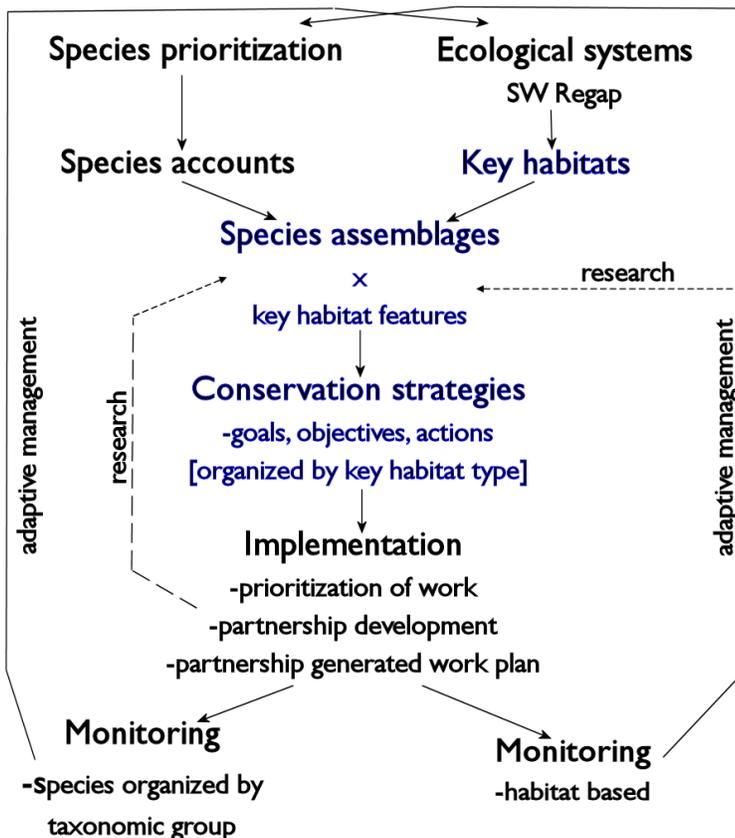


Conservation Strategies for Nevada's 27 Key Habitats and Their Associated Wildlife

The Nevada Wildlife Action Plan approach to wildlife conservation is based on 27 individual key habitat conservation strategies. The approach includes objectives and actions within these strategies addressing habitats as well as species assemblages and the needs of individual species. Each strategy includes basic information describing the habitats, their values to wildlife, land uses within these habitats, and problems facing species and habitats. This provides background and support for the goals, objectives, and actions that follow. The objectives and actions are a culmination of existing conservation plans, where available, and represent feedback received from multiple meetings with species experts and conservation partners during the development of the Nevada WAP. Finally, each strategy includes a list of the key conservation partners, programs, and projects, and identifies preliminary focal areas. The basic key habitat outline is provided below for general reference.



The conservation actions represent the WAP team's synthesis of consultations with subject matter experts, the conservation community, and the public at large through the public input process. The reader would be hard-pressed to find a single conservation action that was uniquely created by the WAP team during the drafting of this document that had not already been a part of the Nevada conservation dialogue for the last 5-to-20 years. The emphasis in this process was largely the integration of existing strategies. Gaps exist in the state's comprehensive conservation strategy, and those gaps were identified and filled with projected conservation approaches, again based on what could be learned from people with valuable insights and experience. Lastly, the reader is assured and cautioned that the listing of conservation actions in this section in *do not* represent any kind of legal mandate or vested expectation for any responsible party to carry out or implement. These actions represent the collective task ahead of the wildlife conservation community to achieve comprehensive wildlife conservation in Nevada.

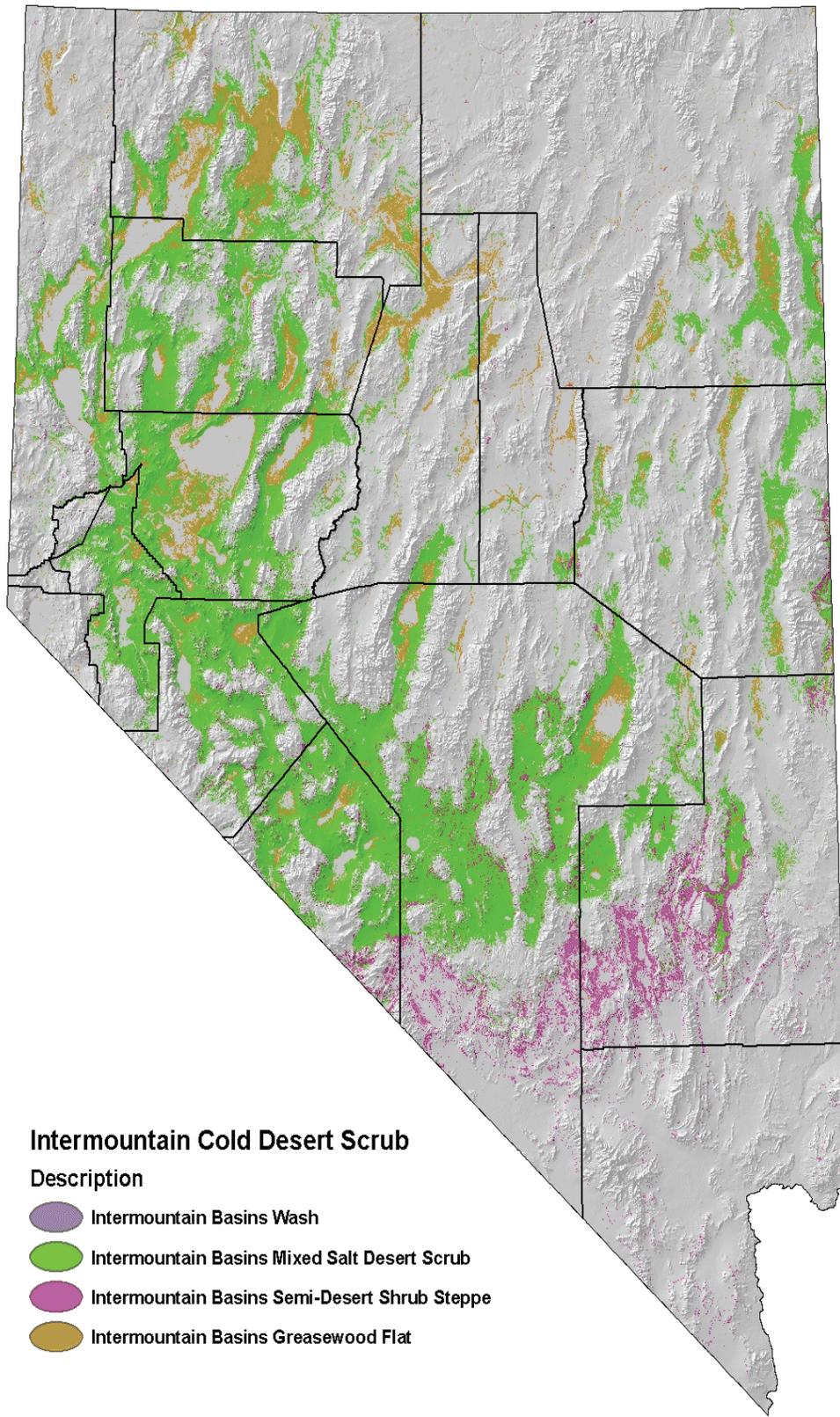


Figure 16. Distribution of Intermountain Cold Desert Scrub types in Nevada (data source: NatureServe 2004).

Key Habitat: Intermountain Cold Desert Scrub

Ecoregions

GreatBasin	6,233,736 hectares	15,403,563 acres
ColumbiaPlateau	222,424 hectares	549,611 acres
Mojave Desert	273,102 hectares	674,834 acres
Total	6,729,262 hectares	16,628,008 acres

Ecological Systems

SO96 Intermountain Basins Greasewood Flat
 SO65 Intermountain Basins Mixed Salt Desert Scrub
 SO14 Intermountain Basins Wash
 SO79 Intermountain Basins Semi-Desert Scrub Steppe

Key Habitat Description

The Intermountain Cold Desert Scrub type is the most extensive habitat type in the state of Nevada, covering roughly 6.7 million hectares. Annual precipitation in the salt desert scrub zone is generally less than 25 cm (10 inches) per year. Temperatures range between extremes of -29 and 43°C (-20 and 110°F), with mean temperatures somewhere in the low teens Celsius (50s F). Distribution of the salt desert scrub type generally follows all the valley bottoms in the state that occur within the Great Basin physiographic region. Plant communities are generally characterized by the presence of a variety of salt-tolerant shrubs of the Goosefoot family (Chenopodiaceae).

Community composition is largely influenced by soil salinity and drainage. Most often, the Cold Desert Scrub type is dominated by either shadscale or greasewood. Winterfat, one of the more palatable mixed salt desert shrub species in the Great Basin, is locally dominant on silty soils at varying elevations. At the lowest flats of the valleys where soils drain poorest and salinities are highest, the most salt-tolerant plants are found, including iodinebush and quailbush. The Cold Desert Scrub type generally gives way to sagebrush somewhere near the tops of the alluvial fans where the primary fault lines of the mountain range are situated. These upper soils are often gravelly and well-drained, and are more likely to support hopsage and associated plants. The dominant grass species in the Cold Desert Scrub type is Indian ricegrass, and to a lesser extent, needle-and-thread grass.

Value to Wildlife

The Intermountain Cold Desert Scrub is the most important habitat in Nevada for several Species of Conservation Priority, including kit fox, pale kangaroo mouse, and Loggerhead Shrike. Soils of this habitat tend to be loose and either sandy or gravelly and are easily excavated by denning or burrowing animals. Wind transported sand tends to accumulate around the shrubby bases of the saltbushes, particularly shadscale, creating hummocks of soil that lend themselves to burrowing and denning. The two most dependable herbivorous food staples are ricegrass and shadscale seeds, although forb seeds and leaf material will also be used when present. In the Great Basin, Cold Desert Scrub is also the primary habitat of the long-nosed leopard lizard, and is an important feeding habitat for pallid bats, which pluck scorpions and other large invertebrates off its exposed desert flats. Loggerhead Shrikes attain high breeding densities in valley bottoms such as the Lahontan Valley, where quailbush and four-wing saltbush create huge mature plants as much as 3 m (10 ft) in diameter. These big shrubs serve as thorny redoubts protecting the shrike's nest found deep inside the most unreachable depths of the foliage. Bald Eagles winter in the valley bottoms, preying on jack rabbits, while kit fox and Prairie Falcons feed primarily on rodents in the ground squirrel-cottontail size class. Cold Desert Scrub serves as an important support habitat for several sagebrush breeders, including Sage Thrasher, Sage Sparrow, and Brewer's Sparrow, while Black-throated Sparrow uses both Cold Desert Scrub and sagebrush habitats fairly equally. Washes are prominent features within the Intermountain Cold Desert Scrub habitat type, and have unique attributes for certain terrestrial species including endemic amphibians because of their function as a conduit for surface runoff and subsoil moisture. By retaining higher soil moisture than surrounding upland areas, they can serve as enhanced movement and migration pathways for these species and facilitate their distribution across the landscape, perhaps serving an important role in amphibian metapopulation maintenance.

Intermountain Cold Desert Scrub Habitat: Key Elements and Species Assemblages*

Shrubs – nesting structure, protection from predators, thermal cover

Loggerhead Shrike

Sage Sparrow

Brewer's Sparrow

Sage Thrasher

Black-throated Sparrow

Sandy Soils – burrowing, denning

Burrowing Owl

pale kangaroo mouse

dark kangaroo mouse

long-nosed leopard lizard

kit fox

Rock Features/Gravelly Soils – denning, protection from predators

Great Basin collared lizard

dark kangaroo mouse

Prey Populations – feeding on species in this habitat

Bald Eagle

Ferruginous Hawk

Prairie Falcon

pallid bat

greater short-horned lizard

desert horned lizard

Existing Environment

Habitat Conditions

Historically, Indian ricegrass was likely much more prevalent in this habitat type than it is today. Invasion of exotic plants, including cheatgrass, halogeton, Russian thistle, and in certain places, saltcedar, has compromised native communities and effected a shift toward less desirable conditions. Fire generally does not carry well in this type and was considered absent to rare during pre-settlement according to recent LANDFIRE descriptions, although shadscale range, once burned, can be extremely difficult and costly to restore to native type if dominated by cheatgrass or non-native forbs. The occurrence of cheatgrass in this type increases its ability to burn more readily. More cold desert scrub is burning annually than it likely did historically and therefore it is at much greater risk.

*Species *not* in bold are stewardship species.

Land Uses

Livestock grazing	Military mission
Urban/suburban development	Road development
Motorized recreation	Utility rights-of-way
Industrial development	Species harvest
Mineral/oil/gas extraction	

Problems Facing the Species and Habitats

Various land uses have resulted in the reduction or removal of important native seed-bearing grasses and forbs, and in many places native understory has been replaced by non-native invasive species, including cheatgrass, halogeton, Russian thistle, and saltcedar on wetter soils. Off-road vehicle activity can result in serious structural damage to shrubs, stripping them of their value as wildlife cover, and soil disturbance can lead to accelerated erosion, particularly around washes. Off-road vehicles and their trails can be important vectors and conduits for non-native species. Localized areas can be vulnerable to overharvest of reptiles for commercial trade, particularly areas with pronounced rock features that harbor highly desirable species such as the Great Basin collared lizard.

Priority Research Needs

- Wildlife/habitats relationships for all Species of Conservation Priority
- Dark kangaroo mouse status and distribution, genetic analysis, habitat preferences, and population demography
- Pale kangaroo mouse status and distribution, habitat preferences, population demography
- Predictive model for Burrowing Owl breeding distribution; key breeding habitat delineation
- Predictive model for kit fox breeding distribution; key breeding habitat delineation; population estimate based on number of potential breeding territories in suitable habitat
- Post-fire range rehabilitation techniques
- Population resiliency to harvest pressure for Great Basin collared lizard, long-nosed leopard lizard, and desert horned lizard
- Determine greater short-horned lizard distribution.

Conservation Strategy

Goal: Thriving self sustaining wildlife populations in healthy plant communities on stable soils within the natural range of soil movement (devoid of destructive erosion resulting in diminished site potential); with vigorous shrub component consisting of the full range of species within range site potential capable of reaching mature phenological stages; vigorous, diverse self-sustaining understory of grasses and forbs.

Objective: Maintain the Intermountain Cold Desert Shrub type at its current distribution in stable or increasing condition trend.

Action: Maintain a vigorous overstory shrub component (greasewood, hopsage, four-wing saltbush, quailbush, etc.); maintain capability of five-foot or greater height/diameter for saltbush species such as four-wing saltbush or quailbush conducive to Loggerhead Shrike nesting.

Action: Maintain vigorous, self-sustaining understory of grasses and forbs with particular emphasis on allowing seed-set and dispersal to sustain seed-eating wildlife.

Action: Maintain general range site health so that erosional forces such as water and wind are kept within natural limits, to the extent that this habitat type can maintain those limits.

Action: Retard the spread of invasive weeds and grasses into unaffected areas; maintain the type's natural fire resistance through maintenance of uncompromised native plant communities.

Action: Where appropriate, maintain rock features, including tufa stacks, rock outcrops, boulder piles, lava flows, cinder scatters, rock float, and talus; monitor local centers of rock removal for industrial or landscaping uses.

Action: Maintain desert wash habitats within this key habitat type by including avoidance of land use practices and alterations which will preclude natural surface runoff and debris flow from adjacent upland areas.

Action: Incorporate WAP objectives and strategies into BLM Resource Management Plans.

Objective: Maintain healthy populations of Species of Conservation Priority at stable or increasing trend.

Action: Maintain diverse, fully complemented wildlife communities through sound, sustainable habitat management and stewardship.

Action: Monitor and where appropriate, mitigate local impacts of Off-Highway Vehicle (OHV) recreation (organized or private) on burrowing owl nesting areas.

Action: Monitor local impacts of commercial reptile collection on key favored collection areas. Regulate take according to monitored and demonstrated need.

Action: Develop predictive models and inventory occupied habitat for key species, including kit fox, Burrowing Owl, and Loggerhead Shrike, for the purpose of developing quantifiable conservation objectives.

Partnerships

Land owner/Manager	Percent
Bureau of Land Management	83.0
Private	13.0
All others	4.0

Existing Partnerships, Plans, and Programs

Federal Agencies

- Bureau of Land Management
- U.S. Fish and Wildlife Service

State Agencies

- Nevada Department of Wildlife

Conservation Groups

- The Nature Conservancy
- Sierra Club

Bird Initiatives

- Partners In Flight North American Land Bird Conservation Plan
- Nevada Partners In Flight

Other Key Partners

- Counties
- Great Basin Bird Observatory

Preliminary Focal Areas

Black Rock Desert	White River Valley (Lund-Preston)
Smoke Creek Desert	Carico Lake Valley
Pyramid Lake Valley	Humboldt Sink
Lahontan Valley	Lovelock Valley
Fletcher townsite	Humboldt River

Mason Valley
Walker River
Big Smoky Valley
Railroad Valley

Winnemucca Lake Valley
Quinn River Valley
King's River Valley
Limestone Hills



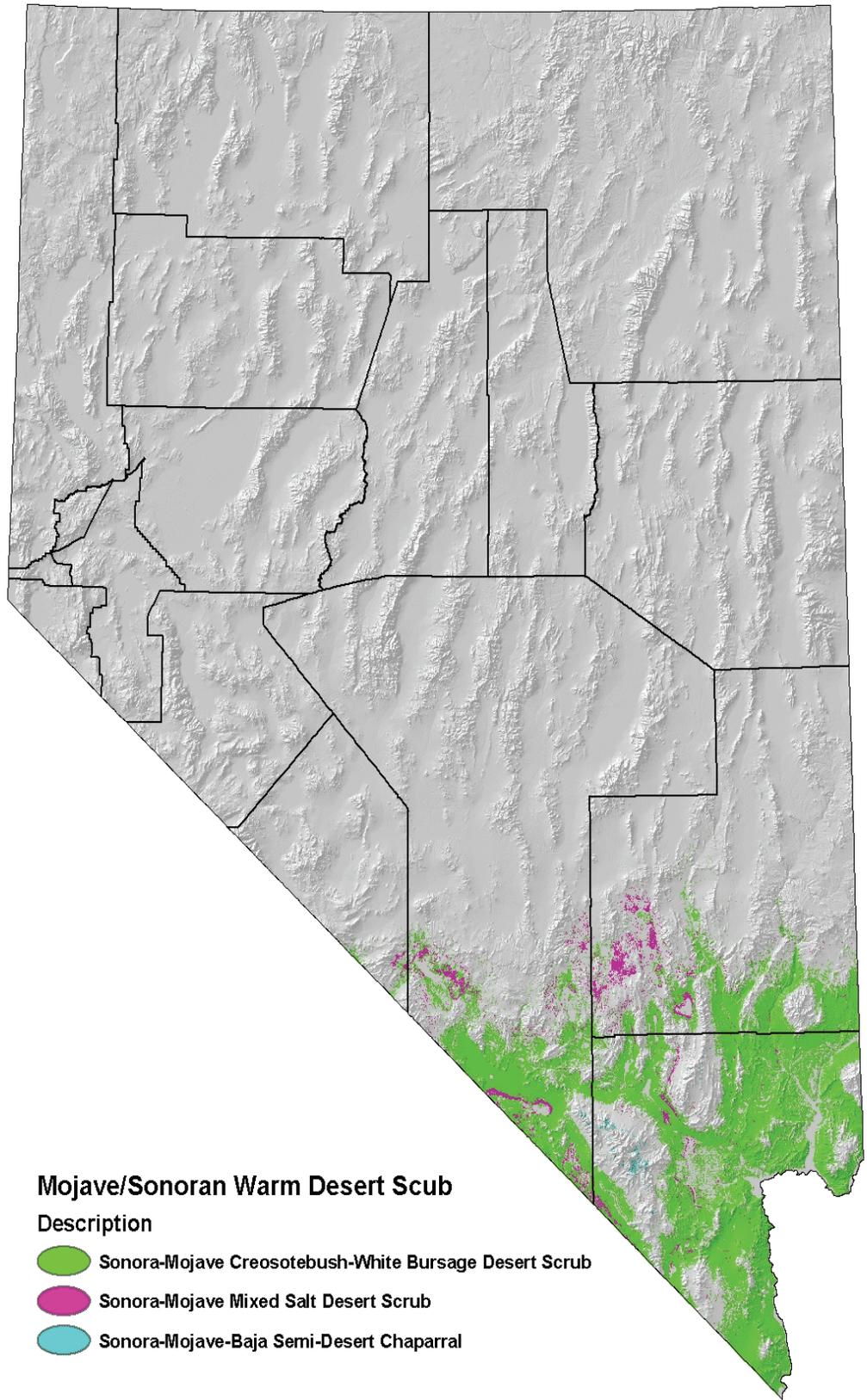


Figure 18. Distribution of Mojave-Sonoran Warm Desert Scrub in Nevada (data source: NatureServe 2004).

