

Threats

Threats to Species and Habitats in Nevada

Introduction

The majority of threats to birds in Nevada are thought to be mediated through habitat processes, as it is generally agreed that the majority of past bird losses in North America was due to habitat impacts, such as habitat loss or degradation. Well-known cases of significant threats that were unrelated to habitat, for example the persecution of egrets for purposes of millinery or DDT-induced mortality of raptors in the 20th century, were likely the exception rather than the rule in the world of bird conservation. Therefore, much of our efforts for estimating pending and future threats to birds were focused on threats to the habitats on which they most depend, and we have high confidence that this is the overall most effective approach for statewide bird conservation in Nevada.

Threats rankings were done for both conservation priority species and habitat types. According to The Nature Conservancy's Conservation by Design process, a threat can be broken down to a "source of stress" and a "stress", which describes the relationship between the cause of impact (e.g., urban expansion) and the impact itself (e.g., habitat conversion due to urban expansion). The stress can further be ranked by severity and scope based on how likely it is that the threat will eliminate or destroy the conservation target, i.e., the priority species or the habitat type in Nevada, and how widespread and pervasive it is throughout the geographic range of the species or habitat in Nevada. The source of stress can be ranked by contribution and irreversibility, which describes how large the contribution of a cause and how irreversible the impact is estimated to be. All projections of stresses and sources of stress were for the next 10 years after the plan is released.

After delving into the worksheets for estimating ranks for sources of stresses and stresses in multiple subcommittee meetings, we concluded that the scope of this plan necessitated a somewhat simplified approach to threats rankings. Specifically, we found it difficult to assign, in a precise way, the geographic scope, severity, and relative contribution of threats statewide, as many threats are regional and thus highly variable in severity across the state. Because threat rankings were entirely based on expert opinion in the planning group, we found that equal application and agreement among experts could best be achieved by a simple combined "low, medium, high" ranking system for the projection of how severely, irreversibly, and widespread a threat will act. Even with this simplified approach, many expert rankings fell out to be "low to medium" or "medium to high", which we saw not as a sign of inadequate effort on the experts' part, but rather as a reflection of the true uncertainty that is associated with projections of impending threats to our conservation targets. Threats generally do not apply to all habitats and birds, and this plan will only rank those threats for a habitat or species, for which we have evidence or overwhelming expert opinion that they deserve a ranking.

In the remainder of this chapter, we provide an overall ranking of each threat for each habitat type used in this plan, and a brief description of each threat category to the best of

Threats

our current knowledge as discussed in subcommittee meetings in preparation of this plan. Reviewers of the plan who can provide additional significant knowledge to our current understanding of threats in Nevada are encouraged to do so. We found that it was a fairly difficult task to rank the relative significance of each threat to the statewide goal of bird conservation objectively, since the plan covers a variety of habitat types and conservation issues, and a significant amount of uncertainty about projections of many future impacts.

Threat categories used in this plan can be divided into habitat threats and species threats, separating those threats that act on birds indirectly through habitat change (e.g., increased fire intervals) from those that act directly on bird survival or reproduction (e.g., diseases). Habitat threats include land management practices (fire suppression, fuels reduction, domestic and feral livestock grazing, biocontrol, wild ungulates), climate change (change in precipitation and snowmelt, change in temperature), water management (surface water diversion and impoundments, groundwater pumping, flood control), urban, agricultural, and industrial uses (agricultural practices, energy development, urban, suburban, and industrial development, mining), recreation (motorized, non-motorized), invasive plants (invasive weeds, conifer encroachment), increased fire frequency or intensity, and plant diseases and pests (insect outbreaks, plant pathogens). Two habitat related threats, commercial timber harvest and military activities, were considered during the subcommittee meetings for threats, but then dropped. Commercial timber harvest does not currently occur in Nevada and is not expected to occur in the next 10 years. Military activities were discussed, but no significant threats to bird populations or habitats were identified. Species threat categories include fragmentation of large home ranges, direct mortality (electrocution and collision, introduced predators, illegal persecution), and disease and parasitism (West Nile Virus, botulism and avian cholera, and cowbird parasitism).

