulting effects on the larger population are not yet quantified. Although it is unclear exactly how wind turbines induce mortality, it has been proposed that bats are dying from barotrauma, the result of a rapid drop in pressure near moving blades. Mortality is seasonal and coincides with migration periods.

NEEDS:

Research Needs: Recent captures of lactating females provides reliable evidence that this species does breed within NV. Extent of breeding range, numbers of summer residents, and locations of roosts are completely unknown and need to be investigated. Information about breeding populations, roost requirements, and the timing and patterns of migration, as well as status and trend, are necessary.

Monitoring and Existing Plans: The silver-haired bat is addressed in the Revised Nevada Bat Conservation Plan (2006) and is a Covered Species under the Clark County MSHCP.

Approach: Monitor and survey species to determine impacts of alternative energy development on Nevada populations. Basic survey work for key roosting and foraging sites needs investigation. Determine trend and distribution. Care should be taken to maintain temporary roosts along migration corridors. As with all bats, this species should be monitored for white-nose syndrome.

spotted bat

Euderma maculatum

WAP 2012 species because of its rare and patchy occurrences and because it is listed as threatened in the Nevada Administrative Code (NAC).



Agency Status	
NV Natural Heritage	G4S2
USFWS	No Status
BLM-NV	Sensitive
USFS-R4	Sensitive
State Prot	Threatened Mammal NAC 503.030.2
CCVI	Presumed Stable

TREND: Trend is unknown as this species is difficult to survey and monitor.

DISTRIBUTION: This species is patchily distributed throughout the state and linked to prominent rock features (i.e., cliffs) that are used for roosting. Spotted bats are rarely encountered in surveys, although acoustic sampling methods are broadening our understanding of the species distribution.

GENERAL HABITAT AND LIFE HISTORY:

Spotted bats are found in a wide variety of habitats from low elevation desert scrub to high elevation coniferous forests if suitable roosting habitat exists. This species primarily roosts in cracks and crevices associated with cliff faces but there is some indication that mines and caves may be occasionally used, especially in winter. Spotted bats have occasionally been found roosting on or in buildings elsewhere in their range, but their reliance on such roosts is not well understood. This species is a year round resident that hibernates during the winter but periodically arouses to forage and drink. Hibernacula characteristics are completely unknown for this species in Nevada. Spotted bats tend to roost singly or in small clusters and are known to move among various cracks and crevices within large cliff features. Spotted bats forage primarily on moths, but do not appear to select particular moth species. They likely feed on any moth they encounter that is appropriate handling size (8-12 mm in length).

Foraging occurs in canyons, in the open, over riparian vegetation, over meadows, along forest edges, or in open coniferous woodland, often 10-15 m high. Spotted bats are capable of rapid, long-distance flight and can access suitable foraging grounds some distance away from roost sites. In some areas (e.g., Colorado), they have been reported to consistently forage in the same areas each night, arriving at the same points at routine times. They are infrequently captured possibly due to noise and light sensitivity, or because they fly high enough to avoid mist nets.

CONSERVATION CHALLENGES:

Threats may include recreational rock climbing, broad-scale urban development, pesticide use, loss of foraging habitat, grazing/meadow management, mining and quarry operations and loss of accessible, open water.

NEEDS:

Research Needs: More information is needed on life history, ecology, reproduction, habitat use, patterns of movement, distribution, status, breeding range, and abundance. Also need more information on winter habitats and hibernacula microclimates. Little is known about foraging behavior, population dynamics, and specific roosting requirements. Roosts are difficult to find, and the preference of spotted bats to roost singly and change roosts frequently only compounds the problem. In addition, spotted bats are thought to fly later in the evening than other bats, and may often be missed in capture studies that do not attempt to catch bats all night long.

Monitoring and Existing Plans: Spotted bats are discussed in the Nevada Bat Conservation Plan (2006). This species is also a Watch List species in the Clark County MSHCP.

Approach: Critical roosting areas should be identified and protected. Sampling should focus on habitat specific to this species. Acoustic sampling may be helpful in increasing our understanding of this species, but it is important that the right kind of microphone is used for recording as this species calls are at much lower frequencies than other species. The results of status and distribution studies recommended under Research Needs will help determine management needs. As with all bats, this species should be monitored for white-nose syndrome.