Key Habitat: Mojave/Sonoran Warm Desert Scrub

Ecoregions

Mojave Desert	1,996,580 hectares	4,912,188 acres
Great Basin	68,980 hectares	170,444 acres
Total	2,065,540 hectares	5,082,632 acres

Ecological Systems

S070 Sonora-Mojave Mixed Salt Desert Scrub

S069 Sonora-Mojave Creosotebush-White Bursage Desert Scrub

Key Habitat Description

The complex of vegetation types that comprise the Mojave/Sonoran Warm Desert Scrub habitat are uniquely adapted to the harsh conditions present in desert ecosystems. Plants are typically tolerant of low humidity, prolonged droughts, desiccating winds, high alkalinity or salinity, rocky or very sandy soils, and the periodic influx of high quantities of water in the form of surface flooding. Extensive alluvial fans, or bajadas, reach from the perimeter of the mountains down to the low intervening basins, typically ending at the playas that characterize the valley bottoms. These alluvial fans and playa ecotones are where the Mojave/Sonoran Warm Desert Scrub plant communities are found.

Creosote scrub (Sonora-Mojave-Baja Creosote-White Bursage Desert Scrub) occurs on well-drained sandy flats and bajadas throughout most of the Mojave Desert from 150 to 1,500 m (500 to 4,900 ft) elevation in Nevada. Its range extends from the Colorado River on the south to Pahrangat Valley on the north. Dominant plant species are creosote bush, white bursage, and beavertail cactus.

Saltbush scrub (Sonora-Mojave-Baja Mixed Salt Desert Scrub) occurs in the basins and valley bottoms of the Mojave Desert in two basic communities – xerophytic on dry soils and halophytic on saturated soils. The xerophytic community is characterized by saltbush, desert holly, and shadscale. Important species in the halophytic (“salt-loving”) community include greasewood, iodine bush, and western borax-weed.

Value to Wildlife

The harsh conditions and abundant xerophytic and halophytic vegetation types associated with the Mojave/Sonoran Warm Desert Scrub, would, at first glance, give the impression of a somewhat inhospitable and uninviting habitat. However, a large compliment of wildlife species, including many bird, small mammal and reptile species depend on or at least partially utilize Mojave/Sonoran Warm Desert Scrub habitat as well as other nearby habitats. This key habitat is critical to the survival of the federal and state threatened desert tortoise in Nevada. Desert tortoises often place their burrows directly under creosote bushes, taking advantage of the substrate stability created by the creosote roots. Similarly, large kit fox den complexes are often found in association with creosote habitat for the same reason. A host of additional heat-tolerant reptile species are also dependent on this habitat, including the desert iguana, spotted leafnosed snake, and the Western diamondback and sidewinder rattlesnakes. Sparsely vegetated creosote and saltbush areas are home to the Le Conte’s Thrasher. The rocky slopes of many of southern Nevada’s mountain ranges within the Mojave/Sonoran Warm Desert Scrub are critical to the survival of the Nelson bighorn sheep subspecies. Desert kangaroo rats and the desert pocket mouse depend on wind-blown sandy areas associated with this habitat type, and creosote seeds make up a large part of the desert pocket mouse’s diet. In turn, these small mammals and others are an important prey source for snakes as well as various bird species including the burrowing owl and loggerhead shrike.

Key Elements of Mojave/Sonoran Warm Desert Scrub Habitat of Importance to Wildlife*

Creosote Bush – nesting structure, protection from predators
Black-throated Sparrow

Saltbush – nesting structure, protection from predators
LeConte’s Thrasher
Loggerhead Shrike

Yucca – nesting structure, protection from predators
Bendire’s Thrasher
desert night lizard

Pebbly Soils/Pavement – nesting substrate
Lesser Nighthawk

Sandy Soils – burrowing, denning
Burrowing Owl
long-nosed leopard lizard
desert iguana
desert tortoise
kit fox
desert pocket mouse

Wash Ecotone – foraging
Verdin
Crissal Thrasher
Black-tailed Gnatcatcher
Ash-throated Flycatcher
Cactus Wren
long-tailed brush lizard

Rocks/Canyons – protection from predators
Sonoran lyre snake
Great Basin collared lizard
chuckwalla
banded Gila monster
ringtail
Nelson bighorn sheep

Dead/down Plant Debris – protection from predators, thermal cover, moisture retention
Gilbert’s skink
desert night lizard

Raptors – feeding on species in this habitat
Prairie Falcon

*Species *not* in bold are stewardship species.

Generalists – using a variety of elements in multiple habitats
Western banded gecko
Desert horned lizard

Existing Environment

Land Uses

Urban/suburban development	Sand/gravel mining
Motorized recreation	Wild horse/burro range
Military mission	Species harvest

Historic and Current Conditions

Throughout southern Nevada, urban/suburban development is occurring at a rate that could ultimately directly impact approximately 20 percent of the total acreage of this habitat type, and indirectly impact a much more sizable portion. Much of the wildlife habitat outside of the Las Vegas Valley is in relatively good condition, although these areas are subject to increasing pressure from factors such as invasive species and dispersed recreational activity. Approximately 80 percent of the total amount of this habitat type in Nevada occurs within Clark County, where an estimated 70 percent is under some form of protection for the purpose of conserving critical habitat for the desert tortoise, mostly on large blocks of public lands designated as Areas of Critical Environmental Concern. About 20 percent of the habitat within Clark County could be considered as improving in condition over the past 10 years due to the cessation of grazing and off-highway vehicle use resulting from desert tortoise management initiatives. Wild horses and burros continue to be problematic, although in some areas their numbers are declining due to the inability of the range to support them.

Problems Facing the Species and Habitats

The biggest challenge facing wildlife in the Mojave/Sonoran Warm Desert Scrub is conversion of habitat through urban and suburban development. Off-highway vehicle recreation attendant to suburban growth is heavily impacting the urban-wildland interface, leaving structural damage to shrubs and soils that lead to accelerated erosion. Wild horse and burro populations are over-capacity in many areas, and the range is depleted of its diverse understory of seed-bearing grasses and forbs. Invasive species threatening to replace the native understory in many places include red brome, cheatgrass, Sahara mustard, halogeton and Russian thistle. New concerns have arisen because these invasive plants have proliferated to an extent capable of significantly altering the Mojave scrub fire return interval, from centuries (~500 years) to decades, causing an irreversible shift in plant communities, and putting maintenance of the ecosystem at risk. Overharvest of reptiles may be occurring in certain areas harboring highly-desirable species (e.g., chuckwalla, Great Basin collared lizard, desert iguana).

Priority Research Needs

- Species-habitat relationships/predictive models for reptiles
- Distribution, population demography, ecology of banded Gila monster
- The influence of wash vegetation (mesquite/catclaw) on distribution of breeding birds in creosote bush uplands
- Population demography for ringtail and kit fox

Conservation Strategy

Goal: Healthy, self-sustaining wildlife populations in healthy plant communities on stable soils with vigorous shrub component consisting of the full range of species within range site potential; vigorous, diverse self-sustaining understory of grasses and forbs.

Objective: No net unmitigated loss or fragmentation of habitat in areas designated by the Clark County Multiple Species Habitat Conservation Plan (MSHCP) as “Intensive Management Areas” or “Less Intensive Management Areas,” or in areas designated as “Multiple Use Management Areas” that represent the majority of habitat for a species.

Action: Integrate WAP objectives with objectives and conservation actions outlined in the Clark County MSHCP.

Action: Integrate WAP objectives and actions into BLM Resource Management Plans through plan revision process.

Action: Maintain wild horse and burro herds within established Appropriate Management Levels (AML).

Action: Monitor motorized recreation activity on undeveloped public lands with emphasis on desert tortoise critical habitat and desert washes. Incorporate WAP objectives into OHV management plans. Develop conservation education program for responsible motorized recreation in and near sensitive wildlife habitat; include regularly updated information on closed areas. Augment land management agency law enforcement activity in closed areas.

Action: Retard the spread of invasive weeds and grasses into unaffected areas; maintain the type’s natural fire resistance through maintenance of uncompromised native plant communities.

Action: Where appropriate, maintain rock features, including tufa stacks, rock outcrops, boulder piles, lava flows, cinder scatters, rock float, and talus; monitor local centers of rock removal for industrial or landscaping uses.

Objective: Maintain healthy populations of Species of Conservation Priority at stable or increasing trend.

Action: Implement the recommendations of the 1994 Desert Tortoise Recovery Plan and the recommendations of the desert tortoise Recovery Plan Assessment Committee.

Action: Update Clark County MSHCP covered species information data bases with latest WAP species information. Integrate WAP Species of Conservation Priority with Covered Species list of the Clark County MSHCP.

Action: Monitor and mitigate local impacts of OHV recreation (organized or private) on burrowing owl nesting areas, and desert tortoise.

Action: Monitor local impacts of commercial reptile collection on key favored collection areas. Regulate take according to monitored and demonstrated need.

Action: Compile a kit fox maternal den atlas; using consensus-generated average home range units, plot occupied kit fox habitat on maps around confirmed sightings of full-grown adults. Generate density information from occupied habitat maps and ground-truthing and generate a population estimate as occupied habitat map approximates comprehensive range coverage. Develop monitoring protocol to determine trend in occupied habitat.

Action: Conduct comprehensive species investigations, including distribution, population demography, and ecology for banded Gila monster, ringtail, and desert pocket mouse. Develop conservation plans for each species based on results of comprehensive studies.

Action: Develop species-habitat relationships and predictive models for reptiles of conservation priority.

Action: Adapt Partners In Flight (PIF) North American Land Bird Conservation Plan species objectives and targets for Mojave/Sonoran Warm Desert Scrub species to Nevada scale; determine habitat capability for achievement of PIF targets; implement habitat improvement projects designed to improve habitat capability for achievement of PIF population targets; measure project efficacy using bird population parameters.

Partnerships

Land owner/manager	Percent
Bureau of Land Management	83.0
Private	13.0
All others	4.0

Existing Partnerships, Plans, and Programs

Major Programs and Partnerships

- Clark County Multiple Species Habitat Conservation Plan
- Desert Tortoise Recovery Plan Reassessment Committee/ Desert Tortoise Recovery Plan

Federal Agencies

- Bureau of Land Management
- U.S. Fish and Wildlife Service
- Department of Defense
- National Park Service
- U.S. Geological Survey (Biological Research Division)
- Department of Energy

State Agencies

- Nevada Department of Wildlife
- Nevada Division of Forestry
- Nevada Department of Transportation

Conservation Organizations

- The Nature Conservancy
- Sierra Club
- National Audubon/Red Rock Audubon Society
- Nevada Natural Resource Education Council

Other Key Partners

- University of Nevada
- Partners In Flight
- Great Basin Bird Observatory
- Local Town Boards
- Off-Highway Vehicle Organizations
- Sportsman's Organizations
- Moapa Band of Paiutes

Preliminary Focal Areas

Mormon Mesa	Newberry Mountains	Meadow Valley Mountains
Coyote Springs Valley	Mormon Mountains	Tule Desert
Gold Butte-Pakoon	Paiute Mesa	Desert National Wildlife Range
Piute-El Dorado valleys	Black Mountains	Muddy Mountains
Blue Diamond Hills	River Mountains	Red Rock Canyon
Upper Las Vegas Wash	McCullough Range	

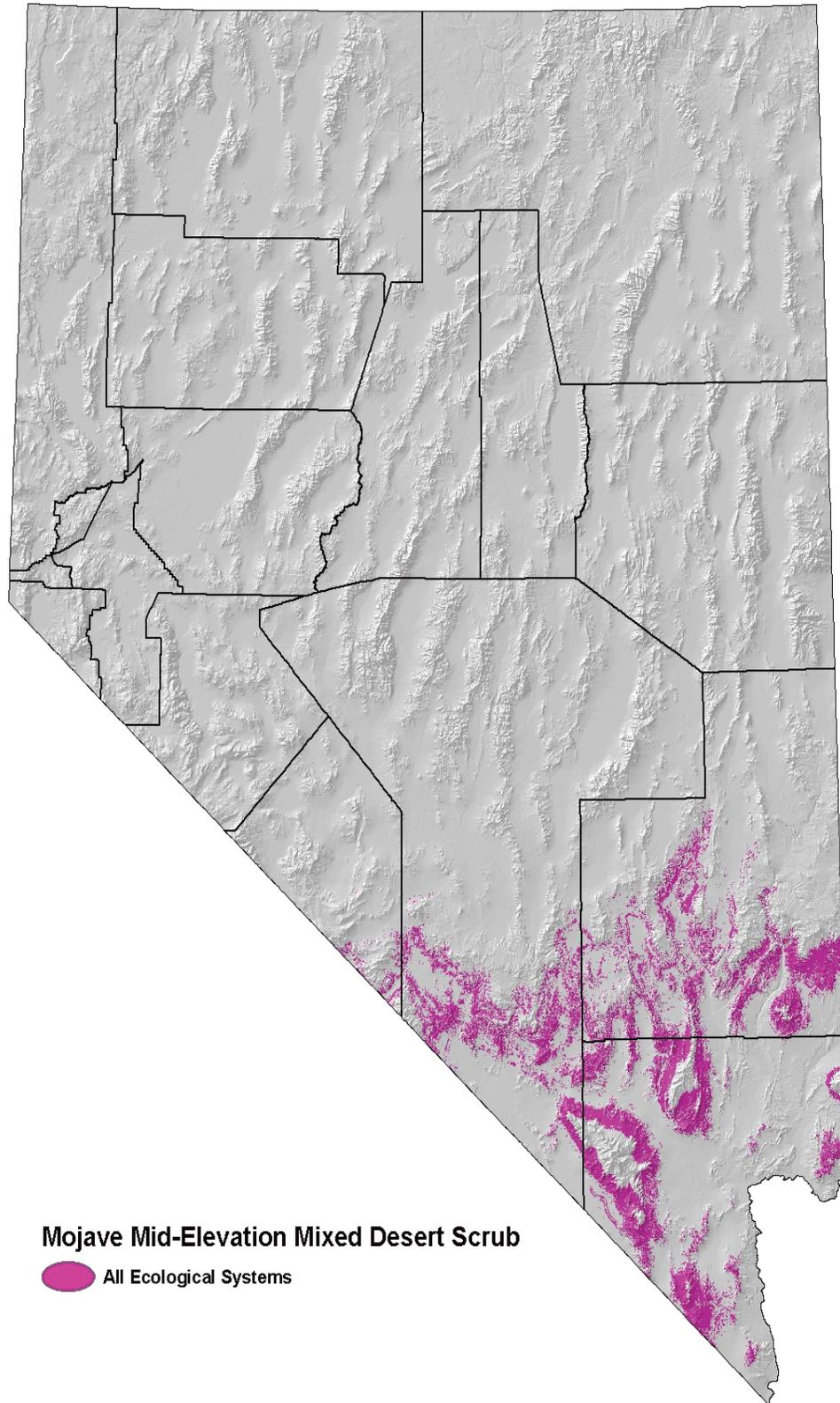


Figure 19. Distribution of the Mojave Mid-elevation Mixed Desert Scrub type in Nevada (data source: NatureServe 2004).

Key Habitat: Mojave Mid-Elevation Mixed Desert Scrub

Ecoregions

Mojave Desert	926,962 hectares	2,290,522 acres
Great Basin	134,051 hectares	331,240 acres
Total	1,061,013 hectares	2,621,762 acres

Ecological Systems

SO59 Colorado Plateau Blackbrush-Mormon Tea Shrubland
 SO60 Mojave Mid-Elevation Mixed Desert Scrub
 SO114 Sonora-Mojave Semi-Desert Chaparral

Key Habitat Description

This key habitat includes the Joshua tree forest and two transitional brush communities that are typically found between the desert scrub and the woodland zones on mountain ranges within or near the Mojave Ecoregion. Dominant or co-dominant shrubs include Joshua tree, blackbrush, Mormon tea, hopsage, buckhorn cholla, Gambel's oak, greenleaf manzanita, and cup-leaf ceanothus. Grass understory species associated with these brush communities include Indian ricegrass, needle-and-thread, and galleta.

Value to Wildlife

The presence of Joshua tree in Nevada is critical to the presence of Bendire's Thrasher and desert night lizard. Joshua tree is also an important habitat for Scott's Orioles, although they are also found in piñon-juniper habitats, sometimes in the absence of Joshua tree. The Black-chinned Sparrow has a very limited distribution in Nevada, found in the largely impenetrable shrubby stands of blackbrush, manzanita, and Gambel's oak, often in the piñon-juniper interface. Other species occurring in this habitat also occur elsewhere. The ringtail is likely associated with this type because it typically occurs near rock outcrops, rimrock, or in canyons.