The following table summarizes our draft rankings of each threat category by habitat type. A threat received a **High** ranking for those habitats, in which we expect that the threat will either introduce significant, hard-to-reverse disruption to the set of priority species or the bird community overall in the next 10 years, or continue to do so after significant past impacts. **Med** (medium) was applied to those threats for which we expect disruptions that are regionally significant and/or fairly hard to reverse. Threats received a **Low** ranking, if we expect some significant disruption that is either localized or relatively easy to reverse. An **Unk** (unknown) ranking was only applied to those threats and habitats, for which we believe that the threat will likely have significant impacts, but the nature of these impacts and their geographic scope or irreversibility are currently unknown. **No ranking** was applied to threat-habitat categories, when we projected that the threat was not applicable on a statewide scale to this habitat type, and thus a “no ranking” may therefore be read as “not applicable”. The no-ranking outcome, however, does not imply that a threat is not applicable to that habitat type in special cases, it only means that we currently project the impacts not to be significant at a statewide bird conservation scale in the next 10 years.

Threats

Threat	Habitat Type																					
	Agriculture	Alpine	Aspen	Cliffs	Coniferous Forest	Desert Springs	Ephemeral Wetlands/Playa	Great Basin Lowland Riparian	Joshua Tree	Marshes	Mesquite-Acacia	Mojave Lowland Riparian	Mojave Scrub	Montane Riparian	Montane Shrublands	Open Water	Pinyon-Juniper	Sagebrush	Salt Desert - Great Basin	Salt Desert - Mojave	Wet Meadows	
Fire Suppression					Low												Low	Low				
Fuels Reduction												Low					Low					
Livestock Grazing (Domestic and Feral)			High			High		High	Med	Med	Med	Med		High	High			Med			High	
Biocontrol Activities								Med				High										
Wild Ungulates			Low																			
Change in Precipitation and Snowmelt	High	High	High		High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	Med	Med	High
Change in Temperature	Unk	High	High	Unk	Unk	High	High	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk
Surface Water Diversion, Impoundments						High	High	High		High		High		High								Med
Groundwater Pumping	Med					High		Med		High		Med				Med						Med
Flood Control								Med				Med				Low						
Agricultural Practices	Med																					Med

Threats

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	Agriculture	Alpine	Aspen	Cliffs	Coniferous Forest	Desert Springs	Ephemeral Wetlands/Playa	Great Basin Lowland Riparian	Joshua Tree	Marshes	Mesquite-Acacia	Mojave Lowland Riparian	Mojave Scrub	Montane Riparian	Montane Shrublands	Open Water	Pinyon-Juniper	Sagebrush	Salt Desert - Great Basin	Salt Desert - Mojave	Wet Meadows
Energy Development						Med							High					Med		Med	
Urban, Suburban, and Industrial Development	Med				Med		High				High	High	Med				Med	Med			
Mining			Med	Med			Low	Low		Low		Low	Med	Low		Med		Med			
Motorized Recreation			Med			Med	Med	Low	Med		High	Med	Med	Med	Med		Med	Med	Med	Med	
Non-motorized Recreation			Med		Med									Med	Low		Low				
Invasive Weeds	Med		Med		Low	High		High	High		High	High	Med	Low	Med		Med	High	Med	Med	Med
Conifer Encroachment			Med												Med			Med			
Increased Fire Frequency or Intensity					Med				High		High	High	Med	Med	High		Med	High		Med	
Insect Outbreaks			Med		High			Unk	Unk		Unk	Unk		Med	Unk		High	Unk			
Plant Pathogens			High		High			Unk	Unk		Unk	Unk		High	Unk		Unk	Unk			
Fragmentation of Large Home Ranges			High			High		High	High			High	High	Med	Med			Med		High	Med

