Field Guide and Natural History of Breeding Birds on the Western Edge of the Great Basin

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The photographers credited herein retain all rights to their images. All other elements of the document are published under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License (CC BY-NC-SA 4.0). For more information, please contact Erica Fleishman, efleishman@ucdavis.edu, (530) 754-9167.

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Introduction

We wrote this field guide and natural history to share information on the ecology and identification of the species of birds that our data suggest regularly breed or occur on Department of Defense lands and ecologically similar areas on the western edge of the Great Basin. Although existing field guides provide some of the same details, we focus on the regional context. For example, we describe how to differentiate among species with similar appearance or song that co-occur in the western Great Basin. If the biology of a given species varies considerably among ecosystems, we present the most relevant information for our region.

The Great Basin (taupe) and approximate area covered by this guide (red). Image produced by the Great Basin Landscape Conservation Cooperative.

We note where inferences on distribution and abundance are based on our research from 2012 through 2014 on the east slope of the Sierra Nevada in Mono County, California, from approximately Walker south to Virginia Lakes, and in the Wassuk Range. We also report trends in most species' distribution and abundance on the basis of data from the North American Breeding Bird Survey (Breeding Bird Survey), a transnational program coordinated by the U.S. Geological Survey's Patuxent Wildlife Research Center and the Canadian Wildlife Service's National Wildlife Research Center. Breeding Bird Survey data are collected by skilled volunteer observers. The monitoring program is well established, and analyses of the survey data have been included in more than 450 publications. Numerous studies have examined the information content of Breeding Bird Survey data and whether reliable inference about associations of birds with different locations and land-cover types can be drawn from those data. The Breeding Bird Survey samples multiple points, typically along roads, once during the breeding season. Two of the primary caveats to basing inference on Breeding Bird Survey data are that one sample does not allow estimation of whether species were absent or undetected, and many species breeding in the vicinity may not be detected during the sampling period.

Among the dominant land–cover types in the western Great Basin are woodlands dominated by single–leaf pinyon (*Pinus monophylla*) and juniper (*Juniperus osteosperma*, *J. occidentalis*), shrubsteppe dominated by sagebrush (*Artemisia* spp.), and riparian woodlands dominated by deciduous trees (e.g., aspen [*Populus tremuloides*], chokecherry [*Prunus virginiana*]) and shrubs (e.g., willow [*Salix* spp.], Woods' rose [*Rosa woodsii*]). Jeffrey pine (*Pinus jeffreyi*), lodgepole pine (*Pinus contorta*), and red fir (*Abies magnifica*) also are dominant trees in some parts of the east slope of the Sierra Nevada and Wassuk Range.

Natural variability is infinite, and exceptions to many of our characterizations are inevitable. For example, some number of birds of a given species will nest in unexpected locations, prey on unusual food sources, or make an atypical song. Future work undoubtedly will document breeding birds and vagrants in addition to the species described herein. We encourage users of the field guide to explore other sources of information on avian ecology and identification. Among the resources we find most useful are the *National Geographic Field Guide to the Birds of North America*, *The Sibley Guide to Birds*, the iBird application for mobile telephones, and the sound files provided by xeno-canto and the Macaulay Library of the Cornell Lab of Ornithology.

Unless otherwise stated, adult male and female birds, and juvenile and adult birds, have similar appearance. We present the species accounts in current taxonomic order and use the names provided by the most recent version of the continental taxonomic authority, the American Ornithologists' Union's Checklist of North and Middle American Birds.

In our ecological descriptions, we use some terms or definitions that are specific to ornithology.

Brood. A group of birds that are cared for at one time, regardless of genetic similarity. Individual birds may have one or more broods per breeding season. Members of many species of birds will attempt to renest if their offspring are killed by predators or if their nest fails for other reasons. Some species regularly raise two or more broods to fledging in a given breeding season

Brood parasitism. The act of laying eggs in the nests of other birds. The birds that care for the eggs may be members of the same species or different species. Some species both care for their own young and parasitize the nests of other species. Obligate brood parasites typically do not care for their own young. Brown-headed Cowbirds (*Molothrus ater*) are widespread and common brood parasites in North America.

Call note. A non-song vocalization made by birds. Use of call notes varies among individuals and species and may be associated with begging for food, signaling to a mate, predator alarms, and flock cohesion. Flight calls are a subset of calls that are made on the wing. Most species of birds have multiple call types. Call notes usually are shorter and simpler than songs.

Cardueline finch. Any species in the global subfamily Carduelinae within the family Fringillidae. All true finches in the conterminous United States are Cardueline finches.