WAP HABITAT LINKS: Intermountain Riparian, Lower Montane Woodlands and Chaparral, Intermountain Coniferous Forest and Woodlands, Sierra Coniferous Forests and Woodlands, Cliffs and Canyons, Caves and Mines, Developed Landscapes.

Townsend's big-eared bat

Corynorhinus townsendii

WAP 2012 species because of its patchy distribution, rangewide population status concerns, and possible susceptibility to white-nose syndrome.



Agency Status	
NV Natural Heritage	G3G4S2
USFWS	No Status
BLM-NV	Sensitive
State Prot	Sensitive Mammal NAC 503.030.3
CCVI	Presumed Stable

TREND: Declining throughout the state.

DISTRIBUTION: Although this species can be found throughout the state, it is restricted to caves and mines with suitable microclimates.

GENERAL HABITAT AND LIFE HISTORY:

Roosting habitats are usually mines, caves, and other cave-like spaces with populations occurring in areas dominated by exposed, cavity forming rock and/or historic mining districts. Maternity and hibernation colonies typically are in caves and mine tunnels. Hibernacula are generally in relatively cold places, often near cave or mine entrances and in well-ventilated areas. This species does not use crevices or cracks; it hangs from the ceiling, generally near the zone of total darkness (Schmidly 1991). In Nevada, all known roost sites are in abandoned mines. Found at elevations between 210 and 3,500 m in pinyon-juniper-mahogany, white fir, blackbrush, sagebrush, salt desert scrub, agricultural, and occasionally urban habitats. Foraging associations include the edge of habitats along streams, adjacent to and within a variety of wooded habitats.

Townsend's big-eared bats are moth specialists; over 90% of its diet is composed of lepidopterans.

This species is nimble; it is able to fly through narrow passages (Hoffmeister 1986). These bats often travel large distances while foraging, including movements of over 150 kilometers during a single evening. Females gather in small nursery colonies in the warm parts of caves or mines, sometimes in buildings (western U.S.). Individuals generally return to the same maternity roost in successive years. Males tend to roost singly, spread across the landscape. Suitable maternity sites seem to be a limiting factor.

CONSERVATION CHALLENGES:

This species is highly susceptible to human disturbance and is most threatened by disturbance or destruction of roost sites through vandalism, recreational caving, mine reclamation, renewed mining, and permanent mine closures. Townsend's big-eared bats have a habit of roosting openly within mines, with some individuals often found near the entrance, making them more easily detected and disturbed than other species that hide in crevices. Maternity colonies are particularly sensitive and females have been known to abandon their young due to a single disturbance event. Similarly, during hibernation, because they roost in the open, they are easily observed and disturbed often causing individuals to use up stored fat and starve to death. Townsend's big-eared bats are also mine and cave obligates; therefore, are not flexible in their roosting needs. Maternity colonies seem to be fairly limited and never abundant; surveys almost always find at least one individual in a mine, but these are generally single bachelor males. Additional threats include timber harvest practices and loss of riparian habitat. Although there have not been any studies to confirm such impacts, pesticide spraying in forested and agricultural areas could affect the prey base (moths) of these bats. Threats to populations of these bats may also include the loss of genetic diversity and population connectivity due to reduced population sizes or available roost sites.

NEEDS:

Research Needs: Although this species is commonly surveyed for and found, basic biological information is still lacking, and the location of critical roosts is needed. More information is needed on foraging requirements, seasonal movement patterns, population genetics (i.e. the degree of relatedness within and between different maternity roosts), and susceptibility to white-nose syndrome. Roost shifting has been observed elsewhere and needs investigation within NV. This may include the study of limiting factors (e.g., microclimate requirements) that affect roost requirements.

WAP HABITAT LINKS: Lower Montane Woodlands and Chaparral, Caves and Mines.