Key Elements of Mojave Mid-Elevation Mixed Desert Scrub Habitat of Importance to Wildlife*

Yucca – nesting structure, protection from predators
Scott's Oriole Cactus Wren
Loggerhead Shrike Ash-throated Flycatcher
Bendire's Thrasher **desert night lizard**

Shrubs – nesting structure, protection from predators, thermal cover
Crissal Thrasher Black-tailed Gnatcatcher
Brewer's Sparrow Black-throated Sparrow

Understory – foraging on herbaceous species, protection from predators
Panamint kangaroo rat

Blackbrush/Oak – nesting structure, protection from predators
Black-chinned Sparrow

*Species *not* in bold are stewardship species.

Sandy Soils – burrowing, denning
Burrowing Owl desert iguana
kit fox desert horned lizard
desert tortoise long-nosed leopard lizard

Pebbly Soils/Pavement – nesting substrate
Lesser Nighthawk

Rock Outcrops – protection from predators, foraging
ringtail lizard
Nelson bighorn sheep chuckwalla
banded Gila monster Sonoran lyre snake
western banded gecko Prairie Falcon
Great Basin collared

Wash Ecotone – foraging
Costa's Hummingbird Gilbert's skink
Verdin Panamint alligator lizard

Existing Environment

Land Uses

Urban/suburban development	Military mission
Industrial development	Road development
Motorized recreation	Utility rights-of-way
Non-motorized recreation	Species harvest
Minerals/oil/gas extraction	

Habitat Conditions

These ecological systems are mostly intact, owing largely to desert tortoise conservation and the inclusion of much of the montane shrub types within the Spring Mountains NRA.

Problems Facing the Species and Habitats

Recent fires (2005) in this habitat type have raised unprecedented concerns over its ability to recover from catastrophic wildfire. Invasion of non-native understory plants such as red brome have demonstrated new capability to carry fire through the type which was likely evolved with a much longer fire return interval. Off-road vehicle activity can result in serious structural damage to shrubs, stripping them of their value as wildlife cover, and soil disturbance can lead to accelerated erosion, particularly around washes. Differences in elevation, fuels, and dominant species cause important differences in fire regimes between the blackbrush-dominated (mean fire return interval of 400 years) and chaparral-dominated (mean fire return interval of 81 years) ecological systems in this type, with additionally shorter fire return interval among blackbrush communities at increasing elevations (mean fire return interval of 200 years, perhaps). Differences in fire regimes will affect management responses and strategies. On one hand, prescriptions are for stand replacement fire every 80 years in chaparral, and, on the other hand, fire suppression is recommended in blackbrush systems. Localized areas can be vulnerable to overharvest of

reptiles for commercial trade, particularly areas with pronounced rock features that harbor highly desirable species such as chuckwalla and Great Basin Collared Lizard. Utility rights-of-way have facilitated increased predation of desert tortoise by Common Raven. The U.S. Breeding Bird Survey (BBS) has documented a population decline 50 percent or greater for Bendire's Thrasher between 1966 and 1999. The PIF North American Landbird Conservation Plan has identified Bendire's Thrasher as a Watch List Species in need of Immediate Action in the Mojave Bird Conservation Region due to the combination of significant population decline and restricted distribution. The BBS has also documented a population decline of 50 percent or greater for Brewer's Sparrow, but it is identified as a "Watch List Species in need of Management Action," because its overall population size and distribution is considerably greater. The stewardship responsibility for Brewer's Sparrow is much greater for the Great Basin than it is for the Mojave Desert, but more should be learned about the extent of breeding of this species in the Mojave Ecoregion. The BBS has documented a population decline of 25 percent or greater for Black-chinned Sparrow, and it is also identified as a "Watch List Species in need of Management Action" in the Mojave Region.

Priority Research Needs

- Population status and trend, wildlife/habitat relationships model and decline factors for Bendire's Thrasher
- Population status and trend and wildlife/habitats model for Black-chinned Sparrow
- Breeding status and population size of Brewer's Sparrow in Mojave Desert habitats
- Population status and ecology of banded Gila monster
- Determination of recovery rates of popular reptiles collected for the pet trade to inform responsible harvest management
- Wildlife/habitats relationships models for all reptiles of Conservation Priority

Conservation Strategy

Goal: Healthy, self sustaining wildlife populations in healthy plant communities on stable soils; Joshua tree overstory with mature stands exhibiting structural complexity, potential for cavities, and appropriately long fire return interval that does not inhibit Joshua tree regeneration, with vigorous shrub component consisting of the full range of species within range site potential; vigorous, diverse self-sustaining understory of grasses and forbs.

Objective: Provide enhanced management and conservation for Mojave Mid-Elevation Mixed Desert Scrub ecological systems through 2015 with stands in stable or increasing condition trend.

Action: Protect Joshua tree habitat through implementation of the Clark County Multiple Species Habitat Conservation Plan (MSHCP).

Action: Develop range restoration techniques for this type following fire.

Action: Increase protection for montane shrub stands from off-highway vehicle damage through the Clark County MSHCP process forest planning for the Spring Mountains NRA, and resource management planning for BLM lands.

Action: Maintain vigorous, self-sustaining understory of grasses and forbs with particular emphasis on allowing seed-set and dispersal to sustain seed-eating wildlife.

Action: Where appropriate, maintain rock features, including tufa stacks, rock outcrops, boulder piles, lava flows, cinder scatters, rock float, and talus; monitor local centers of rock removal for industrial or landscaping uses.

Objective: Maintain healthy populations of Species of Conservation Priority at stable or increasing trend.

Action: Maintain diverse, fully complemented wildlife communities through sound, sustainable habitat management and stewardship.

Action: Monitor recreation activity impacts on wildlife. Develop conservation education program for responsible motorized recreation near sensitive wildlife habitats.

Action: Monitor local impacts of commercial reptile collection on key favored collection areas. Regulate take according to monitored and demonstrated need.

Action: Develop predictive models and inventory occupied habitat for key species, including banded Gila monster, Bendire's Thrasher, Brewer's Sparrow, and Black-chinned Sparrow, as a basis for developing quantifiable conservation objectives.

Partnerships

Land owner/manager	Percent
Bureau of Land Management	57.0
Department of Defense	24.0
U.S.Fish and Wildlife Service	12.0
U.S. Forest Service	5.0
National Park Service	2.0
Other	1.0

Existing Plans, Partnerships, and Programs

Major Programs and Partnerships

- Clark County Multiple Species Habitat Conservation Plan
- Red Rock Canyon National Conservation Area Management Plan
- BLM Las Vegas District Resource Management Plan
- Spring Mountains National Recreation Area Conservation Agreement

Federal Agencies

- Bureau of Land Management
- Department of Defense
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- U.S. Geological Survey/Biological Resources Division

State Agencies

- Nevada Department of Wildlife
- Nevada Division of Forestry

Sportsman's Groups

- Mule Deer Foundation
- Rocky Mountain Elk Foundation
- Nevada Bighorns Unlimited
- Fraternity of the Desert Bighorn
- Southern Nevada Off Road Enthusiasts

Conservation Organizations

- The Nature Conservancy
- National Audubon Society/Lahontan Audubon Society (Important Bird Areas Program)
- Red Rock Audubon Society
- Sierra Club
- Nevada Resource Education Council

Bird Conservation Initiatives

- Partners In Flight North American Land Bird Conservation Plan

- Nevada Partners In Flight

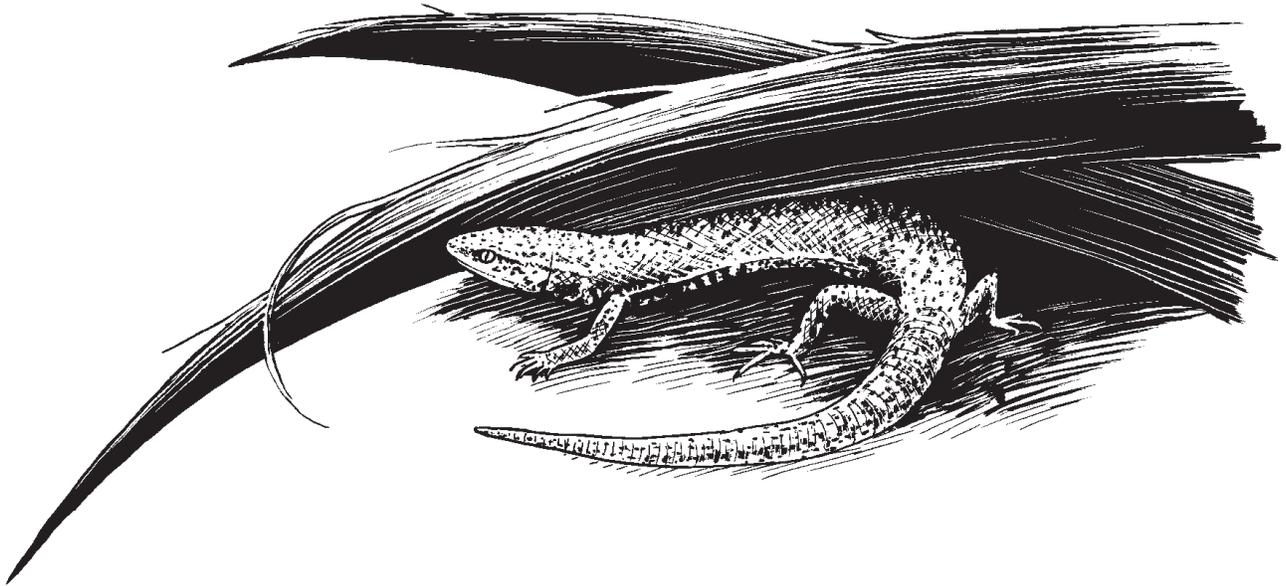
Other Key Partners

- Great Basin Bird Observatory
- University of Nevada
- Off Highway Vehicle Organizations

Preliminary Focal Areas

Red Rock Canyon
McCullough Range
Spring Mountains

Newberry Mountains
Wee-Thump Joshua Tree Wilderness



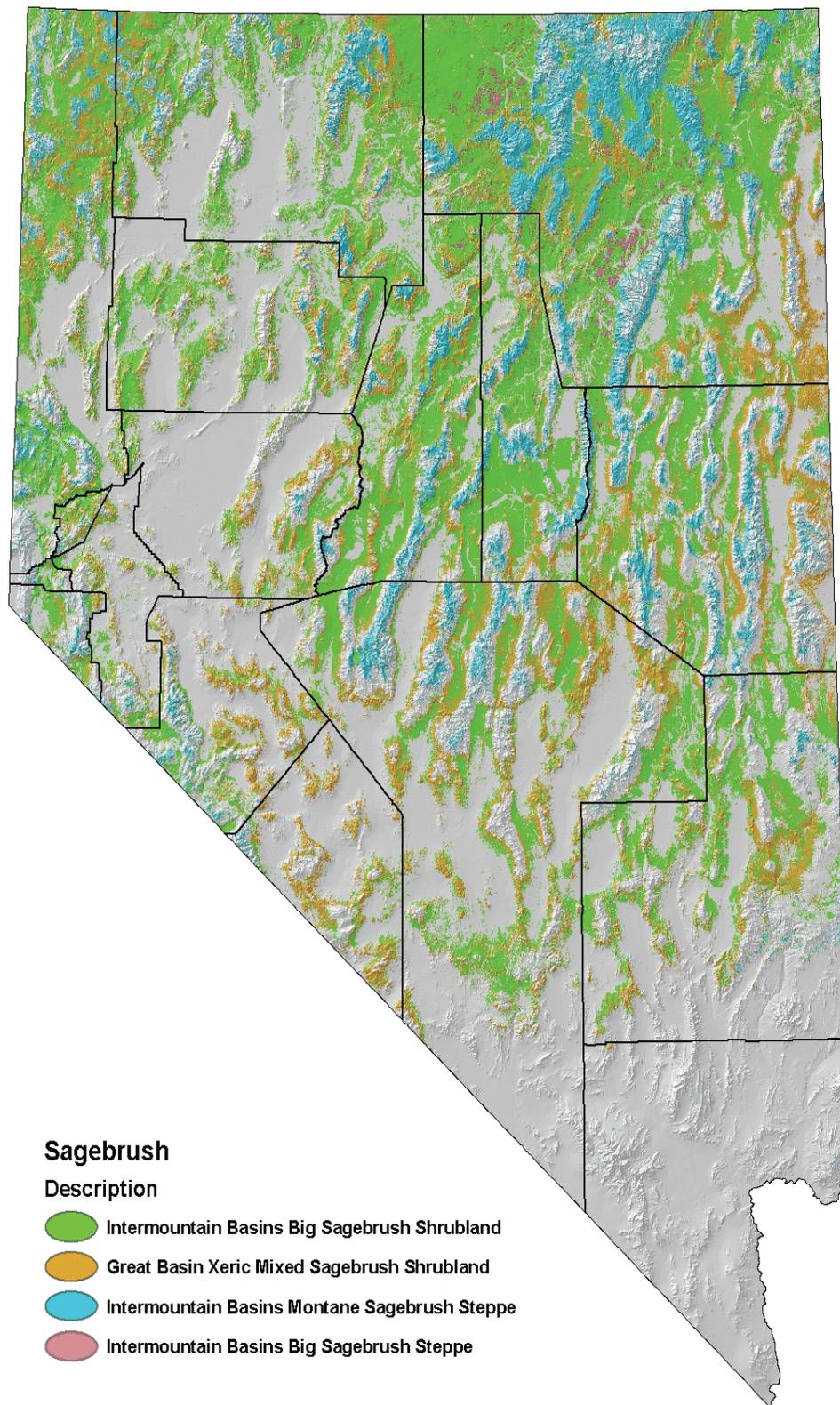


Figure 21. Distribution of the Sagebrush habitat type in Nevada (data source: NatureServe 2004).

Key Habitat: Sagebrush

Ecoregions

Great Basin	8,167,321 hectares	20,181,450 acres
Columbia Plateau	3,353,565 hectares	8,286,660 acres
Mojave Desert	158,975 hectares	392,828 acres
Sierra Nevada	8,395 hectares	20,745 acres
Total	11,688,256 hectares	28,881,683 acres

Ecological Systems

S054 Intermountain Basins Big Sagebrush Shrubland
 S055 Great Basin Xeric Mixed Sagebrush Shrubland
 S071 Intermountain Basins Montane Sagebrush Steppe
 S078 Intermountain Basins Big Sagebrush Steppe

Key Habitat Description

Sagebrush generally occurs throughout the Great Basin and is most common in valleys and mountain ranges north of the Mojave Desert, although it does occur in the Mojave Desert ecoregion, mostly at mid-elevations and higher on mountain ranges. Sagebrush types are generally found in a mosaic with other habitat types but can occur as large monotypic expanses. Sagebrush habitats generally occur between 1,370 and 3,050 m (4,500 and 10,000 ft), and are widespread throughout valley, foothill and mountain environments. Annual precipitation ranges from 20 to 76 cm (8 to 30 inches), mostly in the form of snow, and temperatures range from -35 to 45 °C (-30 to 110 °F). Overstory structure can range from 15 cm (6 inches) high or less in sagebrush sites on exposed, rocky slopes, to 2 to 3 m (7 to 10 ft) high in drainages where big sagebrush has extended its roots into the water table. Most of the time, however, sagebrush canopy ranges between 60 and 90 cm (25 to 35 inches) high. Canopy cover ranges from 5 to nearly 50 percent, but a range of 10 to 35 percent was more common during the pre-settlement condition described by LANDFIRE.

There are some 27 recognized species and distinct subspecies of sagebrush in Nevada. Dominant species include basin sagebrush, mountain sagebrush, Wyoming sagebrush, low sagebrush, and black sagebrush (Cronquist et al. 1994). Co-dominant plant species include bitterbrush, snowberry, rabbitbrush, winterfat, bluebunch wheatgrass, bluegrass, needle-and-thread, Idaho fescue, Indian ricegrass, Great Basin wildrye, Indian paintbrush, globemallow, and penstemon. Trees most often associated with the type include Utah juniper, western juniper, and single leaf piñon. The altitudinal distribution of sagebrush generally follows a pattern of basin sagebrush in the valley floors or lower alluvial fans, Wyoming sagebrush at the mid-elevations, and mountain sagebrush typically encountered above 2,000 m (6,500 ft). Low sagebrush tends to grow where claypan layers exist in the soil profile and soils are often saturated during a portion of the year. Black sagebrush tends to grow where there is a root-limiting layer in the soil profile.

Value to Wildlife

Because Nevada encompasses the heart of the sagebrush sea, it naturally assumes high stewardship responsibility for the species of wildlife that have evolved specifically to thrive in sagebrush habitats. In Nevada, eight species are predominantly dependent on sagebrush habitat for most of their life history needs including pygmy rabbit, Great Basin pocket mouse, sagebrush vole, sagebrush lizard, Greater Sage-Grouse, Sage Thrasher, Brewer's Sparrow, and Sage Sparrow (the last three also occur as breeding species in cold desert scrub, but to a much lesser degree). Mule deer are also dependent on the sagebrush type to meet some of its life history requirements.

The Greater Sage-Grouse is probably the species most highly adapted to the use of sagebrush itself. Sage grouse are equipped with a specially-designed grinding organ that fuses the crop and the gizzard to address the difficult challenges of digesting sagebrush herbaceous matter. Ninety-eight percent of the year-round diet of the adult sage grouse is comprised of sagebrush leaves, which gives the bird the ability to winter on sagebrush range.

Sage grouse nest on the ground under low-growing sagebrush bushes enhanced with thick bunchgrass understory. Sage Thrashers, Brewer's Sparrows, and Sage Sparrows depend heavily on the shrub component for nesting

substrate, and their distribution is closely tied with that of sagebrush. Black-throated Sparrows, Loggerhead Shrikes, and Gray Flycatchers also nest in the mature shrub component. Gray Flycatchers seek out the tallest sagebrush plants for nesting, and are a characteristic species of the big sagebrush growing in riparian zones. Pygmy rabbits also prefer the taller big sagebrush that grows on deeper soils, but their occurrence is governed more by the presence of the deep soils (for burrowing) than by the tallness or character of the shrubs.

Sagebrush range in good condition also supports a lush undergrowth of bunchgrasses and forbs. The presence of this highly productive understory is critical to the needs of other wildlife species, including the sagebrush vole. The various shrew species that live in sagebrush are invertivores, but they depend on the productivity of the herbaceous component for the abundant production of their prey items, as well as for cover.