Cavity nester. Species that nest in holes, crevices, or openings in trees or other structures. Some cavity nesters (e.g., woodpeckers) excavate their own cavities or modify existing cavities, whereas others cannot excavate their own cavities and instead nest in cavities excavated by other species, natural cavities, or structures

created by humans.

Culmen. The shape and curvature of the upper edge of the top portion of the bill.

Dominance hierarchy. A social structure within a group of animals in which individuals follow an approximately linear rank with respect to other individuals. Within birds, these social relationships often are complex and dynamic.

Emberizid. Any species in the family Emberizidae (New World sparrows and relatives).

Gorget. A patch of colored feathers, often iridescent, on the throat and upper breast. The term is most commonly used with respect to hummingbirds.

Mating system. (1) The number of pairs in which an individual bird is a member during a given breeding season. (2) Parental care behavior. In monogamous systems, a single male and a single female share parental duties during the breeding season. In polygamous systems, individual birds have two or more mates and may care for more than one nest. Both polygyny and polyandry occur in birds. Extra-pair copulations rarely affect parental behavior. In promiscuous systems, which are common in hummingbirds, individual males mate with multiple females, but do not participate in nest building or parental care.

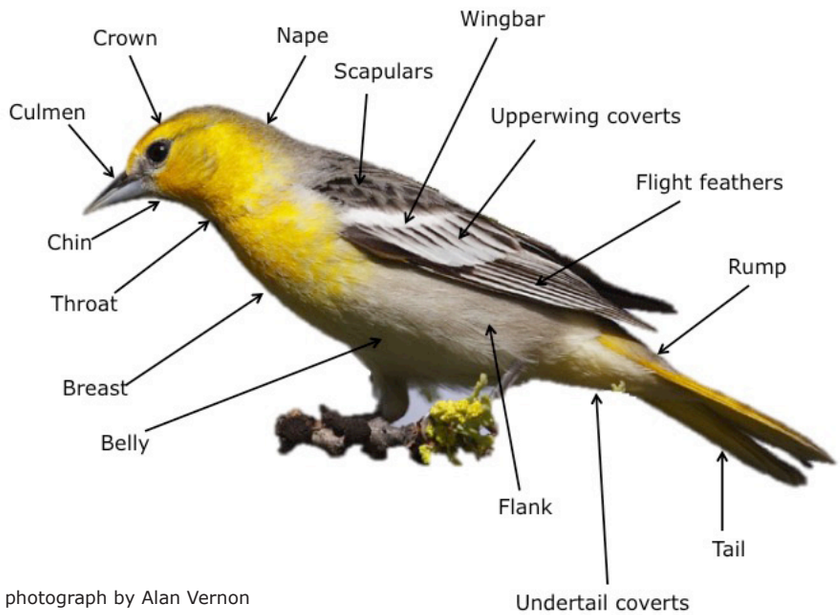
Plumage. An individual bird's full set of feathers. Inspection of plumage is the primary method of estimating the ages of birds in the field. Juvenile plumage refers to the first full set of feathers attained after natal down. Immature plumage refers to any feathers present before the first full adult plumage, including the juvenile plumage. Adult plumage refers to the final set of feathers. Some bird species have distinct breeding and non-breeding plumages in a given year.

Primary projection. The distance between the tip of the longest primary flight feather and the tip of the longest secondary flight feather. This feature is especially useful for identifying flycatchers in the genera *Empidonax* and *Contopus*.

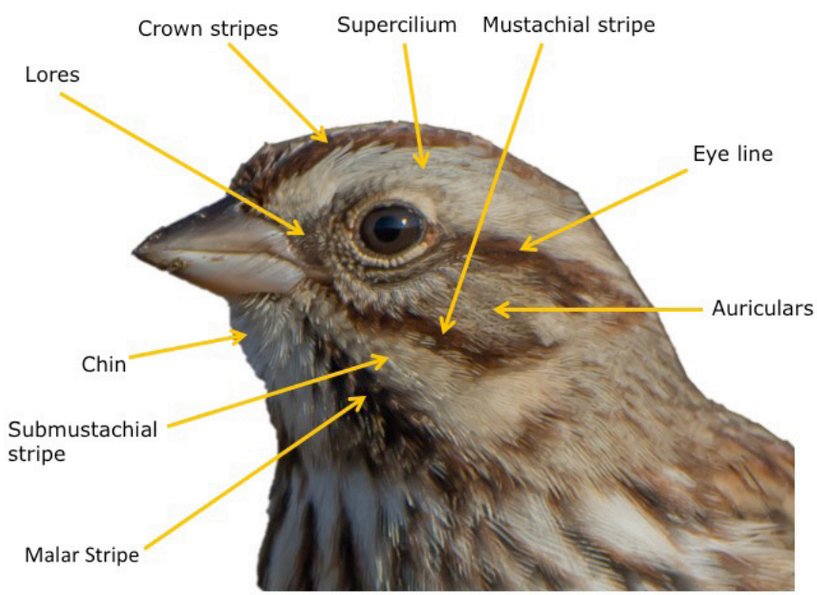
Song. A class of vocalization, usually heard shortly before and during the breeding season, which is used either to attract a mate or to advertise territorial boundaries. Songs typically are longer and more complex than other vocalizations and, in most species, only the males sing. Most passerines have learned songs, whereas most non-passerines do not. The songs of suboscinces (flycatchers) are genetically determined. The songs of oscines (all other passerines) are learned.