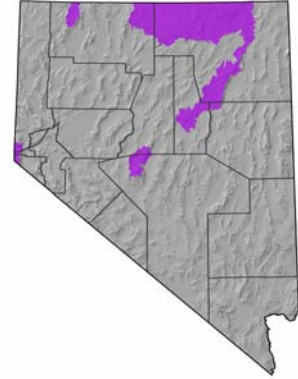
Monitoring and Existing Plans: Townsend's big-eared bats are addressed in the Nevada Bat Conservation Plan (2006), a 1999 Conservation Strategy (Pierson et al. 1999), and are Evaluation Species under the Clark County MSHCP.

Approach: Continue to map and monitor species occurrences of winter, maternity, bachelor, lekking, and night roosts. Ensure adequate biological surveys are conducted prior to mine closures to determine if bats occur. Coordinate protection measures such as installation of bat gates or access restrictions with appropriate land management agencies. As with all bats, this species should be monitored for white-nose syndrome.

western jumping mouse

Zapus princeps

WAP 2012 species because it is vulnerable to decline due to large-scale habitat conversion and loss, especially with respect to climate change.



Agency Status	
NV Natural Heritage	G5S2
USFWS	No Status
CCVI	Presumed Stable

TREND: Trend is unknown.

DISTRIBUTION: Found in northeast, central, and western Nevada.

GENERAL HABITAT AND LIFE HISTORY:

Western jumping mice occur in mountain meadows, marshes, and along banks of streams and ponds, in dense cover of tall grasses and herbs. They nest in burrows in well-drained mound or elevated banks (Jones et al. 1983) or on the surface among vegetation.

In spring, this mouse feeds on insects and other invertebrates. By mid-summer, its diet may shift to mostly grass seeds and small fruits.

Western jumping mice are primarily solitary. Their home range in UT averaged 0.2-0.6 ha (0.5-1.5 acres) in different areas in different years (Cranford 1983). Adult density was 8-32/ha (8-32/2.5 acres) in different areas. Adults may enter hibernation September-October. Throughout winter, periods of hibernation alternate with arousal from torpor. During years when summers are relatively short, there is high juvenile mortality because the young have not been able to sufficiently accumulate enough fat reserves to survive the winter. In one study of climate change effects in the Ruby Mountains, western jumping mice showed upslope contractions at their lower range limits while also expanding its upper range limit some 600 meters (Rowe et al. 2010). This may be due to the fact that this species has specific optimum temperature requirements for hibernation and as climate change causes higher elevations to warm, this species may be able to successfully move higher into these warming zones to hibernate.

CONSERVATION CHALLENGES:

This species preferred riparian habitat is vulnerable to degradation and/or loss, especially with respect to climate change. In some areas, fire could also be a concern.

NEEDS:

Research Needs: It is important to determine western jumping mice current distribution in Nevada, compared to its historic distribution. Its dependence on riparian habitat quality needs to be better understood and this species response to climate change should be documented.

Monitoring and Existing Plans: This species is not currently systematically surveyed or monitored.

Approach: Implement statewide small mammal inventory and trapping network and monitor shifts in range or other responses to climate change. Determine population status and distribution; assess population connectivity and the viability of fragmented sub-populations, and protect occurrences as appropriate.

western red bat

Lasiurus blossevillii

WAP 2012 species due to its dependence on montane riparian habitat, a vulnerable habitat type.



Agency Status	
NV Natural Heritage	G5S1M
USFWS	No Status
BLM-NV	Sensitive
USFS-R5	Sensitive
State Prot	Sensitive Mammal NAC 503.030.3
CCVI	Presumed Stable

TREND: Trend is unknown. Known populations are local and rare.

DISTRIBUTION: Thought to be restricted to riparian habitats along the western and southern edges of Nevada, so range is probably not extensive. Confirmed breeding in Fallon in 2009.

GENERAL HABITAT AND LIFE HISTORY:

Western red bats are primarily found in wooded habitats, including mesquite bosque and cottonwood/willow riparian areas. This species roosts in tree foliage and possibly in leaf litter on the ground. The seasonal behavior of this species is not well understood. Previously, it was thought to be a migrant only, but recent studies have indicated that it is a summer resident in the Fallon and Muddy River areas. Breeding has been confirmed in a private orchard in Fallon. Western red bats probably migrate from Nevada in winter. This species roosts singly.

Food items consist of a wide variety of insects, taken opportunistically apparently based on size rather than type.