Threats

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	Agriculture	Alpine	Aspen	Cliffs	Coniferous Forest	Desert Springs	Ephemeral Wetlands/Playa	Great Basin Lowland Riparian	Joshua Tree	Marshes	Mesquite-Acacia	Mojave Lowland Riparian	Mojave Scrub	Montane Riparian	Montane Shrublands	Open Water	Pinyon-Juniper	Sagebrush	Salt Desert - Great Basin	Salt Desert - Mojave	Wet Meadows
Electrocution and Collision*																					
Introduced Predators	High					High		High			Med	High		Med					Med		
Illegal Persecution	Med																		Med		
West Nile Virus*																					
Botulism and Avian Cholera									Med							Med					
Cowbird Parasitism	Low		Low			Low		Low	Low		Low	Low		Low	Low		Low	Low			Low

*no habitat-specific effects known

Threats

Habitat Threats in Nevada

1. Land Management Practices

a. Fire Suppression

Fire suppression in a classic sense is not a very widespread phenomenon in Nevada's non-urban landscapes, at least if it is defined as the active practice of trying to prevent all fires. Indirect effects that might lead to increased fire intervals, such as removal of herbaceous understory, are more likely to apply on a large scale in Nevada. However, in cases where critical habitat of priority birds is located near human population centers, active fire suppression may be a management practice that affects bird populations. Fire suppression therefore received Low rankings in flammable habitat types that are near urban centers in Nevada.

b. Fuels Reduction Activities

Fuels reduction is usually implemented in areas in which fires have to be controlled by slowing them down near human settlements and, in some cases, to reduce the risk of catastrophic fires in coniferous forests. Usually, these practices include removal of highly flammable shrubs, thinning of young and old trees, and weed control, as well as creation of open buffer areas as fire barriers. All habitat types that are adjacent to human population centers or outlying settlements may be subject to more intensive fuels reduction activities and wood gathering. Similar to fire suppression, this threat received a Low ranking in those habitats where fuels reduction is practiced near urban centers.

c. Livestock Grazing

Domestic livestock is part of most publicly managed lands in Nevada (except Clark County). Various levels of use occur in different habitat types and regions of the state. Most uses involve cattle and sheep ranching, and seasonal use of public lands is regulated in a variety of ways. Generally, riparian, wetland, and similar habitat types (where they are accessible to livestock) receive more intense use due to their higher-quality forage and access to water. In the plan, the phrase "heavy livestock use" is applied in cases where the presence of livestock is likely to result in heavy use of a particular bird-habitat, and it is not meant to evaluate grazing management other than to acknowledge that livestock naturally tends to make heavier use of a particular habitat if it has access.

In addition to domestic livestock, **feral** livestock including wild horses or burros occur in various densities on all public lands of Nevada. As with domestic livestock, feral livestock generally makes more intensive use of highly water-dependent habitat types, but burros are also known to graze on very dry vegetation. The level of impact from this threat is directly related to the amount of use and number of livestock present in sensitive habitats, particularly during the growing season and plant establishment periods. The habitats that received a High ranking are those that are water-dependent and provide high

Threats

quality forage. Upland habitats generally see a more dispersed use by livestock and thus received an overall Med ranking.

d. Biocontrol Activities

This category was specifically created due to the recent invasion and introduction of the salt cedar (tamarisk) leaf beetle, *Diorhabda elongata*, to combat salt cedar invasion in riparian areas. Where established, the beetle fully defoliates salt cedar over a large geographic scale on an annual basis, but its desired positive effects on recovery of native riparian vegetation have not yet been established. The affected salt cedar trees survive defoliation for several years, during which they cannot provide suitable nesting habitat for most riparian songbirds. Therefore, for the next 10 years, it is likely that the beetle will outpace any active revegetation efforts in riparian areas in Nevada, which is why Mojave lowland riparian received a High ranking and Great Basin lowland riparian a Med. Because several bird species use salt cedar often as the only available nesting habitat alternative in many southwestern riparian areas, the beetle poses a threat to several priority species, including Southwestern Willow Flycatcher, Lucy's Warbler, and Bell's Vireo. Other methods of widespread biocontrol that may affect birds or their habitats are not currently known in Nevada.

e. Wild Ungulates

In a few cases, wild ungulate herbivory may be ranked as a threat to bird habitats, and only elk are currently recognized for having local impacts. Their populations are managed for productivity and for sustaining hunting opportunities. In places where elk may be using habitats or sites more intensely than historically, they may have habitat impacts. Overall, this threat is considered low, however, throughout Nevada.