Speculum. A colored patch of feathers on the wing, typically on the upperside of the secondaries and secondary upperwing coverts. The speculum is particularly helpful for identifying ducks in the field.

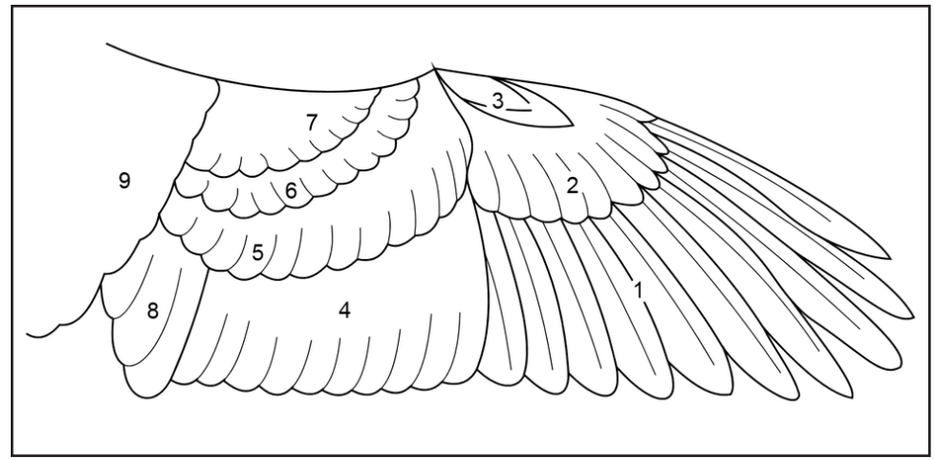
In our descriptions of appearance, we use a number of terms that are specific to avian anatomy. The following figures may be useful cross-references.



photograph by Alan Vernon



photograph by Bonnie Ott



Representation of a bird's wing. 1, primary remiges (primaries); 2, primary coverts; 3, alula; 4, secondary remiges (secondaries); 5, greater secondary coverts; 6, median secondary coverts; 7, lesser secondary coverts; 8, tertiary remiges (tertials); 9, scapulars.

We hope you will enjoy these accounts as much as we enjoyed compiling them, and we look forward to many more years of learning and exploring on our nation's public lands.

Mallard *(Anas platyrhynchos)*

Natural history

David Pavlik

- In North America, Mallards breed throughout most of Canada and Alaska and in all but the southernmost conterminous United States. In winter, the species occurs throughout the conterminous United States and northern Mexico. The species also breeds across the Palearctic and winters south through sub-Saharan Africa and India. Introduced, domesticated birds breed locally in Australia, New Zealand, Hawaii, and areas where the species formerly occurred only in winter.
- Mallards are uncommon and local in the Great Basin.
- Most Mallards are short- or medium-distance migrants. Mallards arrive on their breeding grounds in March or April and depart for autumn migration when water freezes or food sources are covered in snow (Drilling et al. 2002).
- During the breeding season, Mallards feed mostly on adult and larval aquatic invertebrates. During migration and winter, they feed on aquatic vegetation, seeds, terrestrial plants, and crops (Drilling et al. 2002).