A landscape characteristic unique to the mountain sagebrush community is the presence of snowbank swales -- small mesic communities where snow accumulates under ridges or in depressions and persists well past normal snowmelt. These snow-watered communities are characterized by the presence of snowberry, squaw currant, and lush grass/forb understories much greater in density than on the surrounding uplands. Snowbank swales are important to the sagebrush wildlife community because they provide a temporal transition between the desiccation of understory on the uplands and the shift in dependence to meadows for herbaceous food. Green-tailed Towhees thrive in these microsites and Inyo shrews are expected at greater densities (NatureServe 2005). Brooding sage grouse seek the fresh forbs in these mesic microsites after the upland forb component has desiccated, and mule deer use these swales for feeding and bedding throughout their time on summer range.

Several species nest on habitats adjacent to sagebrush habitat, but spend most of their hunting time over sagebrush range where they primarily prey on ground squirrels and jack rabbits (e.g., Prairie Falcons on cliffs and rimrock, and Ferruginous Hawks on the piñon-juniper edge or sometimes on rimrock). In eastern Nevada, Bald Eagles winter on sagebrush valley bottoms in widely scattered singles or pairs, preying chiefly on jack rabbits -- somewhat of a deviation from their normal expected wintering strategies (fish and waterfowl). The reptile Species of Conservation Priority found in sagebrush are considered to be habitat generalists, but it is important to note that the recent taxonomic split of the pygmy short-horned lizard (*Phrynosoma douglasii*) from the greater short-horned lizard (*P. hernandesii*), could have significant implications regarding the importance of sagebrush to the maintenance of the pygmy short-horned lizard. To date, the occurrence and distribution of pygmy short-horned lizard has not been studied in Nevada, although it is expected along the Oregon and Idaho borders.

Key Elements of Sagebrush Habitat of Importance to Wildlife*

Mature Shrub – nesting structure, protection from predators, thermal cover
Greater Sage-Grouse
Loggerhead Shrike
Sage Sparrow
Brewer's Sparrow
Sage Thrasher
Black-throated Sparrow

Early/Midseral Shrub – foraging, protection from predators, thermal cover
mule deer

Tall Big Sage/deep Soils – burrowing, protection from predators, foraging
pygmy rabbit
Gray Flycatcher

*Species *not* in bold are stewardship species.

Woodland/Rock Ecotone – nesting, foraging
Ferruginous Hawk
Mountain Bluebird

Grasses/Forbs – nesting cover, foraging
Greater Sage-Grouse
Columbian Sharp-tailed Grouse
 Vesper Sparrow
sagebrush vole
Merriam’s shrew
Preble’s shrew
Panamint kangaroo rat

Sandy Soils – burrowing, protection from predators
Burrowing Owl
dark kangaroo mouse
pale kangaroo mouse

Mesic Sites – foraging
Inyo shrew
Green-tailed Towhee

Prey Populations – feeding on species in this habitat
Ferruginous Hawk **kit fox**
Bald Eagle **desert horned lizard**
Prairie Falcon **greater short-horned lizard**

Generalists – using a variety of elements in multiple habitats
Wyoming ground squirrel

Mojave – ecoregional difference
Gilbert’s skink

Existing Environment

Land Uses

- | | |
|----------------------------|--|
| Livestock grazing | Urban/suburban development |
| Motorized recreation | Industrial development |
| Non-motorized recreation | Road development |
| Recreation development | Military mission |
| Mineral/oil/gas extraction | Waste and hazardous materials disposal |
| Wind energy development | Species harvest |
| Utility rights-of-way | Fire management |

Habitat Conditions

Much of the basin sagebrush and Wyoming sagebrush range in Nevada currently lacks understory of native bunchgrasses and forbs that were historically present. Shrub cover has increased from what are generally regarded as pre-settlement conditions, and non-native annual grasses, most notably cheatgrass, have invaded big sagebrush and black sagebrush range, bringing with them an accelerated fire interval that precludes sagebrush regeneration. Low sagebrush is being similarly invaded by medusa head, an aggressive exotic grass that can tolerate the shallow

clay soils of these range sites, and a similar negative impact through altered fire regime is threatening the low sagebrush landscape. Overall, a temporal conversion from shrubland with high species diversity to annual grassland with lower diversity drastically reduced wildlife value is occurring.

Almost completely cut over during the historic mining era of the late nineteenth century, piñon-juniper woodlands thrived with fire suppression after the 1920s and have not only re-populated all of its pre-settlement range but have aggressively invaded historic sagebrush range, drastically altering range site potential and creating conditions difficult to restore to pre-invasion expression. Piñon-juniper expansion is also generally facilitated by regional warming (Grayson 1993). Currently, there is considerable discussion in Nevada concerning the need to manipulate the balance between woodland expansion and healthy sagebrush community maintenance in light of the recent efforts to list the Greater Sage-Grouse under the Endangered Species Act. Although that effort has not been successful, attention is drawn to the need to maintain the habitats required by sage grouse throughout their life cycle.

This combination of major habitat type conversions is rapidly depleting and fragmenting the expansive sagebrush ocean. New road development, existing road improvement, and urban/suburban and industrial development are also greatly altering the natural wild landscape, creating barriers to mule deer migratory corridors, increasing wildlife use of urban landscapes, and increasing the opportunity for disturbance. Increased human population in several areas of the State has exerted increased pressure on the landscape, and thus sagebrush community integrity will continue to be challenged over time.

Problems Facing the Species and Habitats

Loss of habitat to the various conversion processes currently exerting pressure on sagebrush habitat and post-settlement homogenation of the structure and composition of vegetation results in reduced living space for the wildlife that depend on it. Where sagebrush habitat has been depleted of its understory, it lacks the ability to provide nesting cover, escape cover, and sources of food to herbivorous and granivorous animals. Lack of nesting and escape cover coupled with increasing human infrastructure (roads, utility rights-of-way), not only create travel lanes for mammalian predators and perch sites for avian predators, but also serves to fragment the landscape into smaller and smaller patches, increasing the success of predators at the expense of other species such as ground-nesting birds. Predation pressure may be reaching significant levels on a suite of sagebrush residents, including Greater Sage-Grouse. The efficacy of predator control as it is currently implemented has yet to be evaluated – either with regard to cost-benefit or actual species response benefit. Increased human activity on the land is leaving in its path a footprint of habitat degradation in the form of a broken-down shrub layer, loss of species diversity, and increased soil erosion that reduces site restoration capability.

The U.S. Breeding Bird Survey documented a population decline of 50 percent or greater for Brewer's Sparrow between 1966 and 1999. The PIF North American Landbird Conservation Plan has identified Brewer's Sparrow as a Watch List Species in need of Management Action in the Intermountain Bird Conservation Region due to the significant population decline.

Priority Research Needs

- Species/habitat relationship models for Species of Conservation Priority in sagebrush, with special attention to species response to different resource management strategies and treatments, including wilderness or National Conservation Area designation, grazing systems, fire management, level of recreational use, and wild horse and burro impacts
- Population demography for Species of Conservation Priority; including Greater Sage-Grouse, Ferruginous Hawk, and pygmy rabbit
- Movements and landscape use – Greater Sage-Grouse, Ferruginous Hawk, Prairie Falcon, Columbia Sharp-tailed Grouse
- Distribution and population densities for mice, voles, and shrews of Conservation Priority
- Influence of habitat fragmentation on predation of Greater Sage-Grouse
- Predator control efficacy with regard to prey species responses

- Evaluation of fire regime condition class values generated by LANDFIRE as valid surrogates for Greater Sage-Grouse habitat suitability.

Conservation Strategy

Goal: Thriving self sustaining wildlife populations in healthy sagebrush communities on stable soils; vigorous, structurally diverse shrub component in various age classes; vigorous, diverse self sustaining understory of native grasses and forbs.

Objective: Stabilize the loss of sagebrush to wildfire/exotic species invasion by 2015.

Action: In collaboration with the BLM and USFS, update fire response plans for all districts using the latest information gathered from collaborative wildlife conservation planning efforts such as the Governor’s Sage Grouse Conservation Team and LANDFIRE descriptions of historic ranges of variability and fire regimes. Prioritize areas for rapid fire response; set fire response objectives for all lands by district.

Action: In collaboration with BLM and USFS, update range rehabilitation contingency plans to reflect collaborative wildlife conservation planning priorities.

Action: Develop a multi-agency native plant seed bank program with 1,5, and 10-year inventory objectives.

Action: Seek ways to modify federal fire rehabilitation policy so that funding can be banked and spent toward achieving regional objectives over a multi-year implementation period.

Action: Update memoranda of understanding among cooperative resource agencies to delineate roles and responsibilities as well as take into account new opportunities for contribution and participation for partner agencies.

Action: Develop a conservation education program to encourage public recognition of the value of the sagebrush ecosystem.

Action: Incorporate specific, quantified wildlife objectives into fire rehabilitation projects to qualify them for NRCS private lands assistance programs.

Action: Integrate the application of fuel breaks into fire rehabilitation projects to reduce re-burn frequency and protect unburned areas.

Objective: Reduce the loss of sagebrush to piñon-juniper encroachment by 2015.

Action: Through coordinated resource planning processes (comprehensive stakeholder involvement operating by consensus), design a science-based piñon-juniper management strategy that responsibly reclaims sagebrush lands from piñon-juniper invasion where accepted site potential interpretations do not support piñon-juniper occurrence, yet maintains sufficient high-quality piñon-juniper wildlife habitat at the mountain range scale.

Action: Develop a statewide distribution map of piñon-juniper habitat delineating stand age, canopy cover, snag density, and soil site potential throughout its range in Nevada.

Action: Using soil site potential, identify sites where piñon-juniper has clearly invaded sagebrush range; determine current site potential for restoration; prioritize restoration projects based on computed potential wildlife benefit.

Action: Develop and implement a stand treatment prioritization process that weighs the degree of invasiveness of a stand against its relative wildlife habitat value. Stands prioritized for treatment would rate highest in imminent threat from invasiveness and lowest in relative wildlife habitat value.

Action: Determine project sideboards (e.g., protection of adjacent mountain-mahogany stands; protection of identified high-quality piñon-juniper wildlife habitats); apply piñon-juniper treatment using

methods posing the least potential threat and greater potential benefit to adjacent habitats at-risk (e.g. those described above).

Action: Apply necessary sagebrush plant community restoration techniques; protect from site and plant community disturbance for the time necessary to assure recovery; monitor results and wildlife response

Objective: Restore healthy range condition to degraded sagebrush habitat through 2015.

Action: Using scientifically-informed collaborative processes, assess plant community structure and diversity to better define habitat quality for the full range of wildlife species using sagebrush.

Action: Using state-of-the-art scientific knowledge such as current range states/transition theory, and working through collaborative stakeholder processes, develop a proactive strategy for the judicious application of sagebrush management treatments to rejuvenate habitat and minimize risk of plant community breakdown and exotic plant invasion.

Action: Improve understory condition and diversity of native forb communities through progressive grazing management. Design grazing management strategies that initiate range recovery while providing the compensations necessary to maintain livestock operation objectives.

Action: Establish a project development assistance program that facilitates the coordination and concentration of locally-raised sportsman’s conservation donations into matching packages to secure federal and state conservation project funds for significant range restoration.

Objective: Maintain healthy populations of Species of Conservation Priority at stable or increasing trend.

Action: Adopt the objectives of the Greater Sage-Grouse Conservation Plan for Nevada and Eastern California and integrate plan activities into implementation of the WAP.

Action: Adopt sagebrush bird species population objectives set by the PIF North American Land Bird Conservation Plan and integrate those objectives, stepped down to Nevada scale, into WAP implementation.

Action: Inventory rodents and shrews to delineate distribution and determine relative abundance in sagebrush.

Action: Improve knowledge of species-habitat relationships for wildlife species that live in sagebrush to produce more accurate predictive models and realistic, scientifically- informed conservation objectives, with pygmy rabbit recognized as a top priority.

Action: Improve knowledge of sage grouse predation in relation to fragmented habitat.

Action: Continue to provide best management practices for Species of Conservation Priority to BLM land use planning process through Nevada Partners in Flight.

Partnerships

Land owner/manager	Percent
Bureau of Land Management	77
Private	14
U.S. Forest Service	5
U.S. Fish and Wildlife Service	1
Tribal	1
All Others	2

Existing Partnerships, Plans, and Programs

Key Partnerships and Programs

- Governor’s Sage-Grouse Conservation Team local area planning groups
- Eastern Nevada Landscape Coalition/Great Basin Restoration Initiative
- LANDFIRE

Federal Agencies

- Bureau of Land Management
- U.S. Forest Service
- U. S. Fish and Wildlife Service
- National Park Service
- Natural Resources Conservation Service/Nevada Conservation Districts

State Agencies

- Nevada Department of Wildlife
- Nevada Department of Agriculture
- Nevada Division of Forestry

Conservation Organizations

- The Nature Conservancy
- National Audubon Society/Lahontan Audubon Society
- Sierra Club

Sportsman’s Organizations

- Mule Deer Foundation
- Rocky Mountain Elk Foundation
- Nevada Bighorns Unlimited
- Fraternity of the Desert Bighorn
- Wild Turkey Federation – Elko

Bird Initiatives

- Partners In Flight North American Land Bird Conservation Plan
- Nevada Partners In Flight

Other Key Partnerships

- Counties
- Native American tribes
- Mining Industry/Nevada Mining Association
- University of Nevada, Reno Cooperative Extension
- Great Basin Bird Observatory
- Intermountain West Joint Venture
- Nevada Resource Education Council

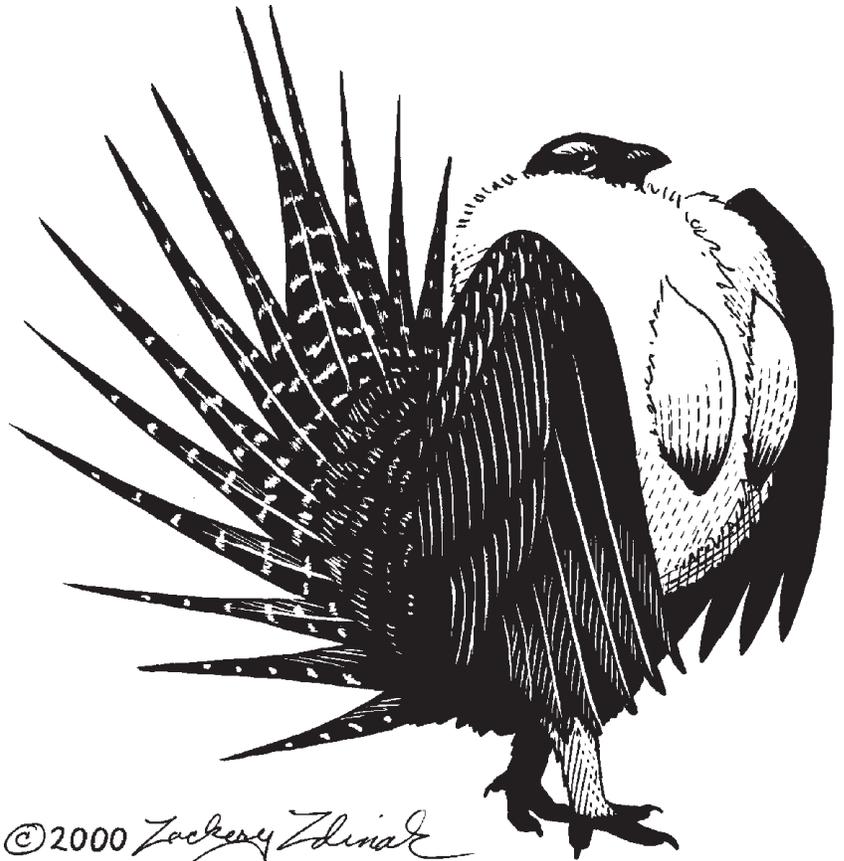
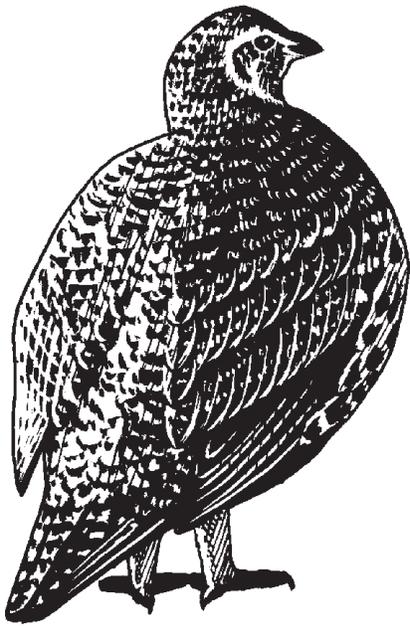
Preliminary Focal Areas

The following list of preliminary Focal Areas are gleaned from the Priority Management Unit lists of the various Local Area Sage Grouse Plans. It is assumed that habitat preservation/restoration work in these areas will benefit most if not all of the sagebrush Species of Conservation Priority.