2. Climate Change

a. Change in Precipitation and Snowmelt

Most climate models predict decreased winter precipitation in most of Nevada and adjoining regions, albeit precipitation in the form of rain may increase in some regions. Most of Nevada's water-dependent habitat types currently receive the majority of their year-round water from snowmelt. Climate change therefore affects those ecosystems, habitat attributes, and bird species that depend on snowmelt. Many habitats of priority bird species have a significant successional time lag (e.g., Joshua tree woodlands), as the recovery time estimates in our habitat accounts indicate, which may affect predictions of their northward and elevational range shifts. The recovery time of habitats (see habitat accounts) also affects the irreversibility of habitat impacts from secondary effects of climate change, such as catastrophic fires, insect outbreaks, and prolonged droughts. Therefore, we try to predict, to the best of our knowledge, which habitats and species would be most threatened by overall decreased water availability in the next 10 years,

Threats

and overall, this ranks among the most significant threats to the integrity of bird habitats in our desert state, which is why most habitats received a High ranking.

b. Increased Temperature

This category refers to direct effects of temperature increases, such as shifts in terrestrial invertebrate, fish, or other aquatic prey availability for foraging birds, or increased ambient temperatures for raising broods and foraging for favored prey items. It may be a difficult issue to separate conceptually from decreased water availability in many cases, but in some cases, increased temperatures alone may pose a threat. In other regions, particularly in Europe, recent research has shown that migration onset and wintering grounds have changed toward earlier northward movements and more frequent wintering in northern latitudes. This is likely already occurring in North America in several species, and the consequences of reduced migration to species conservation are not yet known, which is the reason this threat received largely an Unk (unknown) ranking.

3. Water Management

a. Surface Water Diversions, Impoundments

Surface water diversions refer to all infrastructure used to convey water out of its natural outflow system to agricultural and municipal uses. Most of this infrastructure has been in place for many decades in Nevada, but if threats to bird habitats and bird populations persist as a result of historic structures (as is the case in most of Nevada), or if new ones are expected to be installed in the next 10 years, this was ranked as a significant threat. While past impacts from surface water diversion continue to threaten bird habitats in Nevada, existing water diversions also provide a significant opportunity for habitat recovery if water can be returned to natural systems, as has been demonstrated by multiple recent restoration projects. Impoundments are generally done for upstream water storage of rivers and streams, and they result in habitat conversion of sections of riparian or ephemeral wash habitats, but they also create habitat for other species. Similar to diversions, this threat primarily applies to species that rely on vegetation types below reservoirs that are maintained by natural flood regimes and floodplain connectivity. For all riparian areas and downstream water-dependent habitat types, this threat therefore received High ranking, as past impacts are expected to continue for the next 10 years.

b. Groundwater Pumping

Unlike surface water diversions, groundwater pumping refers to all subsurface water retrieval for municipal and agricultural uses at levels that may impact water-dependent habitat types. Aside from large groundwater developments for city use, this threat may also rank for those rural areas that rely on private wells for water supply, if the use of these is expected to increase without regulation. Those habitat types that have dominant vegetation tapped into groundwater and are in areas where significant pumping is expected received a High ranking for this threat.

Threats

c. Flood Control

Flood control measures may include bank stabilization (rip-raping, grading) and channelization. As with surface water diversions, most of these measures have been practiced for decades in Nevada's streams and rivers, but their impacts on riparian areas and wetlands may persist or increase enough to be ranked as a threat to bird populations. Most flood control measures are restricted to larger rivers and streams that are near inhabited areas, but because most urban centers in Nevada are near lowland streams or rivers, this category received a Med ranking for lowland riparian habitats.