Nesting

- During the breeding season, male Mallards defend territories that include nest sites and foraging areas. In winter, the species is non-territorial and forms hierarchical flocks within which antagonistic interactions are common (Drilling et al. 2002).
- Mallards are monogamous, but males actively pursue forced extra-pair copulations. Most broods have more than one male parent (Drilling et al. 2002).
- Mallards typically nest in uplands adjacent to a water source. Most nest sites are well concealed by overhanging vegetation. The species uses a variety of vegetation types for cover, including trees, reeds, shrubs, and crops (Drilling et al. 2002).
- The female forms the nest by making a depression in the ground with her breast and feet. She lines the nest with material that she can reach from the depression, often grasses, reeds, or shrub stems (Caldwell and Cornwell 1975).
- Mallards lay one clutch of seven to ten (sometimes as few as one or as many as 13) eggs per year (Ehrlich et al. 1988). Egg color varies, and the eggs are unmarked. Larger clutches may reflect conspecific brood parasitism (Drilling et al. 2002).
- Mallard nests are parasitized by other duck species and conspecifics. High water levels, limited nesting sites, and high density of breeding ducks are correlated with a higher incidence of brood parasitism (Drilling et al. 2002).

Status and trend

- Breeding Bird Survey data suggest that Mallard abundance is stable across the United States but increased by an average of 1-3% per year from 1968 to 2012 in the Great Basin and Sierra Nevada (Sauer et al. 2014).
- Historically, Mallards occurred in western and central North America. Humans introduced the species to eastern North America.
- The abundance of Mallards, like that of most duck species, varies as a function of annual precipitation. Reproductive success and survival decrease in dry years.

Habitat associations

- In the central portion of their range, Mallards generally breed in ephemeral, small wetlands rather than large, permanent wetlands or lakes. In forests, the species breeds in ponds and lakes. During the winter, Mallards inhabit almost any wet area.
- We rarely detected Mallards in the eastern Sierra Nevada, and did not detect them in the Wassuk Range.

Identification

- Adult male Mallards have a green head, red-brown lower neck and breast, whitish-gray body, black rump, and white tail. Males' wings are grayish, and the speculum of both males and females is deep blue with thick white borders above and below. The plumage of adult females, and of males during non-breeding seasons, is mottled light and dark brown, and their heads are paler than their bodies.
- Adult male Mallards are distinctive. In the western Great Basin, female Mallards may be confused with female Gadwalls and Northern Pintails. The tails of Gadwalls and Northern Pintails are brownish rather than white, and those two species rarely occur away from ponds and creeks on the valley floor.
- Mallards make loud quacks and deep laughing calls that are similar to those of other dabbling ducks.

Response to human activity or natural disturbances

- Although Mallards are abundant, the species may be affected by conversion of its habitat to agriculture in the Prairie Pothole-Parkland region (Drilling et al. 2002).
- Mallards are the most commonly hunted duck species in North America, and 20-25% of the continental population may be harvested in autumn. Hunting does not appear to be causing a decline in the species' abundance (Drilling et al. 2002).

Data gaps

- Mallards are well studied, but some questions remain about its lifetime breeding success and behavior during the breeding season. The frequent hybridization of Mallards with congeners in its introduced range has not been well studied, and may be affecting the gene pool of its congeners (Drilling et al. 2002).

Mountain Quail *(Oreortyx pictus)*

Natural history

David Pavlik

- Mountain Quails are handsome but reclusive.
- Mountain Quails are resident in the Cascade and Coastal Ranges, the Sierra Nevada, and several isolated mountain ranges in Baja California and the Great Basin.
- In the western Great Basin, Mountain Quails occur from the foothills to the crest of the Sierra Nevada.
- Most Mountain Quails are elevational migrants. The timing of local migration depends on the elevation and the timing of snowfall (Gutiérrez and Delehanty 1999).
- Mountain Quails feed mostly on vegetation, including seeds, fruit, and buds. Less than 5% of adults' diet but as much as 20% of juveniles' diet is animal matter (Gutiérrez and Delehanty 1999).

Nesting

- Little is known about Mountain Quails' breeding behavior, including territoriality and mating systems. During the non-breeding season, the species forms coveys of three to 20 birds (Gutiérrez and Delehanty 1999).
- Mountain Quails nest on the ground. The nest is well-concealed by overhanging vegetation, generally large shrubs or trees. The nest is a scrape in the ground that is lined with soft plant material from the immediate vicinity (Bent 1932).
- There are few data on average clutch sizes, and estimates from different studies vary considerably. Eggs are cream-colored and unmarked. Egg laying commences as early as mid March. Anecdotal reports of second broods have not been verified (Gutiérrez and Delehanty 1999).
- Parasitism of Mountain Quail nests has not been documented, but few studies have examined nest contents.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Mountain Quails is stable rangewide (Sauer et al. 2014), although the species' montane habitat and low detection probability limit the ability of the Breeding Bird Survey to assess trends.
- The highest abundance of the species is in the Sierra Nevada (Gutiérrez and Delehanty 1999).