Buffalo/Skedaddle	Cortez
Massacre	Shoshone
Sheldon NWR	Toiyabe/Monitor/Toquima Ranges

Montana Mountains
Santa Rosa Range
Owyhee Desert
O'Neil Basin
Salmon Falls Creek
Thousand Springs Valley
Tuscarora
Wassuk Range

Clan Alpine Range
Desatoya Mountains
Pine Nut Range
Lincoln County
Schell Creek Range
Bodie Hills
White Mountains



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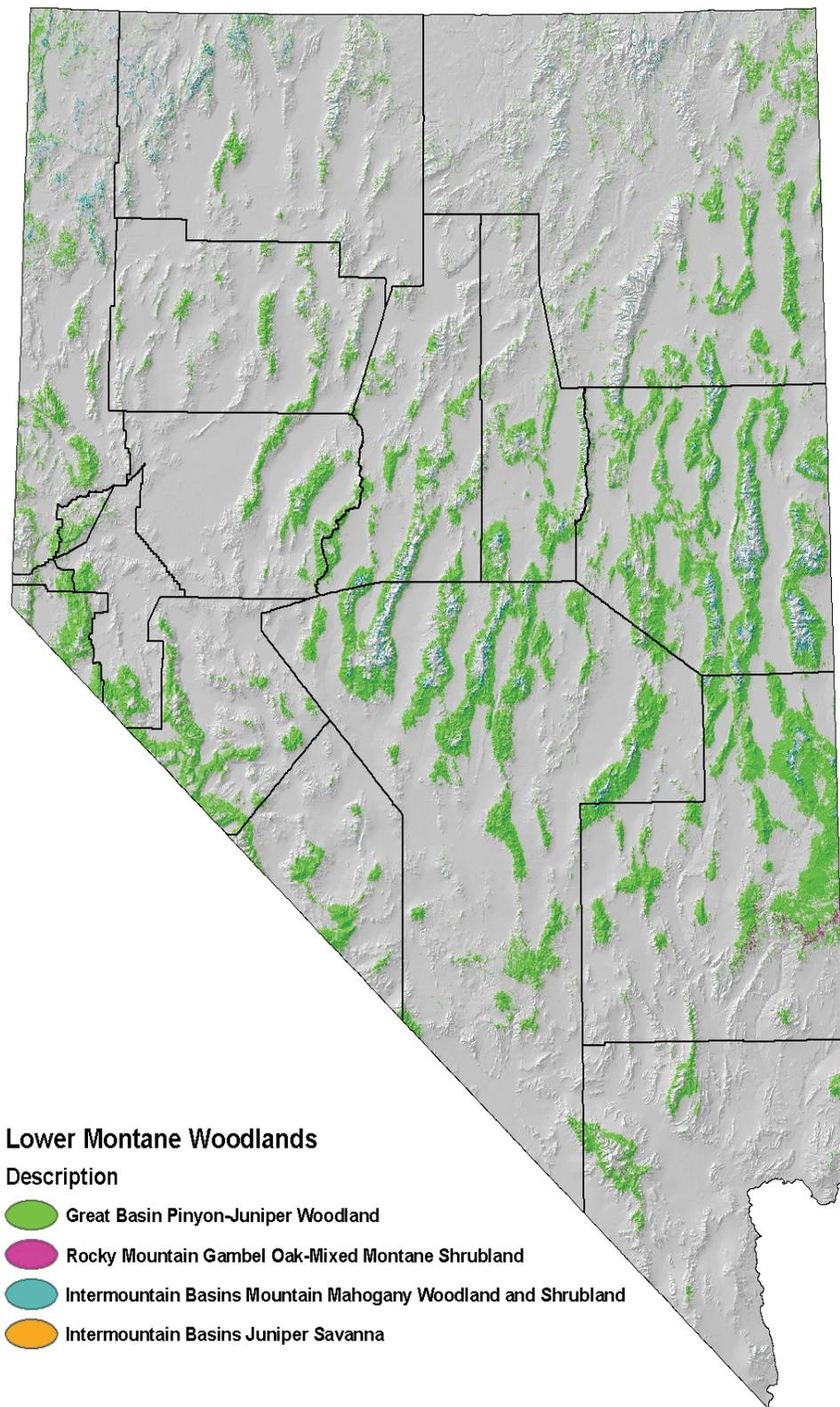


Figure 23. Distribution of the Lower Montane Woodlands habitat type in Nevada (data source: NatureServe 2004).

Key Habitat: Lower Montane Woodlands

Ecoregions

Great Basin	3,413,775 hectares	8,435,437 acres
Columbia Plateau	248,788 hectares	614,755 acres
Mojave Desert	161,573 hectares	399,246 acres
Sierra Nevada	16,031 hectares	39,612 acres
Total	3,840,167 hectares	9,489,050 acres

Ecological Systems

S075 Intermountain Basins Juniper Savanna
 S046 Rocky Mountain Gambel Oak-Mixed Montane Shrubland
 S050 Intermountain Basins Mountain Mahogany Woodland and Shrubland
 S040 Great Basin Piñon-Juniper Woodland

Key Habitat Description

Piñon-juniper woodlands include pure to nearly pure stands of singleleaf piñon, or any of four species of junipers – Utah, Western, Rocky Mountain, or California. This woodland is sometimes referred to as a pygmy forest for its short stature; even at maturity individual trees rarely exceed six m (20 ft) in height. Physical features of piñon-juniper woodlands are highly variable, even within a single mountain range.

Many factors interact in a complex manner to determine the elevation limits of piñon-juniper, which varies throughout Nevada, including total annual precipitation, seasonal precipitation pattern, and thermal minima and maxima during the growing season and winter. They are generally found between 1,525 and 2,440 m (5,000 and 8,000 ft) elevation, but will reach as far down as 1,220 m (4,000 ft) at the edge of the Mojave Desert, and as high as 3,050 m (10,000 ft) on the White Mountains (Trimble 1989). Juniper typically occurs in pure stands at the lower elevations (Tausch and West 1988), mainly because it is adapted to survive on drier sites (Trimble 1989).

The communities associated with this habitat are highly variable and complex. Variability is controlled by climatic changes, modification of landform by climatic events (Tausch 1998) and variation in current environmental conditions (West et. al. 1998). Areas dominated by singleleaf piñon are usually mixed variably with Utah juniper and mountain-mahogany. Ponderosa pine, white fir, and Jeffrey pine may be present along its upper margins. Shrubs associated with this type include sagebrush, gambel oak, alderleaf mountain-mahogany, littleleaf mountain-mahogany, cliffrose, manzanita, and bitterbrush.

Though capable of reaching a height of 15 m (50 ft) under ideal conditions, Gambel oaks are more typically found as tall shrubs or dwarf trees in dense thickets (Lanner 1984). In Nevada the type is found only in the eastern counties. Other species of true shrubs (as opposed to dwarf trees) are an important component of this system, perhaps the most important of which is serviceberry. Serviceberry also forms thickets and sometimes reaches six m (20 ft) in height.

Mountain-mahogany generally occurs in scattered pockets on mountain slopes between 1525 and 3050 m (5,000 and 10,000 ft) throughout the Great Basin and is most common in central, eastern and northern Nevada. It occurs on sites characterized by steep, rocky, dry slopes generally above the 30 cm (12 inch) precipitation zone. Mountain-mahogany has the potential to grow into nearly impenetrable thickets with a closed midstory. This habitat is generally dominated by curlleaf mountain-mahogany, a drought resistant evergreen tree that can attain a height of about 10 m (35 ft) (Lanner 1984). Some old growth stands have been documented at over 700 years old, with individual trees as old as 1,350 years.

Other plant species typically found in mountain-mahogany stands include big sagebrush, bitterbrush, ceanothus, Indian paintbrush, and arrowleaf balsamroot. Associated tree species include subalpine fir, white fir, limber pine, and common juniper.

Value to Wildlife

Juniper savannah and piñon-juniper woodlands provide a variety of sheltering functions for wildlife that range from hiding cover to cavities and nest sites for birds, bats, and small mammals. As an evergreen cover, the forests provide important thermal protection for wildlife during winter, and provide shelter from summer’s intense sun. The Ferruginous Hawk exploits piñon-juniper by relying on older trees of sufficient size and structure to support their large nest platforms, but these trees must be located at the lower edge of the forest where they also provide a long view of surrounding, open sagebrush expanses where their prey occur. For birds and bats in particular, the piñon-juniper woodland provides structure for nesting and roosting, and locations for foraging that would otherwise be missing from the mid-elevation cold desert were it dominated by shrubs.

One of the critical products of the piñon-juniper woodland is the piñon nut crop, which is exploited both by humans (including a Native American tradition that dates back for millennia) and wildlife. Species such as the Pinyon Jay are strongly tied to this resource. Though not so closely tied to a single species, the juniper berry crop is also an important food resource for birds and small mammals.

Gambel oak leaves provide browse for mule deer, and their mast crop (acorns) are sought by small mammals and many species of birds, including the wild turkeys which have been introduced as a game species. Serviceberry likewise provides browse for deer, their fruit is important for small mammals, black bears, birds, and beaver and marmot eat their bark (Stubbenieck et al. 1992). With its tangle of vegetation, this type also provides important cover for birds, mammals, and reptiles.

Mountain-mahogany provides similar values—cover, nest sites, and foraging opportunities—but in a subtly different fashion. The overstory created by mountain-mahogany tends to be sparser than the thick canopy that can form in piñon-juniper, and as such more diffuse light tends to reach the ground. In young-to-middle aged stands of mountain-mahogany the understory often supports a variety of forbs, grasses, and shrubs, all of which offer foraging opportunities for birds, small mammals, and reptiles. Serviceberry is another important component of this ecological system. The serviceberry fruit is an excellent source of nutrition for wildlife, and the young growth is excellent browse for deer (Stubbenieck et al. 1992).

Key Elements of Lower Montane Woodlands Habitat of Importance to Wildlife*

Woodland Non-specific

Overstory – nesting structure, protection from predators, thermal protection

Cassin’s Finch	Gray Flycatcher
Western Scrub-Jay	Clark’s Nutcracker
Steller’s Jay	Black-throated Gray Warbler
Juniper Titmouse	

Rocks/Mines – nesting, roosting, protection from predators

Gray-crowned Rosy-finch	Sonoran Mountain kingsnake
Black rosy-finch	Sonoran lyre snake

Mature Stand/Snags/Cavity – nesting structure, protection from predators, dying trees

provide insect prey base	
long-eared myotis	fringed myotis
Allen’s big-eared bat	Mountain Bluebird
western small-footed myotis	

*Species *not* in bold are stewardship species.

Aerial Feeders/Migrants – species foraging in this habitat (e.g., aerial insectivores, bird species during migration)

Townsend’s big-eared bat	big-free-tailed bat
spotted bat	Cooper’s Hawk

Grassy Understory – foraging
Green-tailed Towhee

Generalists – using a variety of elements in multiple habitats
greater short-horned lizard
pygmy short-horned lizard

Overstory – nesting structure, protection from predators, thermal protection
Scott’s Oriole
Gray Vireo

Ferruginous Hawk
Ash-throated Flycatcher

Piñon-juniper in the Mojave Desert – ecoregional differences; shrub understory
Black-chinned Sparrow

Cone-bearing Stands – foraging
Pinyon Jay
Western Scrub-Jay
Steller’s Jay

Clark’s Nutcracker
pinyon mouse

Burned/Disturbed – insect prey base for foraging, cavities for nesting
Western Bluebird

Mountain-mahogany

Riparian Ecotone – foraging, nesting

Virginia’s Warbler	Orange-crowned Warbler
MacGillivray’s Warbler	Red-naped Sapsucker
Dusky Flycatcher	Broad-tailed Hummingbird

Grassy Understory – foraging
Green-tailed Towhee

Existing Environment

Land Uses

Livestock grazing	Wood products extraction
Motorized recreation	Urban/suburban development

Non-motorized recreation	Military mission
Recreation development	Species harvest
Wind energy development	

Habitat Conditions

Piñon-juniper has thrived in the last 100 years after having been significantly cut over to fuel the mining boom of the late 19th century—a fate shared by mountain-mahogany as well. Piñon-juniper has re-taken all of its historic range and now significantly invades other plant communities, most notably the sagebrush steppe and montane sagebrush zones that typically occur below and above the piñon-juniper zone. In some areas, piñon-juniper has successfully invaded throughout the sagebrush steppe zone and is now making incursions into the basin sagebrush community on the valley floors. In northeastern Nevada, monotypic stands of Utah juniper and Western juniper are invading and increasingly dominating basin sagebrush communities on the valley floors.

Gambel oak communities are somewhat less susceptible to disturbance in Nevada because they tend to grow on steeper slopes, and in combination with their thicket-form they do not invite exploration. Habitat quality in Gambel oak-brush communities has however probably declined somewhat as a result of fire suppression, fire being an agent of change that encourages regeneration in serviceberry and sprouting in Gambel oaks.

Mountain-mahogany stands in Nevada are stable in distribution, exist in advanced stages of maturity with either closed or open canopies depending on non-replacement fire history, and often their live crowns are out of reach of browsing ungulates. These old stands are at significant risk to loss by fire, especially facilitated by cheatgrass, because they are sensitive to fire and, once burned, may be hard to recover. Mountain-mahogany, although a very prolific seeder, requires mineral soil for seed establishment because it does not tolerate plant competition, does not sprout after burning, and regeneration of burned stands from seed can appear to be poor if native or domestic browsers remove the highly palatable seedlings. In sharp contrast, fire suppression working in concert with overutilization by ungulates has likely contributed to the progression of serviceberry stands (mixed montane shrub) to the same mature, non-regenerating seral stages in many areas of its occurrence in Nevada.

Problems Facing the Species and Habitats

Problems associated with the ecological systems comprising this key habitat include stand densification and spread of catastrophic fire from adjacent ecological systems with more frequent fire to the piñon-juniper type, and invasion of cheatgrass and associated short fire intervals resulting in loss of old mountain-mahogany stands and heavy browsing of palatable mountain-mahogany seedlings. In piñon-juniper woodlands, stand densification, which resulted from the historic loss of grass cover and competition that prevented tree seedling establishment, the absence of historic small non-replacement fires over long intervals, and the spread of crowning fires to woodlands from adjacent shrub types are leading toward a significant change in vegetation structure. In some places where recreational activities are superimposed over wildlife habitat, disturbance to wildlife in the form of displacement, behavioral modification, or compromised reproductive success could occur.

Priority Research Needs

- Definition of “high quality” piñon-juniper woodland with respect to its performance as wildlife habitat
- Wildlife/habitats relationships for serviceberry/mixed montane shrub
- Knowledge of mountain-mahogany ecology and regeneration
- Predictive model for Pinyon Jay nest colony site selection/nut-caching strategy
- Occurrence, distribution, genetic composition, and population viability for Sonoran mountain kingsnake
- Value of piñon-juniper woodlands to bat roosting, including identification of key species, different roosting strategies, and landscape management implications

Conservation Strategy

Goal: Thriving self sustaining wildlife populations in healthy plant communities on stable soils devoid of destructive erosion, in appropriate potential natural vegetation; maintenance of mixed montane shrubland and grass-forb understory components through natural fire return intervals or mimicked by

non-natural disturbance; maintenance of a full range of multi-age stands for piñon-juniper and juniper savannah, including mature stands with snags; naturally regenerating mountain-mahogany stands protected from fire.

Objective: Increase the vigor/diversity/productivity of piñon-juniper stands on piñon-juniper sites as described by soil site interpretation to maintain piñon-juniper wildlife populations in a stable or increasing trend.

Objective: Reduce the area of piñon-juniper-invaded landscapes as described by soil site interpretation and LANDFIRE biophysical settings descriptions.

Action: Design a science-based piñon-juniper management strategy that maintains sufficient high-quality wildlife habitat while responsibly reclaiming lands from piñon-juniper invasion where accepted site potential interpretations do not support piñon-juniper occurrence.

Action: Initiate a comprehensive species/habitat relationships analysis to define high-quality piñon-juniper wildlife habitat.

Action: Develop a statewide condition map of piñon-juniper habitat delineating stand age, canopy cover, snag density, and soil site potential throughout its range in Nevada.

Action: Using population objectives set by continental and regional planning processes (Partners In Flight, Nevada Bat Plan), set proportionate population objectives for Nevada based on available habitat and potential habitat carrying capacity. Use these data to inform piñon-juniper management strategy.

Action: Develop predictive models and inventory potential breeding habitat for Pinyon Jay to inform an integrated conservation strategy that maintains breeding flocks in appropriate sites throughout their range.

Action: Inventory piñon-juniper habitat for bat roosting activity; develop optimal habitat models and integrate results into the statewide condition map.

Action: Develop and implement a stand treatment prioritization process that weighs the degree of invasiveness of a stand against its relative wildlife habitat value. Stands prioritized for treatment would rate highest in invasiveness and lowest in relative wildlife habitat value.

Objective: Increase the extent and vigor of the native shrub, grass, and forb understory in piñon-juniper stands.

Action: Research the response of landscapes to treatment for piñon-juniper invasion, determining the response of native species as well as invasive annual grasses and forbs to the removal of the piñon-juniper overstory.

Action: Reseed treated or burned piñon-juniper stands where encroachment and closed canopy has eliminated the native understory, and where native plants require management manipulation to compete against invasive annual grasses and forbs.

Action: Manage grazing regimes (timing, intensity) in piñon-juniper and mountain-mahogany to permit natural reseeding of native grasses and forbs.

Action: Integrate WAP objectives and strategies into BLM and USFS land use planning processes.

Objective: Increase the health of piñon-juniper stands by managing for self-replacing, multi-aged stands in a heterogeneous mosaic across the landscape.

Action: Identify key piñon-juniper habitat characteristics for healthy wildlife populations.

Action: Develop a model using a statewide piñon-juniper habitat condition map so that treatments can be applied to landscapes to manage for habitat complexity.

Action: Manage treatments to retain snags and mature trees with cavities and complex structure to support nest and roost sites.

Objective: Retain vigorous, productive stands of mountain-mahogany on appropriate sites.

Action: Identify healthy mountain-mahogany stands that bear significant seed crops under required climatic conditions.

Action: Prioritize healthy mountain-mahogany stands for protection during wildfire events.

Action: Manage landscapes adjacent to healthy mountain-mahogany stands to minimize the threat of wildfire spreading to reproductive stands.

Action: Minimize removal of mountain-mahogany seedlings by ungulates during stand re-establishment.

Objective: Increase hectares of serviceberry/mixed montane shrub through active piñon-juniper woodland management by 2015.

Action: Map serviceberry/mixed montane shrub (hereafter referred to as “serviceberry”) stands throughout the state at a scale finer than SWReGAP.

Action: Determine condition and trend of serviceberry stands; prioritize stands for active regeneration management; identify soil sites within piñon-juniper woodlands that might convert to serviceberry with piñon-juniper removal; augment natural serviceberry regeneration with planted stocks and/or reseeding.

Action: Protect regenerating serviceberry sites from livestock grazing for an appropriate period of time to ensure stand viability.