4. Agricultural, Industrial, and Urban Development

a. Agricultural Practices

Most agriculture in Nevada requires irrigation, although a small portion of it also takes place in naturally wet areas. Possible threats associated with agricultural practices include cessation of flood irrigation, heavy use of pesticides or herbicides (causing water quality impacts, loss of prey, or direct mortality), mowing schedules, and maintenance of adjoining areas (shelterbelts, etc.). Livestock grazing practices are excluded from this category, as they are covered separately (see above). As in most of North America, the trend toward replacing small, family-operated agricultural operations with industrial agriculture generally leads to impacts on bird habitats, as trees, shelterbelts, return flow wetlands and flooded fields, and native forbs and grasses are typically lost to operational efficiency. Overall, the threat is ranked Med for agricultural areas and wet meadows.

b. Energy Development

This category includes all large-scale energy projects, such as solar energy projects, wind energy projects, and geothermal energy projects and their associated infrastructure (windmills, solar panels, pipelines, powerlines, etc.). More traditional energy developments, such as hydroelectric, nuclear, and coal-based energy projects will likely play less of a role in new energy developments in Nevada than the above-named forms of renewable energy. Development of energy involves a footprint of infrastructure, including all access roads and other forms of transportation, and they require water rights, usually involving groundwater pumping. Several new large-scale renewable energy projects are currently being planned in Nevada, and depending on which habitat types are involved in their siting, they pose a threat to birds through habitat conversion and fragmentation. All habitat types in which current energy projects are located and for which new projects are planned received a Med ranking, except for Mojave scrub, which is subject to several large-scale energy developments in Nevada.

Threats

c. Urban, Suburban, and Industrial Development

Urban and suburban development refers to city sprawl, including “exurban” developments (i.e., outlying residences within commuter distance). Industrial developments, such as the development of industrial parks, airports, warehouses, etc., are included in this threat category, as these are most often part of urban development and come with similar threats to birds and their habitats. Primary threats from these developments lie in habitat conversion for associated infrastructure and edge impacts to adjoining habitats. Indirect effects, such as fuel reduction, fire suppression, introduced predators, and increased fire frequency also play a major role, and these are covered in other threat categories. Generally, the widespread habitat types that are subject to past and future sprawl received a Med ranking, while the restricted and vulnerable habitat types (i.e., lowland riparian and mesquite-acacia) near sprawl received a High ranking.

d. Mining

All infrastructure and habitat conversion associated with mining operations are covered under this threat category. Generally, impacts from mining are similar as for energy development, but mining typically involves a different set of bird habitats, such as pinyon-juniper, cliffs, and montane shrublands. Mining operations require water, and mine tailings and other soils around mining operations may have impacts on water quality in surrounding habitats. As with other long-term threats, mining includes existing operations if they have continuing impacts to birds, but also include new operations. Mine reclamation projects that involve significant habitat restoration may offset some of the estimated impacts from this threat.



Urban sprawl northwest of Reno, Washoe County. Photo by Elisabeth Ammon.

5. Recreation

a. Motorized Vehicles

This category includes all motorized, recreational vehicles that are used off the pavement (off-highway vehicles, or OHV), including dirt bikes, small all-terrain vehicles, and other four-wheel drive vehicles. Impacts include destruction of ground vegetation, burrows, litter and cryptobiotic soils, disturbance to nest sites, introduction of weeds, and habitat conversion and fragmentation from increased dirt road development. Also, access by the

Threats

public to remote, previously disturbance-free areas significantly increases in areas of OHV use. As a general rule, this threat is greatest near urban centers, but the popularity of motorized recreation is such that even remote landscapes see regular OHV use. Therefore, our rankings were Med for a large number of habitat types, but High for those that are heavily visited by OHV users.

b. Trails and Camping (Non-Motorized Recreation)

The trails and camping category includes all traditionally non-motorized recreation, such as establishment of foot, horse, and mountain bike trails, as well as picnic areas, campgrounds, and other outdoors facilities for the public. While generally considered low impact, non-motorized recreation may cause local habitat conversion for camping facilities and access roads in habitat types that are often particularly important to birds (e.g., riparian or aspen). Potential impacts are degradation of shrub and herbaceous understory in heavy use areas, increased fire danger, wood carvings in aspen (see aspen habitat account for details), introduction of feral cats, and disturbance to nest or roost sites. Opportunities exist to avoid potential impacts of non-motorized recreation through trail planning and public education. Most non-motorized recreation focuses on montane habitat types, but most of it is usually also low impact. Therefore, the affected habitat types received a Med or Low ranking.