Generally forage high above the tree canopy, often making capture and detection of this species very challenging.

CONSERVATION CHALLENGES:

Degradation and loss of riparian zones, particularly mature cottonwood overstory, is the constant threat to red bats. The intensive use of pesticides in fruit orchards may constitute a threat to roosting bats and may significantly reduce the amount of insect prey available. Controlled burns may be another significant mortality factor for red bats that roosting in leaf litter during cool temperatures.

NEEDS:

Research Needs: Little is known about seasonal movement patterns, reproductive biology, population dynamics, and specific roosting requirements. Tree roosting species are particularly difficult to survey as these species often roost singly or in small groups and frequently shift roosting sites. Research studies should focus on conducting widespread, fine scale inventories using acoustic equipment to document this species distribution and seasonal use, delineating its tree roosting requirements, and documenting the change in abundance and distribution of cottonwood galleries and other riparian areas in the state. The status of this species needs further study and documentation. Other needs include altitudinal distribution, the effects of controlled burns, and the effects of pesticide use in orchards.

Monitoring and Existing Plans: Red bats are addressed in the Nevada Bat Conservation Plan (2006). This species is covered under the Lower Colorado River MSCP.

Approach: Key roosting sites should be identified, mapped, and monitored. Develop management strategies for large cottonwood gallery groves, including restoration of degraded stands and replacement of lost habitat. As with all bats, this species should be monitored for white-nose syndrome.

western small-footed myotis

Myotis ciliolabrum

WAP 2012 species due to regional population concerns in the west and its potential vulnerability to white-nose syndrome.



Agency Status	
NV Natural Heritage	G5S3
USFWS	No Status
BLM-NV	Sensitive
CCVI	Presumed Stable

TREND: Although western small-footed myotis are found throughout the state, there is a general lack of knowledge of its status and trend.

DISTRIBUTION: This species has been captured throughout the state. There is some evidence that in the south, this species is primarily found at the middle and higher elevations (>1,800 m) although occasionally found at lower elevations. In the central and northern portions of Nevada, it seems to be more common at valley bottoms (1,050 - 1,800 m).

GENERAL HABITAT AND LIFE HISTORY:

The western small-footed myotis is a crevice rooster, using mines, caves, buildings, rock crevices, hollow trees, and exfoliating bark on trees. It is found in a variety of habitats including desert scrub, grasslands, sagebrush steppe, blackbrush, greasewood, pinyon-juniper woodlands, pine-fir forests, agriculture, and urban areas. The western small-footed myotis hibernates individually or in large colonies, and in some areas may tolerate drier and colder hibernacula than some other species. This species generally crawls into small cracks and crevices during hibernation and can therefore easily be missed during surveys.

Forages early in the evening on a variety of insects including small moths, flies, ants and beetles that occur in open areas. Elsewhere in the US, this species has been documented foraging 1-3 m above the ground along cliffs and rocky slopes.

Western small-footed myotis look very similar to the California myotis which can cause confusion when identifying captured individuals. However, the two species are easily distinguished from each other acoustically.

CONSERVATION CHALLENGES:

Threats include loss of roosting habitat, permanent mine closures, recreational caving, contaminant poisoning, and disturbance during winter hibernation. Additionally, due to its habit of hibernating underground in larger groups, this species could be particularly vulnerable to white nose syndrome.

NEEDS:

Research Needs: For a seemingly common and widespread bat throughout most of Nevada, very little is known about the western small-footed myotis. Little is known about foraging behavior, reproductive biology, roosting requirements, acceptance of bat gates, and population dynamics. Information is needed on the current distribution and status of the species. Particular attention should be focused on locations and characteristics of winter hibernacula, which can be in deep, complex abandoned mines.

Monitoring and Existing Plans: Western small-footed myotis are addressed in the Nevada Bat Conservation Plan (2006).

Approach: Continue monitoring and mapping key habitat for the species, especially maternity and hibernating sites. Delineate range more precisely and initiate research to study key aspects of the species' biology. Critical roosting sites in mines and caves should be appropriately protected and all mines should be properly evaluated for wildlife use before closure. As with all bats, this species should be monitored for white-nose syndrome.