Partnerships

Land owner/manager	Percent
Bureau of Land Management	79.2
U.S. Forest Service	13.5
Private	6.2
Other	1.1

Existing Partnerships, Plans, and Programs

Major Programs and Partnerships

- Governor’s Sage Grouse Conservation Plan for Nevada and Portions of Eastern California, and Local Area Planning Groups
- Eastern Nevada Landscape Coalition/Great Basin Restoration Initiative
- LANDFIRE

Federal Agencies

- Bureau of Land Management
- U.S. Forest Service
- National Park Service (Great Basin National Park)

State Agencies

- Nevada Department of Wildlife
- Nevada Division of Forestry
- Nevada Department of Agriculture
- Nevada Natural Heritage Program

Conservation Organizations

- The Nature Conservancy
- National Audubon Society/Lahontan Audubon Society
- Sierra Club

- Nevada Resource Education Council

Bird Initiatives

- Partners In Flight North American Land Bird Conservation Plan
- Nevada Partners In Flight

Other Key Partners

- Counties
- Intermountain West Joint Venture
- Great Basin Bird Observatory
- University of Nevada (UNR Biological Resources Research Center; Natural Resources and Environmental Sciences; Cooperative Extension)

Preliminary Focal Areas

Pine Nut Range
Toiyabe/Monitor/Toquima Ranges
Great Basin National Park
Bodie Hills
Schell Creek Range

Egan Range
Ward Mountain
Wilson Creek Range
Clover Range



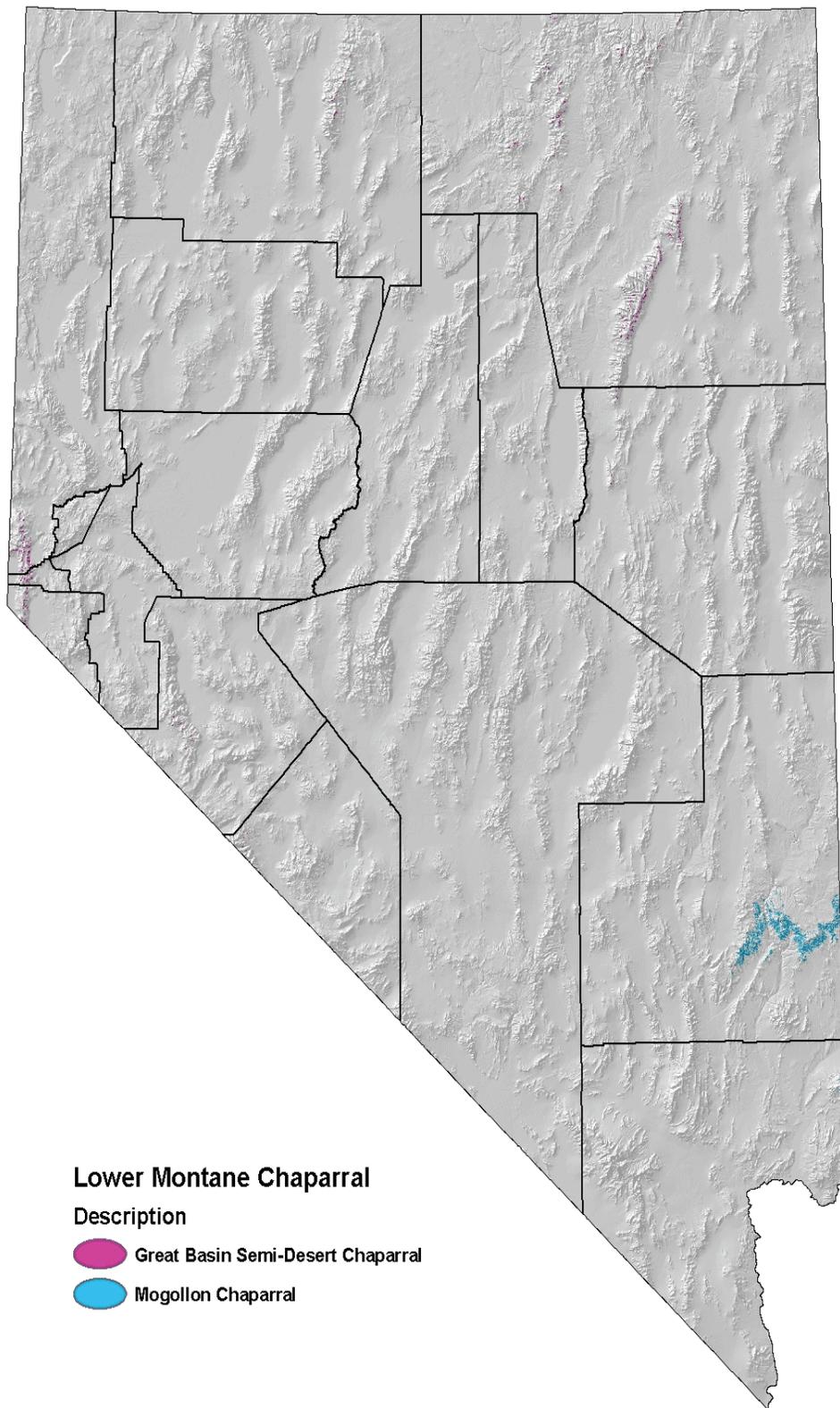


Figure 25. Distribution of the Lower Montane Chaparral habitat type in Nevada (data source: NatureServe 2004).

Key Habitat: Lower Montane Chaparral

Ecoregions

Great Basin	43,238 hectares	106,842 acres
Mojave Desert	7,281 hectares	17,992 acres
Sierra Nevada	4,244 hectares	10,488 acres
Columbia Plateau	4,109 hectares	10,153 acres
Total	58,872 hectares	145,475 acres

Ecological Systems

S053 Great Basin Semi-Desert Chaparral

S057 Mogollon Chaparral

Key Habitat Description

Chaparral habitat is generally characterized by hot dry summers and cool moist winters and dominated by a dense growth of mostly small-leaved evergreen shrubs. In Nevada, Great Basin semi-desert chaparral is found on side slopes transitioning from low-elevation desert landscapes into piñon-juniper woodlands. These are typically fairly open-canopy shrublands with spaces between shrubs – either bare, or supporting patchy grasses and forbs. Characteristic species may include manzanita, ceanothus, mountain-mahogany, (though usually absent), California buckwheat, ashy siltassel, shrub live oak, cliffrose, and oak leaf sumac. Typical fire regime in these systems varies with the amount of organic accumulation. (NatureServe 2004).

Mogollon chaparral occurs more extensively across central Arizona and western New Mexico, but also extends into southern Nevada. It often dominates along the mid-elevation transition (1,000-2,200 m) between Mojave Desert scrub and montane types. It occurs on foothills, mountain slopes and canyons in drier habitats below the ponderosa pine woodlands. Stands are often associated with dry, coarse-textured substrates such as limestone, basalt or alluvium. The moderate-to-dense shrub canopy includes species such as oak, mountain-mahogany, ceanothus, siltassel, cliffrose, sumac, and manzanita at higher elevations. Most chaparral species are fire-adapted, resprouting vigorously after burning or producing fire-resistant seeds. Stands occurring within montane woodlands are the result of recent fires and eventually will again give way to the climax montane woodland species. (NatureServe 2004)

Value to Wildlife

Lower montane chaparral is limited in extent in Nevada. Where chaparral does occur, it offers thickets of vegetation that provides excellent cover for birds and small mammals. In addition, birds such as hummingbirds and flycatchers use this type as a foraging area which they access from nest sites in adjacent forests. Manzanita, ceanothus, oaks, and many of the other species comprising chaparral provide seeds and fruits for a wide variety of wildlife. Cliffrose is a mule deer staple, especially in winter months.

Key Elements of Lower Montane Chaparral Habitat of Importance to Wildlife *

Mesic Microsites – foraging
Inyo shrew
Merriam's shrew

*Species *not* in bold are stewardship species.

Great Basin Chaparral
Shrubs – protection from predators, foraging, thermal cover
Mountain Quail Fox Sparrow
 Western Bluebird Dusky Flycatcher
 Mountain Bluebird Broad-tailed Hummingbird
 MacGillivray’s Warbler **California bighorn sheep**
 Green-tailed Towhee **mule deer**
 Gray Flycatcher

Mogollon Chaparral
Shrubs – protection from predators, foraging
Gray Vireo mule deer
Black-chinned Sparrow Nelson bighorn sheep
 Cactus Wren desert horned lizard
brush mouse desert night lizard
Sonoran lyre snake Gilbert’s skink

Mesic Microsites – foraging
Sonoran mountain kingsnake

Existing Environment

Land Uses

- | | |
|--------------------------|----------------------------|
| Livestock grazing | Wood products extraction |
| Motorized recreation | Urban/suburban development |
| Non-motorized recreation | Road development |
| Recreation development | Species harvest |
| Wind energy development | |

Habitat Conditions

Lower montane chaparral habitats are believed to be in fair-to-good condition in Nevada. With typically rocky sites and a small grass and forb component, this habitat type tends to be less attractive to uses that can lead to habitat degradation if poorly managed. However, the fact that grasses and forbs are naturally sparse in this habitat type also makes it more vulnerable to over-utilization when uses are focused here. Fire is an agent that can cause dramatic and undesirable shifts in vegetation and community health in many other habitats, but chaparral is resilient and fire is an important element of regeneration and perpetuation.

Problems Facing the Species and Habitats

Where natural fire cycles have been suppressed, loss of stand vigor and reproductive capability can be an issue, and as vegetation becomes thick or succession to forest types is facilitated through fire suppression, a significant change in vegetative structure can occur. Such transitions lead to a temporary or even permanent loss or modification of habitat. Principally where recreational activity is unregulated, disturbance to wildlife (movements/displacement, behavior, reproductive success) can be an issue.

Priority Research Needs

- Basic wildlife inventory
- Wildlife/habitat relationships for all Species of Conservation Priority
- Population status and trend for Black-chinned Sparrow and Gray Vireo

- Fire/restoration ecology

Conservation Strategy

Goal: Thriving, self sustaining wildlife populations in healthy plant communities maintained by natural fire return intervals; vigorous, diverse shrub component interspersed with mesic microsites and a patchy grass and forb understory.

Objective: Maintain or increase the vigor of chaparral to maintain chaparral-dependent wildlife populations in a stable or increasing trend.

Action: Conduct an inventory of chaparral habitats, identifying degraded sites with restoration potential as well as high quality habitats in good functioning condition.

Action: Identify lower montane chaparral sites where natural fire events can be permitted to occur without threatening the health and viability of adjacent habitat types.

Action: Integrate chaparral objectives into landscape management planning in piñon-juniper habitats.

Action: Manage recreation on public lands in this habitat type such that excessive erosion does not occur and habitats are not fragmented or damaged by destruction.

Action: Design grazing management strategies that permit natural regeneration of grasses and forbs within chaparral types.

Objective: Maintain Species of Conservation Priority at stable or increasing trends.

Action: Determine the role of chaparral in the maintenance of populations of the Species of Conservation Priority in Nevada.

Action: Incorporate connectivity of Mountain Quail habitat as an element of stand management and fire fuels reduction programs in the Sierra Nevada Range.

Action: Monitor local impacts of commercial reptile collection on key favored collection areas. Regulate take according to monitored and demonstrated need.

Partnerships

Land owner/manager	Percent
U.S. Forest Service	85.1
Bureau of Land Management	6.0
Private	7.9
Other	1.0

Existing Partnerships, Plans, and Programs

Major Programs and Partnerships

- Clark County Multiple Species Habitat Conservation Plan
- Spring Mountains National Recreation Area Conservation Agreement
- Eastern Nevada Landscape Coalition/Great Basin Restoration Initiative

Federal Agencies

- U.S. Forest Service
- Bureau of Land Management
- National Park Service (Great Basin National Park)

State Agencies

- Nevada Department of Wildlife
- Nevada Division of Forestry

Sportsman's Organizations

- Mule Deer Foundation
- Rocky Mountain Elk Foundation
- Nevada Bighorns Unlimited
- Fraternity of the Desert Bighorn

Conservation Organizations

- The Nature Conservancy
- National Audubon Society/Lahontan Audubon Society
- Sierra Club

Bird Initiatives

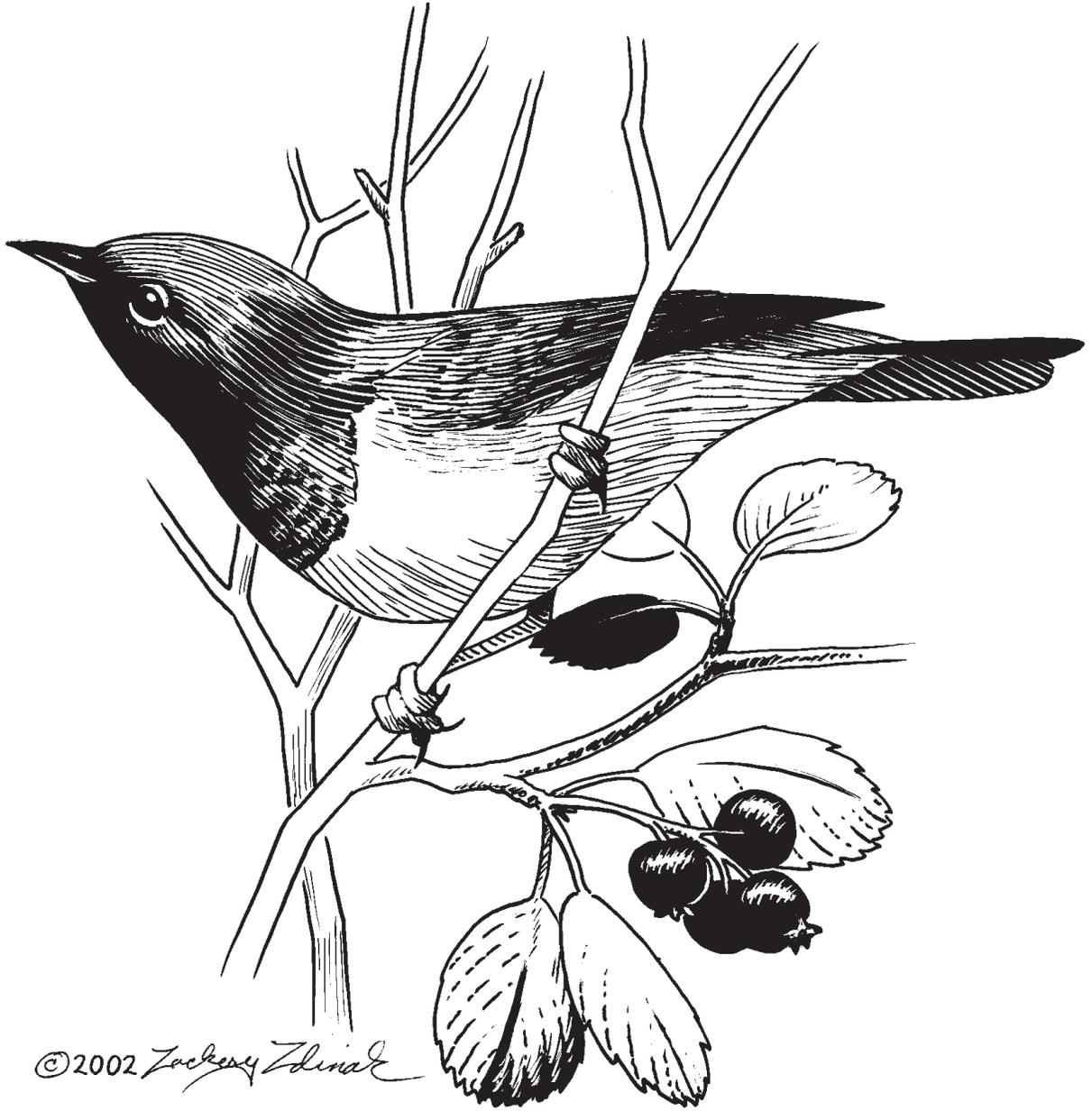
- Partners In Flight North American Land Bird Conservation Plan
- Nevada Partners In Flight

Other Key Partners

- Counties
- Intermountain West Joint Venture
- Great Basin Bird Observatory
- University of Nevada (UNR Biological Resources Research Center; Natural Resources and Environmental Sciences, Cooperative Extension)

Preliminary Focal Areas

Beaver Dam Slope	Great Basin National Park
McCullough Range	North Snake Range
Mormon Mesa	Fox Creek Range
Hidden Forest	Ichabod Range
Spring Mountains	Butler Basin
Newberry Mountains	Pine Nut Range
Virgin Mountains	Clover Mountains
Delamar Mountains	Mormon Mountains



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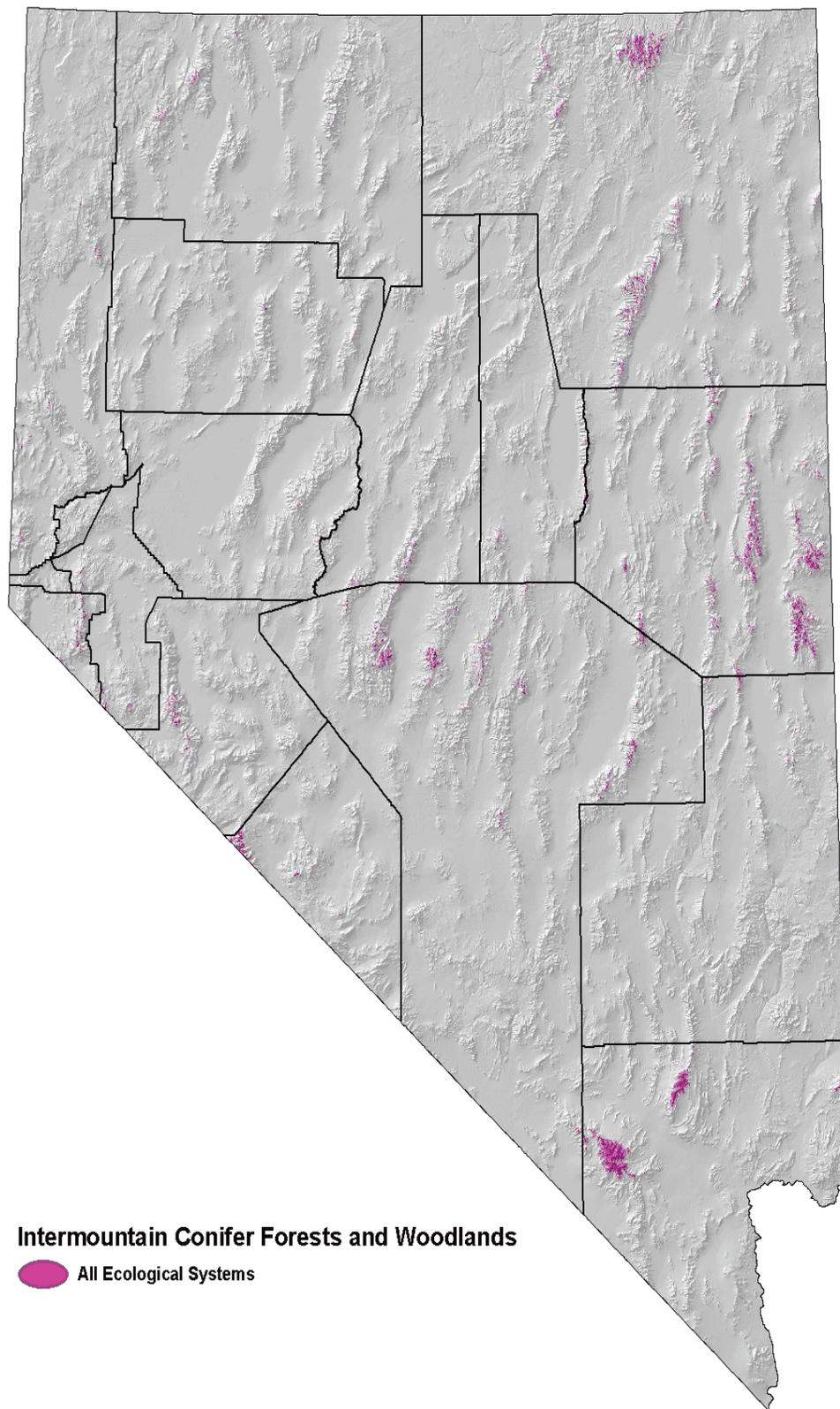


Figure 27. Distribution of the Intermountain Conifer Forests and Woodlands in Nevada (data source: NatureServe 2004).