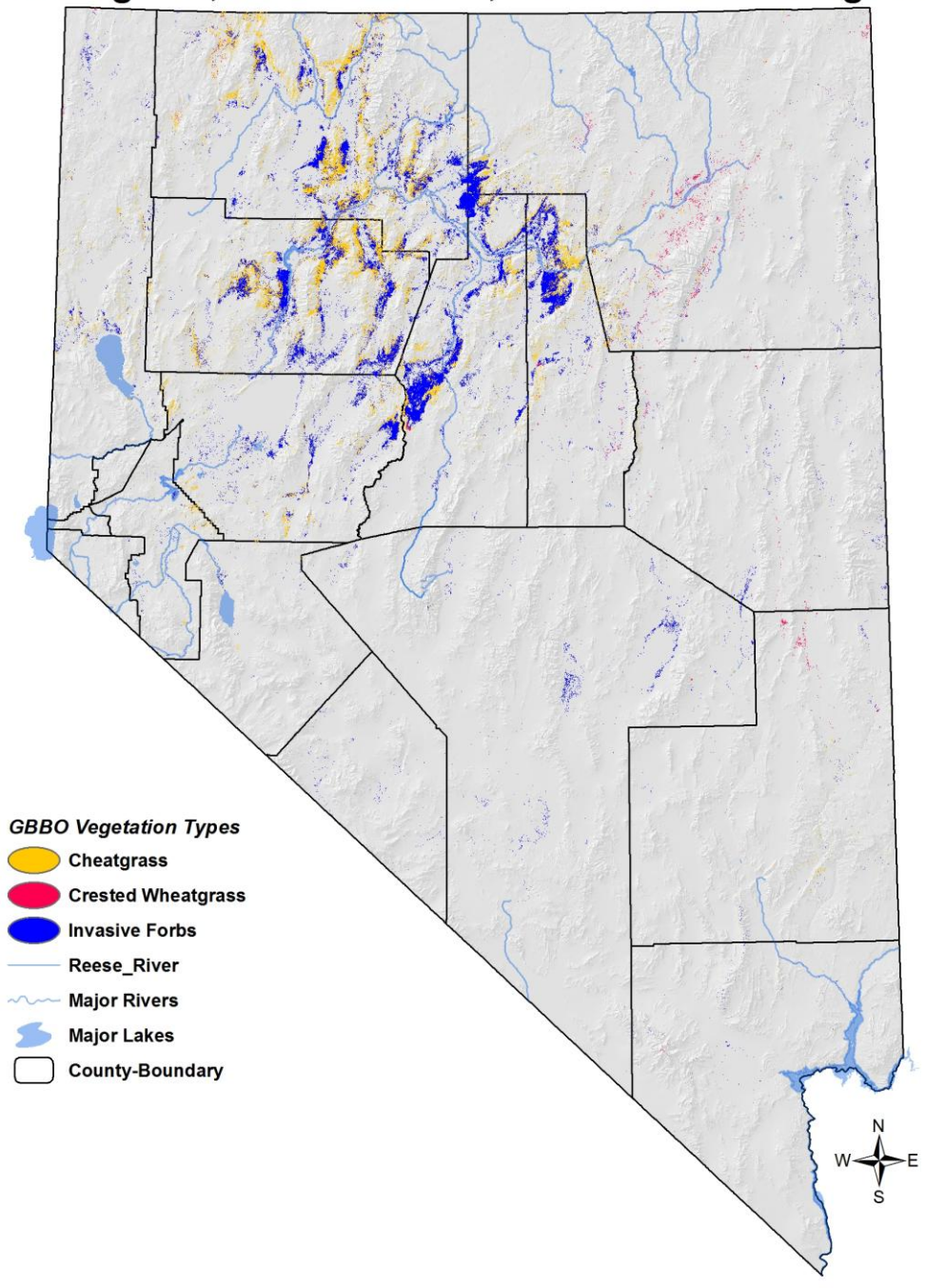
6. Invasive Plants

a. Invasive Weeds

Invasive weeds include a large variety of annual, perennial, and shrubby species that may or may not be classified and noxious. All habitat-altering species, such as perennial pepperweed, cheatgrass, red brome, Russian knapweed, and others, are included in this threat category, and they are ranked as a high threat where they act as aggressive invaders and are difficult to control. As a general rule, most of the problematic invasive plants in the Great Basin and Mojave Desert gained their stronghold in the state in the 1950s-70s, and many have since been firmly established and continue to pose a threat to bird habitat. As a general rule, invasive weeds increase the fire interval in the habitat type they have invaded, so weed control is not only important in preventing habitat degradation from displacement of native understories, but also as a fire prevention activity, particularly in habitat types that are highly vulnerable in catastrophic fires (e.g., Joshua tree, Mojave lowland riparian). To illustrate the pervasiveness of introduced plants, we provide a cheatgrass/invasive forb/crested wheatgrass map below, which only shows the areas on invasion that are visible by remote sensing methods. Many, if not most, habitat types described in this plan have various degrees of additional invasive plant invasion that is not quantifiable by remote sensing. Those habitat types that are particularly prone to invasive plants received a High ranking.

Threats

Cheatgrass, Invasive Forbs, and Crested Wheatgrass



Threats

b. Conifer Encroachment

Several habitat types have been identified as being vulnerable to conifer encroachment in Nevada, including sagebrush and aspen. Generally, the thought is that conifers expand into other habitat types due to locally decreased fire frequency caused by removal of understory. Conifer encroachment was ranked Med for those habitat types where it is prone to occur.

7. Fire Frequency

a. Increased Fire Frequency or Intensity