Habitat associations

- Mountain Quails occur in areas dominated by shrubs, including woodlands and riparian areas. Where Mountain Quails and California Quails co-occur, Mountain Quails usually occur in areas with denser ground cover and more trees. Unlike California Quails, Mountain Quails do not occur in grasslands (Gutiérrez and Delehanty 1999). In the western Great Basin, Mountain Quails primarily occur at higher elevations near trees and do not occur in extensive sagebrush.
- We rarely detected the species in the Wassuk Range and eastern Sierra Nevada.

Identification

- Mountain Quails are large quails. The back, wings, and tail are olive brown. The breast, nape, and head are gray. The chestnut throat has a thin black and a broad white border. The belly and flanks are chestnut, and there are thick white bars on the flanks. The head is adorned by a long, straight plume that is held near vertical or swept back. Juvenile birds are smaller than adults.
- Mountain Quails may be confused with California Quails, but Mountain Quails are larger and have broader white stripes on their flanks, a reddish brown throat, and a longer and straighter head plume. Greater Sage-Grouse and Sooty Grouse are much larger and do not have head plumes.
- The song of Mountain Quails is a loud *QUEEEarc*, delivered repeatedly with pauses of five to six seconds between songs. Other vocalizations include a *klee klee klee* call made by individuals in coveys and an alarm call that is similar to the song but harsher.

Response to human activity or natural disturbances

- The effect of timber harvest on Mountain Quail abundance is unclear, but timber harvest likely has increased the area of habitat. Grazing by cattle often degrades Mountain Quail habitat. Hunting is believed to have a minimal effect on the species but few data exist on its effects. Strict regulations and bans on hunting exist in many parts of the species' range (Gutiérrez and Delehanty 1999).

Data gaps

- Many aspects of Mountain Quail biology and ecology have received little or no study. Major data gaps include population dynamics, breeding, behavior, systematics, and physiology (Gutiérrez and Delehanty 1999).

California Quail *(Callipepla californica)*

Natural history

David Pavlik

- California Quails are medium-sized quails with a drooping head plume. Large groups often are seen running along roadsides and fields.
- California Quails are nonmigratory. The species' range extends from Baja California north to Oregon and eastern Washington and east to western Nevada. The Wassuk Range is on the eastern boundary of the species' range. Introduced populations occur in Nevada, Utah, and Arizona.
- The diet of California Quails is mainly vegetation and varies regionally. In the Great Basin, the species feeds primarily on fruit and the buds or catkins of shrubs, including sagebrush. Arthropods make up less than five percent of the species' diet (Calkins et al. 2014).

Nesting

- California Quails are non-territorial. During the non-breeding season, they form coveys of 25 to 75 birds from related family groups. The species varies from monogamous to sequentially or simultaneously polygamous. Mating by individual birds is affected by dominance hierarchies and may be a function of food availability (Calkins 2007).
- California Quails lay one or two clutches per season. Each clutch contains 12 to 16 eggs (sometimes as few as one or as many as 21) (Ehrlich et al. 1988, Calkins et al. 2014). The eggs are whitish with brown spots. Larger clutches may be the result of intraspecific brood parasitism by other females (Campbell et al. 1990).
- In the Great Basin, egg laying begins in late May or early June (Leopold 1977).
- Nests are constructed by lining a shallow scrape in the ground with plant material. The species nests in areas that are well concealed by grasses, forbs, rocks, or woody debris. They rarely nest in croplands (Crawford 1993, Calkins et al. 2014).
- Intraspecific brood parasitism occurs in the species but is poorly understood and known only from genetic studies (Calkins 2007). California Quails sometimes parasitize the nests of other species, including Wild Turkeys, Mountain Quails, Spotted Towhees, and White-crowned Sparrows (Calkins et al. 2014).

Status and trend

- Breeding Bird Survey data suggest that the rangewide abundance of California Quails increased slightly from 1966 to 2012, with increases of about 2% per year in the Great Basin and Sierra Nevada (Sauer et al. 2014). Abundance was higher in the 19th century than in the 20th century, possibly due to changes in agricultural practices and increasing urban development (Leopold 1977).
- Local abundance and density varies as a function of annual precipitation and the timing of precipitation (Calkins et al. 2014).

Habitat associations

- California Quails require dense cover for roosting and protection from predators, and open ground for foraging. In the Great Basin, the species occurs near dense, thorny shrubs in uplands or near willows. The species relies on stands of large sagebrush for protection from snowfall during winter (Lepper 1978).
- California Quails are common in woodlands and shrublands in the eastern Sierra Nevada. We detected the species at low elevations in the Wassuk Range.