Key Habitat: Intermountain Conifer Forests and Woodlands

Ecoregions

Great Basin	88,526 hectares	218,748 acres
Mojave Desert	32,883 hectares	81,254 acres
Columbia Plateau	21,275 hectares	52,570 acres
Sierra Nevada	504 hectares	1,246 acres
Total	143,188 hectares	353,818 acres

Ecological Systems

S024 Rocky Mountain Bigtooth Maple Ravine Woodland
 S025 Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland
 S026 Intermountain Basin Subalpine Limber-Bristlecone Pine Woodland
 S028 Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland
 S030 Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland
 S032 Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland
 S034 Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland
 S036 Rocky Mountain Ponderosa Pine Woodland

Key Habitat Description

Intermountain conifer forests and woodlands in Nevada are comprised of diverse forested communities that occur in the mountains above the lower montane woodland and shrubland habitats. Montane conifer forests are dominated by a variety of conifers including white fir, Jeffrey pine, lodgepole pine, ponderosa pine, and the deciduous quaking aspen. The composition and structure of overstory is dependent upon the temperature and moisture relationships of the site, and the successional status of the conifer community. Understory shrub components include greenleaf manzanita, snowberry, curleaf mountain-mahogany, creeping barberry, mountain sagebrush, and common juniper. The herbaceous grass and forb cover includes bluebunch wheatgrass, yarrow, Engelmann aster, larkspur, sticky geranium, lupine, western sweet cicely, bracken fern, Fendler meadowrue, western valerian, northern mule's ear, and many others. Montane forest and woodland habitats in Nevada typically occur at elevations between 1,200 and 3,300 m (3,935 and 10,825 feet). The bigtooth maple ravine ecological system, while included in this key habitat type, is sparsely represented in Nevada. These woodlands are dominated by bigtooth maple but may include mixed stands codominated by gambel oak or scattered conifers.

Subalpine forests and woodlands occur to treeline at approximately 3,300 m (11,000 feet) above which they may persist only as clumps in which the trees typically assume stunted growth forms highly influenced by wind and the harsh conditions of high-elevation sites. These forests are found on gentle to very steep mountain slopes, high-elevation ridge tops and upper slopes, plateau-like surfaces, basins, alluvial terraces, well-drained benches, and inactive stream terraces. Englemann spruce and subalpine fir forests are found at cold sites where precipitation is predominantly in the form of snow, sometimes persisting until late summer. Higher elevation limber-bristlecone pine woodlands are found well into the subalpine-alpine transition on wind-blasted, mostly west-facing slopes and exposed ridges. Sites are typically harsh, exposed to desiccating winds with rocky substrates and a short growing season that limits plant growth (NatureServe 2004). In Nevada, subalpine forest and woodland habitats are composed of stands dominated by subalpine fir, Engelmann spruce, whitebark pine, Intermountain bristlecone pine, or limber pine, and quaking aspen is an occasional codominant tree. The understory shrub component includes common juniper, mountain gooseberry, and mountain-mahogany. Dominant herbaceous layer species include Ross sedge and Fendler meadowrue (Nachlinger et al. 2001).

Value to Wildlife

Wildlife depend on a variety of features for foraging and nesting provided by conifer forests and woodlands, including mesic microsites, mid-story structure, and mature canopy. In addition, some wildlife in conifer forests and woodlands primarily make use of the conifer-riparian ecotone because of the diversity of plant growth and edge conditions in these areas (Hill 1995). Young, early successional conifer forests provide dense foliage and

vegetation for species that prefer understory cover, particularly small mammals. These species are tied to forage access and, likely, protection from predators. Old growth spruce–fir forests can also provide this structure since they have treefall and windthrow gaps in the canopy, large downed logs, rotting woody material, and tree seedling establishment on logs or on mineral soils unearthed in root balls (NatureServe 2004). Openings in the dominant canopy facilitate vegetation regeneration which provides favorable habitat for the species utilizing understory cover. Other wildlife species respond to the prey populations that inhabit the forest understory (e.g., Cooper’s Hawk).

Mature or old growth conifer forests are also valuable to wildlife because they provide an abundance of insect infested snags or dying trees. Trees with heart rot provide the essential substrate for cavity excavation which is important for wildlife nesting or denning, and dying trees provide an insect prey base for foraging. Some species are tied to temporal disturbances in conifer habitats (e.g., Three-toed Woodpecker), because they require the resulting insect outbreaks (Leonard 2001).

Although higher elevation conifer woodlands do not provide large patches of “forest” for wildlife, these communities are still important. Wildlife species feed on limber and bristlecone pine seeds, and the trees provide structure in an otherwise sparsely vegetated environment. Conversely, limber pine communities benefit from wildlife since its natural regeneration appears to be closely associated with caching of the large wingless seeds, primarily by Clark’s nutcracker (NatureServe 2004).

Key Elements of Intermountain Conifer Forests and Woodland Habitat of Importance to Wildlife*

Mature Overstory – nesting structure, roosting, protection from predators

Blue Grouse	Clark’s Nutcracker
Cassin’s Finch	Flammulated Owl
Grace’s Warbler	Steller’s Jay
Northern Goshawk	hoary bat
Black-headed Grosbeak	

Mid-story Structure – nesting structure, foraging

Clark’s Nutcracker	Steller’s Jay
Cooper’s Hawk	hoary bat
Dusky Flycatcher	Humboldt yellow-pine chipmunk

Shrub and Herbaceous Cover – protection from predators, foraging, thermal cover

Mountain Quail	Palmer’s chipmunk
Humboldt yellow-pine chipmunk	Hidden Forest Uinta chipmunk
Inyo shrew	mule deer
Montane shrew	

Riparian Ecotone – foraging (diversity of plant growth), protection from predators and nesting (edge conditions resulting in dense cover)

Black-headed Grosbeak	Broad-tailed Hummingbird
Black-throated Gray Warbler	Calliope Hummingbird

*Species *not* in bold are stewardship species.

Snags/Cavities – nesting, roosting (under exfoliating bark or in cavities), foraging (insect prey base in dying trees)

Lewis’s Woodpecker

Olive-sided Flycatcher

Flammulated Owl

Northern Pygmy-owl

Three-toed Woodpecker

Williamson’s Sapsucker

Palmer’s chipmunk

long-eared myotis

Mesic Microsites – foraging

montane shrew

vagrant shrew

Existing Environment

Land Uses

Livestock grazing

Wood products extraction – fuel wood

Motorized and non-motorized recreation

Recreation development

Urban/suburban development

Species harvest

Habitat Conditions

Present-day ponderosa pine forests differ greatly from pre-settlement forests because of logging, fuel wood harvest, fire suppression, improper grazing, and urban development. Size-class distributions are now skewed to smaller trees, with a more closed canopy, higher levels of disease, depleted understories, and high susceptibility to crown fires. Previously, park like forests with clumps of large trees and grassy openings were maintained by low-intensity ground fires every 1-to-12 years, limiting dense growth of young pines. It is now likely that wildlife species that rely on large trees are less common in ponderosa-pine forests than they were historically (Stacier and Guzy 2002). With fire suppression, white fir has vigorously colonized many sites formerly occupied by open ponderosa pine woodlands. These invasions have dramatically changed the fuel load and potential behavior of fire in these forests, and the potential for high-intensity crown fires on drier sites now codominated by ponderosa pine and white fir has increased. In general, fire suppression has led to the encroachment of more shade-tolerant, less fire-tolerant species into conifer communities. There has also been a corresponding increase in landscape homogeneity and connectivity resulting in increased potential of lethality and size of fires (NatureServe 2004). Limber–bristlecone pine woodlands are characterized by sparse shrubs, forbs, grasses, and litter with widely spaced trees. Fire does not carry easily in these habitats so they are rarely destroyed from this disturbance (NatureServe 2004).

Englemann spruce, limber, and bristlecone pine habitats are generally in good condition across Nevada, although disease is increasing in the limber pine communities of the Ruby Mountains. In some cases, bristlecone pine has been documented moving down into aspen stands, a phenomenon attributable to fire suppression. Intermountain conifer and woodland habitats in Nevada tend to be in fair and poor condition, primarily as a result of fire suppression, and include mixed aspen-conifer, mixed conifer, white fir, ponderosa pine, and subalpine fir communities.

Problems Facing the Species and Habitats

Natural processes that have shaped the development of Intermountain conifer forests and woodlands include fire, insects, and storms. Natural processes in conifer forests and woodlands have been inhibited by modern forestry practices, including fire suppression, salvage logging (cutting of burned trees), suppression logging (cutting of insect infested trees), and alteration of natural fire intensity. A long history of fire suppression has facilitated blister rust and insect outbreaks in subalpine fir, limber and whitebark pine communities in Nevada. Some wildlife species may be negatively affected by pest management operations focused on the reduction of insects. For example, pest eradication in lodgepole pine or spruce forests directly affects Three-toed Woodpeckers, because of the reduction or elimination of their preferred food, bark beetles (Leonard 2001).

Many wildlife species are restricted to forests of commercially valuable trees, and past wood products extraction may have reduced habitat suitability with the removal of large diameter trees. Intermountain conifer forests and woodlands in Nevada do not provide many viable commercial opportunities for timber extraction, however, where wood products extraction activities do occur, the most visible impact is loss of nest cavities. At present, the most immediate human threat to species in these habitats may be cutting (authorized and unauthorized) of dead trees for firewood. Extirpation of primary cavity excavators by introduced European Starlings is another potential threat to cavity nesting species. The recruitment of snags (dead trees or branches with good potential for holes) and health of woodpecker populations is essential to conservation of cavity-nesting species (McCallum 1994).

Other concerns for conifer forests and woodlands include maintenance of a vigorous shrub and herbaceous understory, which may be reduced by ungulate, or livestock grazing, or recreation. Small mammals depend on this structure for food, thermal cover, and protection from predators. A reduction of small mammals in previously suitable habitat will have cascading unfavorable effects to species that rely upon these prey populations. Intermountain conifer forests and woodlands in the Spring Mountains and Sheep Range are influenced by urban development and the concomitant use of Federal lands by the growing population of Las Vegas. These areas, particularly the Spring Mountains, are hubs for recreation in southern Nevada. Activities such as winter recreation activities, OHV activities, and dispersed forms of recreation such as hiking and mountain biking, will continue to influence conifer and woodland habitats and their associated species.

Priority Research Needs

- Map the quantity and spatial distribution of disturbance-caused patches of intermountain conifer forests and woodlands, by size and structural stages, across the pre-settlement and current landscape.
- Effects of recreational use on Palmer's chipmunk.
- Effects of fire suppression and habitat fragmentation on species in Intermountain conifer forest and woodland habitats.
- Responses of Intermountain conifer forests and woodlands and their associated species to different treatment types; management actions that are most effective and beneficial for the habitat and wildlife.
- Long-term banding/radio-telemetry studies, coupled with experimental prescribed fire, to quantify the importance of fire (and subsequent insect outbreaks) to reproduction and survival, long-term movement patterns, spatial structure, and temporal and spatial habitat selection of Species of Conservation Priority tied to these natural processes.
- Population status of Hidden Forest Uinta chipmunk and Humboldt yellow-pine chipmunk. If populations are found, conduct population viability analysis, then develop conservation plan.
- Population status of Grace's Warbler.
- Statewide Blue Grouse population assessment

Conservation Strategy

Goal: Thriving self sustaining wildlife populations inhabiting diverse conifer forests and woodlands that include a full range of successional stages across Nevada.

Objective: No additional loss of conifer forests and woodlands that have retained old-growth or late-successional characteristics, particularly in bristlecone and ponderosa pine communities.

Action: Recommend Intermountain conifer forests and woodlands significant to wildlife for special management (i.e., Special Management Areas, Research Natural Areas), as appropriate.

Action: Review and provide comments on the final proposed Special Management Areas including conifer forests and woodlands in the Humboldt-Toiyabe Forest Plan revision.

Action: Develop conservation education programs for responsible motorized recreation near sensitive wildlife habitat in the Spring Mountains and other high quality Intermountain Conifer Forests and Woodland landscapes as needed.

Objective: Proactively manage the landscape to maintain or restore resilient Intermountain conifer forests and woodlands with natural and/or mimicked fire processes.

Action: Implement forest management practices creating pine forests that more closely mimic naturally open parklands with stands of large, mature trees.

Action: Proactively manage conifer communities that need fire through wild and prescribed fires. In particular, focus on white fir, mixed aspen-conifer, and ponderosa pine communities.

Action: Support and provide input in development of a Fire Use Plan for the Humboldt-Toiyabe National Forest.

Objective: Sustain stable or increasing populations of Species of Conservation Priority in conifer forests and woodlands.

Action: Schedule forest thinning or prescribed fire activities during the non-breeding season to avoid direct mortality and minimize disturbance to wildlife.

Action: When removing trees during stand thinning in Intermountain conifer forests and woodlands, avoid cutting nest trees identified for raptors.

Action: Design and implement wood product extraction activities (e.g., fuel wood collection) that retain adequate quantity and quality of snags important to wildlife for nesting and feeding.

Action: Design and implement priority research projects to facilitate the development of effective conservation and management guidelines for conifer forests and woodlands and their associated wildlife species.

Action: Conduct population status assessments for Hidden Forest Uinta chipmunk, Humboldt yellow-pine chipmunk, and Blue Grouse.

Partnerships

Land owner/manager	Percent
U. S. Forest Service	71
Bureau of Land Management	14
National Park Service	6
U. S. Fish and Wildlife Service	6
Other	3

Existing Partnerships, Plans, and Programs

- Spring Mountains National Recreation Area Conservation Agreement
- Forest Stewardship Program
- Eastern Nevada Landscape Coalition

Federal Agencies

- U. S. Forest Service
- Bureau of Land Management
- Great Basin National Park
- U. S. Fish and Wildlife Service

State Agencies

- Nevada Department of Wildlife
- Nevada Division of Forestry
- Nevada Natural Heritage Program

Bird Initiatives

- Partners In Flight – North American Land Bird Conservation Plan
- Nevada Partners in Flight – Nevada Bird Conservation Plan

Conservation Organizations

- The Nature Conservancy
- National Audubon Society/Lahontan Audubon Society (Important Bird Areas Program)
- Red Rock Audubon Society
- Sierra Club

Other Key Partners

- University of Nevada (UNR Biological Resources Research Center; Natural Resources and Environmental Sciences; UNLV Department of Biological Sciences)
- Great Basin Bird Observatory
- Counties
- Intermountain West Joint Venture
- Great Basin Bird Observatory

Sportsman's Groups

- Fraternity of the Desert Bighorn
- Nevada Bighorns Unlimited
- Wildlife Habitat in Nevada
- Southern Nevada Offroad Enthusiasts

Preliminary Focal Areas

East Humboldt Range	Sheep Range
Egan Range	Snake Range
Independence Mountains	Spring Mountains
Jarbidge Mountains	Toiyabe Range
Monitor Range	Toquima Range
Ruby Mountains	White Mountains
Santa Rosa Range	White Pine Range
Schell Creek Range	



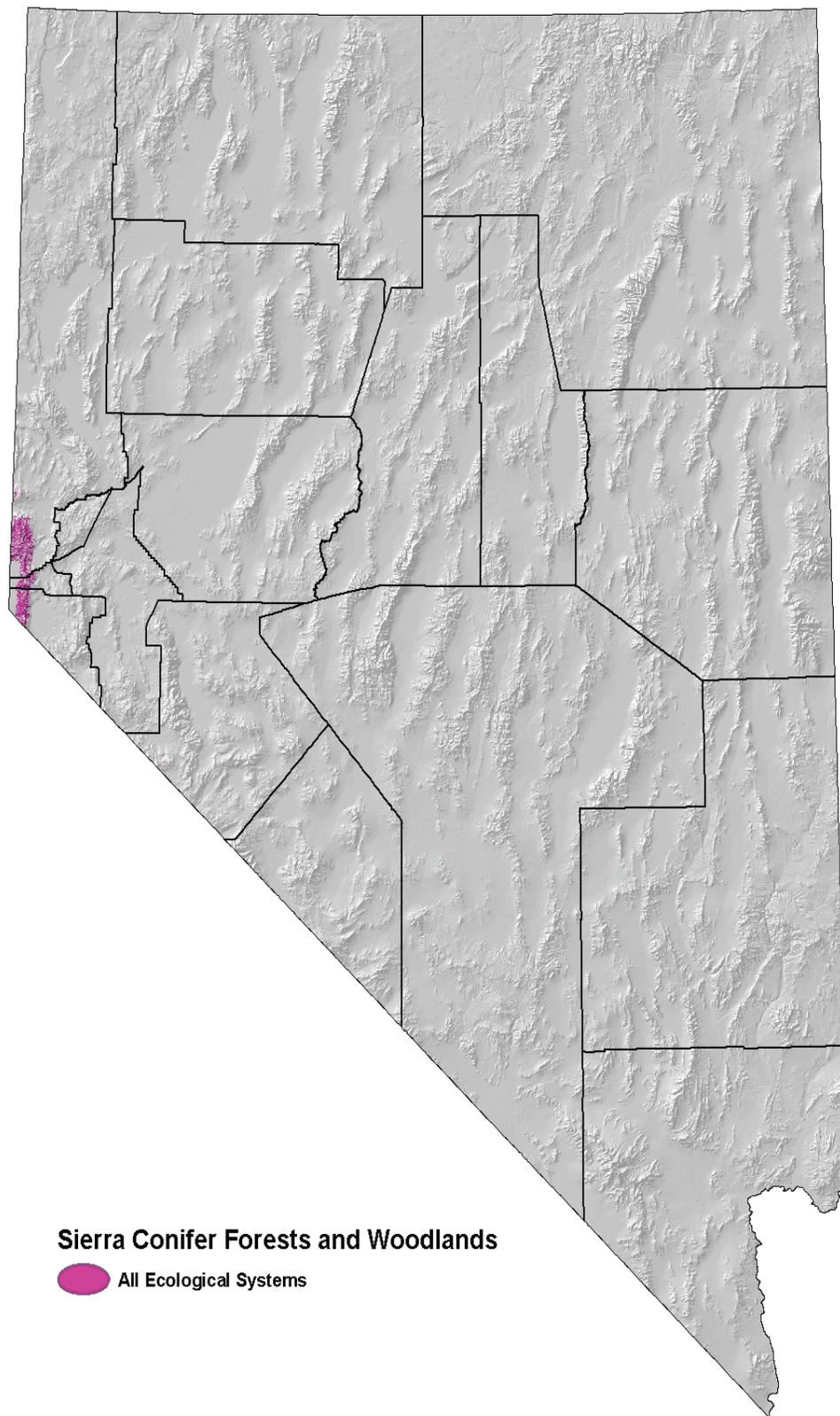


Figure 29. Distribution of the Sierra Conifer Forests and Woodlands in Nevada (data source: NatureServe 2005).