This category was formed to acknowledge that fire frequency and intensity has increased from historic levels in several habitat types of Nevada (e.g., Hunt and Stiver 2000). Causes for this change range widely, including invasive plants that increase fire frequency, loss of native understory and senescence of overstory (crown fires), new fire sources from public uses, climate change effects, and carry-over from fires in other habitat types. Increased fire frequency bears the threat of vegetation communities not being able to reach late-successional stages before the next burn, which can be detrimental to several priority species (e.g., Sage Thrasher and Gray Flycatcher in sagebrush habitats). Increased fire intensity is usually a result of crown fires and carries the threat of eliminating important seed banks of native species. Fires generally increase the probability of weed invasion, which serves as a positive feed-back loop for a continuing increase in fire frequency. In some areas, fire frequency has decreased, and the main effect of decreased fire intervals that is known is conifer encroachment (see above). This threat was ranked high for those habitats where devastating, widespread fires are expected, and Med for those where smaller-scale, or more reversible fires are expected.

8. Plant Disease and Pests

a. Insect Outbreaks

Spontaneous insect outbreaks may be a result of prolonged drought or of natural cycles in insect populations. This category does not include biocontrol measures, but rather insect outbreaks that happen unintentionally. Currently, most insect outbreaks affect coniferous woodlands and sagebrush, but new outbreaks may affect other habitat types in the future. The immediate effects of insect outbreaks on birds include loss of habitat components they may require, and an increase in fuel load. Some bird species may, however, also benefit from local die-offs. Insect outbreaks are expected to increase with a warming climate and greater vulnerability of drought-stressed vegetation, particularly in coniferous species, but details on these effects were not known to us, which is why several habitats received an Unk (unknown) ranking.