Identification

- California Quails generally run, rather than fly, to escape perceived threats. Males have a gray head with a striking black and white facial pattern and black, comma-shaped crown plumes that hang forward over the forehead; brownish backs and wings; and gray underparts with black and white bars on the belly and sides.
- Female California Quails are similar to males but are drabber and browner, especially on the head, and have shorter, straighter head plumes.
- Young juveniles can be distinguished by their small size. Older juveniles are similar to adult females but have smaller, browner head plumes (Calkins et al. 2014).
- California Quails are difficult to distinguish from Gambel's Quails, but the latter do not occur in the western Great Basin. Mountain Quails generally occur at higher elevations and are slightly larger with a chestnut throat, thicker white bars on the flanks, and a longer, straighter head plume.
- California Quails do not sing. Their most common vocalization is a loud *chi-CAW-go*. Birds in coveys make quieter clucks and other call notes.

Response to human activity or natural disturbances

- California Quails are hunted throughout most of their range, with little apparent effect on the species' long-term abundance (Raitt and Genelly 1964).
- Some pesticides cause mortality in California Quails. Local declines in abundance due to agricultural and urban development in parts of California have been substantial (Calkins et al. 2014).

Data gaps

- California Quails have been studied extensively, but little research has focused on the species' evolution and mating systems (Calkins et al. 2014).
- California Quail is one of the few non-passerines breeding in the United States that regularly hybridizes (with Gambel's Quail; Calkins et al. 2014).

Chukar *(Alectoris chukar)*

Natural history

Forest and Kim Starr

- Chukars are colorful game birds native to eastern Europe and southern and central Asia. In the early 20th century, the species was introduced throughout the United States for hunting, and became established in portions of the Intermountain West.
- Chukars are resident in much of the Great Basin, including eastern Oregon, and north through Idaho and eastern Washington. Isolated populations inhabit central California, Colorado, and northern Wyoming (Christensen 1996). Chukars are raised for hunting across the United States and Canada, and birds that escape or are released from rearing facilities often are encountered outside of the species' established range.
- Chukars forage on the ground and feed primarily on vegetation, especially grass and forb seeds. The majority of arthropods that Chukars consume are *Margarodes chukar*, a species associated with cheatgrass seeds that was named after it was discovered in the stomach contents of Chukars (La Rivers 1967).

Nesting

- Chukars are monogamous and males are aggressive toward conspecifics after a pair bond has formed, although it is unclear whether the species establishes discrete territories. After young fledge, they generally join multi-family coveys that may include more than a dozen adults and 100 or more juveniles (Christensen 1996).
- The nesting biology of Chukars in North America is poorly understood because nests are difficult to locate. Nests are a scrape in the ground and are lined with grass or feathers (Christensen 1996).
- Chukars are believed to lay one clutch per season, but this assumption has not been tested in North America. Each nest contains 10 to 21 eggs, although the prevalence of conspecific brood parasitism and the number of eggs produced per female are not known. The color of eggs varies (Christensen 1996).
- There are no data on egg-laying dates in Nevada or California, but estimates of the ages of juveniles suggest that the nesting season extends from April through August (Christensen 1996).
- Parasitism of Chukar nests by Brown-headed Cowbirds has not been documented.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Chukars increased rangewide from 1966 through 2012 and increased by an average of 3.6% per year from 2002 to 2012 in the Great Basin (Sauer et al. 2014).
- The eastern Sierra Nevada is near the western edge of the species' range.

Habitat

- Chukars occupy most land-cover types in the Great Basin. Their abundance is highest in canyons and on rocky slopes near water.
- We detected Chukars infrequently in woodlands in the Wassuk Range and did not detect them in the eastern Sierra Nevada.

Identification

- Chukars are medium-sized Galliformes. They are primarily light gray with black and white bars on their flanks. The head and throat pattern are distinctive. The white throat, chin, and lower cheek are framed with a thick black border that surrounds the eyes. The bill and legs are bright red. Males and females have similar plumage; immature birds are smaller than aduls.
- In the western Great Basin, Chukars may be confused with California Quail, Sooty Grouse, and Greater Sage-Grouse. California Quails have much darker plumage and characteristic head plumes. Sooty Grouse and Greater Sage-Grouse are larger, tend to occur in smaller groups, and have darker, more cryptic plumage.
- Chukars do not sing, but their common name reflects their song-like rallying cry, *kakakaka kakaka chuKAR chuKar*, which is loud, rises in volume, and often is made from a prominent perch or rock outcrop. Individuals in coveys make quiet clucking sounds and flushed birds make a loud alarm note in flight.