Key Habitat: Sierra Conifer Forests and Woodlands

Ecoregions

Sierra Nevada	36,418 hectares	89,991 acres
Great Basin	1,425 hectares	3,521 acres
Total	37,843 hectares	93,512 acres

Ecological Systems

S029 Northern Pacific Mesic Subalpine Woodland
 S033 Mediterranean California Dry-Mesic Mixed Conifer Forest and Woodland
 S121 Mediterranean California Red Fir Forest and Woodland
 S122 Sierra Nevada Subalpine Lodgepole Pine Forest and Woodland
 S123 Mediterranean California Ponderosa-Jeffrey Pine Forest and Woodland

Key Habitat Description

Sierra conifer forests and woodlands are comprised of a diverse assemblage of ecological systems that range from the Sierra Nevada foothills up to ridges and rocky slopes around timberline (2,700 m (8,200 ft)). Mixed conifer forests and woodlands typify the lower elevation systems. These forested systems form closed, multilayered canopies with shrubs present in the understory where openings occur. Common conifer species of the mixed conifer forest and woodland ecological system include white fir, ponderosa pine, incense cedar, and sugar pine (NatureServe 2004). White fir tends to be the most ubiquitous species since it is shade tolerant and has the ability to survive long periods of suppression in brush fields.

Ponderosa and Jeffrey pine forests and woodlands are found on warm, xeric sites in the Sierra Nevada foothills and mountains and are generally segregated by soil fertility and temperature regimes (NatureServe 2004). While ponderosa pine may be dominant at lower elevations and on south slopes, it is commonly replaced by Jeffrey pine at high elevations or colder sites. Dominant shrub layer species include antelope bitterbrush, rabbitbrush, and sagebrush at lower elevations and squaw currant, snowberry, and greenleaf manzanita at higher elevations. Common herbaceous species include squirreltail, blue wildrye, slender hairgrass, western needlegrass, woolly wyethia, and pennyroyal (Allen 1988).

Moving up the slope, conifer forest and woodlands include lodgepole pine, red fir, and the subalpine conifer systems. Red fir conifer forests and woodlands are located in higher elevations, above mixed conifer forest, and heavy snowpack is a major source of soil moisture throughout the growing season. Forest stand structure is typified by even-aged red fir trees with very few other plant species present in any other layer. Another conifer system, lodgepole pine, typically forms open stands of similarly sized trees, and is widespread in glacial basins at upper montane to subalpine elevations of the central and northern Sierra Nevada (NatureServe 2004). Few other species are co-dominants with lodgepole pine but occasional associates include aspen and mountain hemlock. The understory component of lodgepole pine forests is usually sparse consisting of scattered shrubs and herbs, or a rich herbaceous layer at meadow margins (Allen 1988). Northern Pacific mesic subalpine woodlands occur on ridges and rocky slopes around timberline on concave or mesic slopes in areas with long-lasting snowpack and better soil development than other drier and more exposed subalpine woodlands. Characteristic species include mountain hemlock, red fir, whitebark pine, and juniper, as well as patches of grasses, sedges, and forbs grading into adjacent meadows (NatureServe 2004).

Value to Wildlife

Wildlife depend on a variety of features for foraging, roosting, and nesting provided by conifer forests and woodlands that include mesic microsites, mid-story structure, and mature canopy. Forest-associated bat species (e.g., long-eared myotis) day-roost in hollow trees or under exfoliating bark (Bradley et al. 2004). In addition, some wildlife in conifer forests and woodlands primarily make use of the conifer-riparian ecotone because of the diversity of plant growth and edge conditions in these areas (Hill 1995). Young, early successional conifer forests provide dense foliage and vegetation for species that prefer understory cover, particularly small mammals. These species are tied to forage access and protection from predators. Old growth forests can also provide this structure

since they have treefall and windthrow gaps in the canopy, large downed logs, rotting woody material, and tree seedling establishment on logs or on mineral soils unearthed in root balls (NatureServe 2004). Openings in the dominant canopy facilitate vegetation regeneration on the forest floor which provides favorable habitat for the species utilizing understory cover. Other wildlife species respond to the prey populations that inhabit the forest understory (e.g., Northern Goshawk). Typically these species are wide-ranging, and their habitat use is driven more by prey availability than the actual habitat features.

Natural disturbances that plague many western second growth stands, including insect epidemics, disease outbreaks, and fire, are less likely to have catastrophic consequences in Sierra Nevada old growth conifer forests and woodlands. Old growth forests and woodlands provide structural complexity (many trees in different diameter classes), high canopy closure, and downed wood, and some wildlife species require old growth forests for various portions of their life histories. WAP Species of Conservation Priority requiring old growth include Trowbridge's shrew that inhabits mature forests with abundant ground litter and need deep organic layers of soils for burrowing (George 1989); American martens, whose optimum habitat elements appear to be mature old-growth conifer communities with greater than 30 percent canopy cover, and a well established understory of fallen logs and stumps and understory vegetation supporting small mammal prey (Clark et al. 1987); California Spotted Owls, requiring large trees (greater than 90 cm (3 ft) diameter at breast height) for foraging and nesting (Gutierrez et al. 1995); and, White-headed Woodpeckers, requiring abundant mature pines (with large cones and abundant seed production), a relatively open canopy (50 to 70 percent), and snag and stump availability for nest cavities (Garrett et al. 1996).

The Sierra Nevada conifer forest remnants that harbor wildlife species uniquely adapted to live in old growth habitats are important because many of these species are found nowhere else in Nevada. Mature or old growth conifer forests are also valuable to wildlife because they provide an abundance of insect-infected snags or dying trees. Trees with heart rot provide the essential substrate for cavity excavation which is important for wildlife nesting, and dying trees provide an insect prey base for foraging.

Sierra Nevada conifer forests and woodlands also provide foraging habitat for aerial feeders (e.g., bats) or important stopover points for migrating birds (e.g., Rufous Hummingbird). Some species are tied to temporal disturbances in these habitats (e.g., Lewis's Woodpecker), because they require the resulting insect outbreaks (Leonard 2001). Although Sierra Nevada conifer forests and woodlands comprise only a small portion of Nevada's key habitats, they are valuable for wildlife and play an essential role in the State's conservation planning.

Key Elements of Sierra Conifer Forests and Woodlands Habitat of Importance to Wildlife*

Overstory Canopy – nesting structure, roosting, protection from predators

Blue Grouse	Clark's Nutcracker
Cassin's Finch	Nashville Warbler
Northern Goshawk	Steller's Jay

Mid-story Structure – nesting structure, foraging

Dusky Flycatcher
Steller's Jay

Shrub and Herbaceous Cover – protection from predators, foraging, thermal cover

Mountain Quail	Sierra Nevada alligator lizard
montane shrew	

*Species *not* in bold are stewardship species.

Old Growth – mature structure for nesting and roosting, denning (downed wood), burrowing (deep soils), foraging (downed wood and understory vegetation supports small mammal populations)

Bald Eagle

California Spotted Owl

Northern Goshawk

White-headed Woodpecker

Flammulated Owl

American marten

northern flying squirrel

Trowbridge’s shrew

long-eared myotis

Second Growth – nesting, roosting, foraging

Cooper’s Hawk

Steller’s Jay

Northern Pygmy-owl

Disturbance – fire or insect outbreaks create suitable conditions for foraging (increased insects) and nesting (substrate for cavity excavation)

Lewis’s Woodpecker

Western Bluebird

Riparian/Wet Meadow Ecotone – foraging (diversity of plant growth), protection from predators and nesting (edge conditions resulting in dense cover)

Hermit Warbler

Red-breasted Sapsucker

Black-headed Grosbeak

Black-throated Gray Warbler

Broad-tailed Hummingbird

Calliope Hummingbird

Orange-crowned Warbler

Swainson’s Thrush

Williamson’s Sapsucker

mountain pocket gopher

Snags/broken Tops/cavities – nesting, roosting, foraging (insect prey base in dying trees)

California Spotted Owl

Lewis’s Woodpecker

Olive-sided Flycatcher

White-headed Woodpecker

Flammulated Owl

Northern Pygmy-owl

long-eared myotis

Mesic Microsites – foraging

Blue Grouse

Allen’s chipmunk

Inyo shrew

montane shrew

vagrant shrew

Prey Populations – feeding on species in this habitat

Sierra Nevada red fox

Existing Environment

Land Uses

Urban/suburban development	Species harvest
Non-motorized recreation – hiking, camping, back country skiing	Recreation development – ski areas, snow parks, developed campgrounds and day-use areas
Motorized recreation – snowmobiles, OHVs	

Habitat Conditions

The Comstock mining era had a profound effect on the Sierra Nevada conifer forests and woodlands with wood being extracted for building, mining timbers, and fuel wood for domestic purposes, and power mills, crushing ore, and for hoisting works in the mines. Between 1860 and 1875 the Carson Range was completely cut over and the timber of the Tahoe Basin began to be harvested. During this time, little thought was given to stand improvement, species diversity, or leaving a seed source for future stands. As a result, most old growth conifer forest habitat in the Carson Range was eliminated, and the landscape is now dominated by second growth conifer forests. These second growth forests contain trees all relatively similar in age and the white fir component is much greater than pre-settlement forest. Fire suppression beginning in the 1920s fostered the retention of an unnatural proportion of white fir in the forest community, and dead woody material has accumulated to dangerously high levels on the more productive sites. The drought of the early 1990s coupled with epidemic insect infestations resulted in mortality of most white fir and Jeffrey pine that was under 120 years-old. This combination of factors has contributed to the current cycle of rapid stand collapse and regrowth, replacing a cycle of gradual changes.

Problems Facing the Species and Habitats

The altered fire regime of Sierra Nevada conifer forests and woodlands is the most daunting challenge wildlife species and these habitats are currently facing. Many years of fire suppression have resulted in abnormally high fuel levels. Combined with the conifer mortality resulting from fir engraver beetles (white fir) and bark beetles (lodgepole and Jeffrey pine) and increases of the highly flammable invasive cheatgrass, particularly at lower elevations, restoring equilibrium to this habitat will take very proactive management with no guarantee that valuable wildlife habitat won't be lost to future catastrophic events. Another challenge to modifying the current practice of high fire suppression is the proximity of this habitat to the urban interface and resultant concerns for human safety and potential economic loss.

Sierra Nevada conifer forests and woodlands experience significant pressure from urban and suburban development. Development has and will continue to result in permanent habitat loss or conversion, inflict direct mortality, and fragment wildlife habitat if conservation of these forest habitats and their associated species is not incorporated into the planning process. An increasing human population is coupled with the need for infrastructure (e.g., road, utility corridors) that can serve as a conduit for invasive species such as cheatgrass, and result in additional forest fragmentation. The Sierra Nevada provides multiple recreation opportunities that are sources of stress for wildlife and their habitats, including non-motorized (e.g., hiking, back-country skiing) and motorized (e.g., OHVs, snowmobiles) recreational pursuits. OHV use in the area is mostly concentrated on Peavine Mountain. Ski areas, snow parks, and developed day-use areas and campgrounds also facilitate increased disturbance to wildlife and alter the habitat through the removal of vegetation and soil compaction.

Although current forestry practices are designed to address stand health, conifer forests and woodlands in the Sierra Nevada are still recovering from historic forestry practices during the Comstock era. Climate change (i.e., drought) will increase the challenge of restoring and maintaining healthy Sierra Nevada conifer forest and woodland communities.

Wildlife species and their habitats in the Carson Range are subject to increases in noxious weeds, habitat conversion, fragmentation, and population isolation due to the pressures of urbanization. For example, mule deer migration corridors are intersected by major highways and urban development, resulting in increased vehicle collision mortalities and restricted movement of mule deer in and out of the Carson Range. Consequently, the Carson Range, like other mountain ranges in Nevada, is becoming isolated from adjacent landscapes. This

circumstance may ultimately result in decreased genetic variability of populations and increased risk of localized species extirpations as a result of environmental stochastic events.

Priority Research Needs

- Quantity and spatial distribution of Sierra Nevada conifer forests and woodlands across the pre-settlement and current landscape in Nevada.
- Successional stages of Sierra Nevada conifer forests and woodlands necessary to sustain WAP Species of Conservation Priority.
- Effects of fire suppression, fragmentation, and salvage logging on species in Sierra Nevada conifer forest and woodland habitats.
- Long-term banding and radio-telemetry studies, coupled with experimental prescribed fire, to quantify the importance of fire (and subsequent insect outbreaks) to reproduction and survival, long-term movement patterns, spatial structure, and temporal and spatial habitat selection of bird populations tied to these natural processes (e.g., Lewis's Woodpecker).
- Winter range, migration corridors, and population viability of mule deer herds.
- Habitat use and competition between Mountain Quail and California Quail; effects of expansion of California Quail habitats into higher elevation Mountain Quail habitats.
- Range and population viability of American marten.
- Population status and viability of Sierra Nevada red fox.

Conservation Strategy

Goal: Thriving, self-sustaining wildlife populations in a dynamic landscape encompassing the full range of forest successional stages, with a local emphasis on the maintenance of old growth conifer forest conditions.

Objectives from *SNFPA Final Supplemental Environmental Impact Statement* (USDA Forest Service 2004):

- 1) Protect, increase, and perpetuate desired conditions of old forest ecosystems and conserve their associated species while meeting people's needs for commodities and outdoor recreation activities.
- 2) Increase the density of large trees, increase the structural diversity of vegetation, and improve the continuity and distribution of old forests across the landscape.
- 3) Reverse declining trends in abundance of old forest ecosystems and habitats for species that use old forests.

Action: Adopt objectives outlined in the *SNFPA Final Supplemental Environmental Impact Statement* (USDA Forest Service 2004) into the Nevada WAP.

Objective: Conserve the remaining Sierra Nevada conifer forests and woodlands that have retained old-growth or late-successional characteristics.

Action: Update Memorandum of Understanding between the state of Nevada and the Humboldt-Toiyabe National Forest to provide continued protection of the last significant stands of old growth in the Carson Range.

Action: Identify and recommend Sierra Nevada old growth conifer forests and woodlands significant to wildlife for special management (i.e., Special Interest Areas or Special Management Areas) by the Humboldt-Toiyabe National Forest as appropriate during the implementation phase.

Action: Review and provide comments on the final proposed Special Interest Areas and Special Management Areas including old growth Sierra Nevada conifer forests and woodlands in the Humboldt-Toiyabe National Forest revised management plan.

Objective: Proactively manage the landscape to include a mosaic of conifer forests and woodlands resilient to their natural disturbance regime and maintained within acceptable levels of tolerance to avoid catastrophic events including bark beetle outbreaks and fire.

Action: Recommend prescribed fire and silviculture treatments in second growth stands, to promote the

development of multi-aged conifer and woodland stands with complex structure (e.g., old growth conditions).

Action: Cooperate with the Humboldt-Toiyabe National Forest in the completion of a fire use plan that identifies areas for suppression, no suppression, and where to pursue habitat improvement through prescribe fire.

Action: During fire suppression activities, consider the needs of wildlife prior to actions and select alternatives, if possible that have positive benefits to wildlife and their habitats. For example, determine the appropriateness of an area for back-burning and whether it's been identified as an important area for wildlife species of concern.

Action: In the wildland-urban interface, consider the needs of wildlife when designing fuel breaks and avoid clearing all native vegetation if possible.

Action: Work with fire safe councils to support their efforts of public education and wildfire prevention.

Action: Work with California Department of Fish and Game and other pertinent partners in the Sierra Nevada ecoregion to achieve conservation objectives for Sierra Nevada conifer forests and woodlands across its range in order to provide a landscape mosaic that includes forests retaining old growth and late successional characteristics.

Objective: Maintain stable or increasing wildlife populations in Sierra Nevada conifer forest and woodland habitats.

Action: Integrate WAP Priority Species of Concern and key habitats into land use planning efforts for the Tahoe Basin and Carson Range.

Action: Assess and demonstrate benefits (short and long-term) of forest management (e.g., thinning, prescribed fire) to WAP Priority Species of Concern in Sierra Nevada conifer forests and woodlands.

Action: Review forest thinning plans to ensure retention of an adequate quantity and quality of snags and downed wood important to wildlife for nesting, roosting, and feeding.

Action: Conduct forest management in stands without known raptor nests, if possible; or avoid cutting nest trees identified for raptors.

Action: Design and implement priority research projects to facilitate the development of effective conservation and management guidelines for Sierra Nevada conifer forests and woodlands and their associated wildlife species.

Action: Work with partners and stakeholders in the Sierra Nevada ecoregion to achieve conservation objectives for wildlife populations in Sierra Nevada conifer forests and woodlands.

Partnerships

Land owner/manager	percent
U. S. Forest Service	75
Private	13
State of Nevada	9
Other	3

Existing Partnerships, Plans, and Programs

- Spooner Summit Old Growth Cooperative Agreement (1993)
- Nevada Tahoe Resource Team
- Tahoe Regional Planning Agency
- Forest Stewardship Program

Federal Agencies

- U.S. Forest Service
- U.S. Fish and Wildlife Service
- Natural Resources Conservation Service/Conservation Districts

State Agencies

- Nevada Division of State Parks
- Nevada Department of Wildlife
- Nevada Division of Forestry
- Nevada Natural Heritage Program

Conservation Organizations

- Lahontan Audubon Society
- The Nature Conservancy
- Sierra Club

Bird Initiatives

- Partners In Flight North American Land Bird Conservation Plan
- Nevada Partners in Flight
- Nevada Bat Conservation Plan

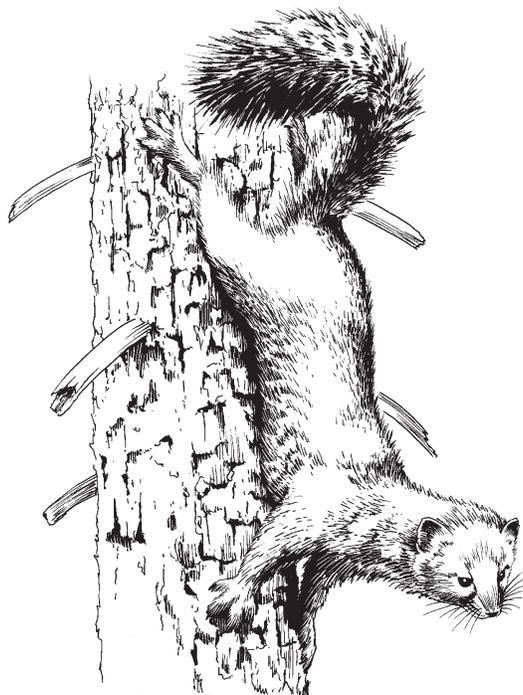
Other Key Partners

- Tahoe Regional Planning Agency
- Carson City; Washoe and Douglas Counties
- University of Nevada (UNR Biological Resources Research Center; Natural Resources and Environmental Sciences)
- Great Basin Bird Observatory

Preliminary Focal Areas

Lake Tahoe Basin

Carson Range



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