Threats

b. Plant Pathogens

Pathogens that have widespread impacts on their host plants may affect bird habitat in some cases. For instance, recent aspen clone die-offs in the Great Basin region have been attributed to fungus infections, and pathogen outbreaks are expected to increase in the future with warming temperatures and reduced water availability that are expected lead to plant stress in a variety of habitats. Other than aspen, plant pathogen effects on entire habitat types have, to our knowledge, not been studied in great detail in our region, which is why this category received several Unk (unknown) rankings.

Species Threats in Nevada

1. Habitat Fragmentation

a. Fragmentation of Large Home Ranges

This threat was intentionally taken out of the “habitat threats list”, because we distinguish between habitat loss and degradation (which affects all species that occupy that habitat) and the additional needs of some species that require large landscapes for large home ranges. Examples of such species include Greater Sage-Grouse, Golden Eagle, and Northern Goshawk. Their conservation depends not only on local habitat condition, but to a significant degree on the compounding of multiple threats on the landscape. Some species, for instance sage-grouse, are known to avoid edges in fragmented landscapes, while others may be indirectly affected by loss of prey populations, for example Golden Eagle. Habitats that support species with large home range or large minimum patch size requirements (e.g., Yellow-billed Cuckoo) received a High ranking, if cumulative habitat threats are expected to affect minimum area requirements of these species.

2. Direct Mortality

a. Electrocution and Collision

Some species may face a significant threat from collisions with infrastructure (e.g., windmills, solar infrastructure, towers, and other) or from electrocution by powerlines. While all species are subject to occasional mortality from these sources, this is ranked as a threat if there is reason to believe that populations of a species are affected.

b. Introduced Predators

In Nevada, most introduced predators that pose threats to birds are pets and feral descendants of these. Near human population centers and rural settlements, both pets and feral cats can cause a threat to nearby bird populations. Particularly affected are ground- or near-ground nesters, but also all other species that have a vulnerable fledgling stage for which the ground layer is important. A non-native predator population that is artificially sustained may eradicate the reproductive success of small birds in the entire area to which

Threats

it has access. Human-subsidized native predators, such as Common Ravens or coyotes, may also pose local threats in some areas, but these are overall considered less of a problem to birds than newly introduced predators. This threat received a Med ranking for those habitats that are most often near human settlements (incl. rural) and recreational facilities, where feral cat colonies, free-roaming pets, and human-mediated native predators are most often located.

c. Illegal Persecution

This category was created to include all illegal shooting, baiting, or other direct killing of birds. While this was historically a likely threat to a number of species, today, persecution may be largely restricted to raptors that are (often mistakenly) perceived as a significant threat to livestock or pets.

3. Disease and Parasitism

a. West Nile Virus

West Nile Virus has been shown to cause mortality in a variety of raptor species and in Greater Sage-Grouse. It is a mosquito-mediated disease that has been confirmed to be present throughout Nevada. It is currently unknown how large a contribution this threat has on bird mortality in most species of Nevada.

b. Botulism and Avian Cholera

Several species are known to be vulnerable to outbreaks of these diseases, including primarily water-dependent birds, such as waterfowl, colonial waterbirds, shorebirds, and marshbirds. As with West Nile Virus, the relative contribution of this threat to bird populations in Nevada is currently unknown, but the incidence of these diseases is generally thought to be lower than in other regions, such as the Great Salt Lake. Outbreaks of these diseases are usually associated with long-term stagnant conditions in waterbodies used for staging and wintering.

c. Brown-headed Cowbird Parasitism

Cowbird parasitism and subsequent reduction in nest success was considered a major threat to many songbirds in recent decades of bird conservation planning. Research results on cowbird impacts and effects of control methods on nesting success have been mixed, but it is probably safe to assume that at least some species or populations are affected by cowbird parasitism. As a general rule, it appears that Brown-headed Cowbirds are more successful at parasitizing nests in low elevations than in the mountains (e.g., Laymon and Halterman 1998). Cowbirds generally take advantage of edge conditions and open canopy covers in a variety of habitats, as they visually seek out nests to parasitize. Increased vegetation cover in the most vulnerable host populations may therefore help avoid cowbird impacts.