Response to human activity or natural disturbances

- Chukars benefit from disturbances such as fire and intensive livestock grazing. Hunting can reduce the species' abundance, although management of hunting and the species' remote habitat have minimized the effects of hunting (Christensen 1996).

Data gaps

- Most studies of Chukars have been related to management of its hunting. The species' basic life history and biology in the United States are not well known (Christensen 1996).

Sooty Grouse (*Dendragapus fuliginosus*)

Natural history

Robin Horn

- Until recently, Sooty Grouse and its sister taxon, Dusky Grouse, were considered a single species, Blue Grouse. Both Sooty Grouse and Dusky Grouse occur in the mountains of the western Great Basin, although they are not known to co-occur in a given mountain range.
- Sooty Grouse are resident from southeastern Alaska south through western Washington and Oregon, the Coastal and Cascade Ranges, and the Sierra Nevada. The species usually occurs in mountains but some populations, especially those on islands, may breed close to sea level (Zwickel and Bendell 2005).
- Migration of Sooty Grouse is not well understood. Most populations are believed to be elevational or short-distance migrants. Sooty Grouse breed in relatively open areas. They winter in areas with a greater density of trees, which may be at higher or lower elevations than their breeding habitat (Zwickel and Bendell 2005).
- In the western Great Basin, Sooty Grouse have been detected in the eastern Sierra Nevada. Dusky Grouse are present in many other mountain ranges further east in the Great Basin.
- Sooty Grouse feed primarily on plants, including fruits, buds, seeds, and leaves. The species forages on the ground and in shrubs and trees. Young birds also consume insects (Zwickel and Bendell 2005).

Nesting

- Territoriality and breeding behavior of Sooty Grouse have not been extensively studied. Males are territorial and frequently display from song perches early in the breeding season. Unlike many other grouse species, Sooty Grouse do not appear to use communal leks. Polygyny has not been confirmed but, given that males do not participate in the rearing of young, is likely (Zwickel and Bendell 2005). The species often forms small flocks from late summer through winter.
- Sooty Grouse have a single brood per season. They begin to lay eggs in late April or early May. Each clutch contains seven to ten (sometimes one to 12) eggs, which are pale with brown spots (Ehrlich et al. 1988, Zwickel and Bendell 2004).

- Sooty Grouse nest on the ground in areas with some form of cover (e.g., live vegetation, logs, or rocks) in a variety of land-cover types. The nest is a shallow scrape made by the female and lined with vegetation from the immediate vicinity (Zwickel and Bendell 2005).
- Parasitism of Sooty Grouse nests by Brown-headed Cowbirds has not been documented.

Status and trend

- The remote breeding habitats of Sooty Grouse are not well documented by the Breeding Bird Survey. Breeding Bird Survey data indicate that the abundance of the species is declining across its range, but data from the Great Basin and Sierra Nevada are too sparse to draw inferences about regional trends in abundance (Sauer et al. 2014).
- We rarely detected Sooty Grouse in the Wassuk Range, and did not detect them in the eastern Sierra Nevada.

Habitat

- Sooty Grouse occupy open areas in the western Great Basin, usually at relatively high elevations. The species occurs in shrubsteppe and grasslands and the edges of or openings within most types of woodlands (Zwickel and Bendell 2004).

Identification

- Sooty Grouse are large and have long tails. Adult males are dark gray with whitish bars on the undertail coverts and a blackish tail with a paler gray terminal band. Males have fleshy yellow supericilliary combs that are visible when they are not displaying and bare yellow neck sacks surrounded by white feathers that are hidden when they are not displaying. Adult females are similar to males but browner, with more-mottled body plumage and no fleshy breeding regalia. Juveniles are similar to adult females but smaller, especially early in the summer.
- Sooty Grouse are quite similar to Dusky Grouse, but the two species do not co-occur in the western Great Basin. Sooty Grouse are larger than quails and do not have head plumes. Greater Sage-Grouse may occur in similar vegetation but are larger, have a longer tail and heavier body, and adults have distinct blackish bellies.
- Male Sooty Grouse sing from elevated perches and can be heard at a substantial distance. The song is a series of six low, deep *woof* sounds delivered slowly. Both sexes make other noises, including clucks and barks.

Response to human activity or natural disturbances

- Sooty Grouse respond well to activities that result in thinning of trees or increases in the extent of open areas (Zwickel and Bendell 1985).
- The species is hunted across most of its range with minimal population-level effects (Zwickel and Bendell 2005).

Data gaps

- Relations between environmental attributes and local occupancy and density of Sooty Grouse have not been studied. Some aspects of the species' breeding behavior are unknown (Zwickel and Bendell 2005).

Cooper's Hawk (*Accipiter cooperii*)

Natural history

Phil Brown

- Cooper's Hawks are quiet and secretive. They often are seen pursuing avian prey.
- Cooper's Hawks occur year-round across most of the conterminous United States. Many populations include both resident birds and short-distance migrants. Populations in the northern Great Plains, New England, and southern Canada are migratory. Wintering and resident birds interact throughout the United States and most of Mexico (Curtis et al. 2006).
- Cooper's Hawks are present year-round in the western Great Basin, although the percentage of resident birds is unclear.
- Cooper's Hawks hunt by ambushing prey from a concealed perch. They occasionally hunt by walking on the ground and pouncing on small mammals and reptiles.
- The species' diet varies geographically. In the Mountain West, Cooper's Hawks may consume equal proportions of birds, mammals, and reptiles during the summer (Hoffman et al. 2002).

Nesting

- Cooper's Hawks are monogamous and sometimes maintain pair bonds across multiple years. Males and females defend a small territory around their nest site but do not establish foraging territories (Hoffman et al. 2002).
- Cooper's Hawks have one brood. In the Great Basin, most females lay eggs from late April to mid May. Each clutch consists of four or five (sometimes three) bluish-white eggs (Ehrlich et al. 1988, Hoffman et al. 2002).
- Nests are constructed in large trees, typically 8–15 m above the ground, with high levels of canopy cover. The male constructs the nest, which is cup-shaped and made of twigs, in a large fork or on a horizontal branch against the trunk.
- Brood parasitism is not known to occur in Cooper's Hawks.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Cooper's Hawks increased from 1966 to 2012 rangewide and in the Sierra Nevada and Great Basin. However, detection probabilities are low and the species is difficult to identify.

- Cooper's Hawks were uncommon in mixed woodland and riparian areas in the Wassuk Range. We did not detect them in the eastern Sierra Nevada.

Habitat

- Cooper's Hawks are adapted to maneuver and hunt in structurally complex environments, including forests and riparian areas. In recent decades, they increasingly have colonized urban and suburban areas (Hoffman et al. 2002).

Identification

- Adult Cooper's Hawks are small and lean. Their backs and the tops of their wings are slate-colored. The breast and belly are covered in fine, dense, reddish horizontal bars. The tail is long with alternating thin, dark bars and broad, whitish bars, and often has a broad, bright white tip. The cheeks are grayish to rufous and finely streaked; the eyes are red; the nape is pale gray, gradually darkening toward the center; and the crown is dark, contrasting with the paler nape and upper back. Females are larger than males and slightly browner on the back and wings.
- Juvenile plumage is distinctive. The back is brown, often with white or buff-colored feathers scattered throughout. The breast and belly are whitish with distinct, thin, sparse, blackish-brown vertical streaks that fade out before reaching the legs. The head is brownish and streaked with tan. The eyes are dull yellow. Northern Goshawks and Sharp-shinned Hawks have denser, blobby streaks that typically continue onto the undertail coverts.
- Cooper's Hawks are larger than Sharp-shinned Hawks and smaller than Northern Goshawks. Adult Northern Goshawks have a paler back and grayish, rather than reddish, bars on the breast. Adult Sharp-shinned Hawks have a dark nape and crown that blends with the back and makes the bird appear to be wearing a hood. In contrast, adult Cooper's Hawks appear to be wearing a cap. Cooper's Hawks have a slower, more even flight than Sharp-shinned Hawks.
- Cooper's Hawks are silent for most of the year but vocalize frequently during the breeding season. The most common vocalization is a loud, repetitive *kek kek kek kek*. Mated pairs make several additional calls in close proximity to the nest.

Response to human activity or natural disturbances

- The abundance of Cooper's Hawks decreased in response to hunting and pesticide use through the mid 20th century but rebounded after DDT and other pesticides were banned and hunting became less common (Hoffman et al. 2002).

Data gaps

- The increasing abundance of Cooper's Hawks near human development may be reducing the abundances of other species in these areas, especially American Kestrels (Hoffman et al. 2002).
- The migratory distances of Sharp-shinned Hawks have become shorter, likely in response to increased food availability in the winter near human development. The migratory distances of Cooper's Hawks, which are better adapted to living near human development than Sharp-shinned Hawks, also may be decreasing, but empirical data are not available (Hoffman et al. 2002).

Red-tailed Hawk (*Buteo jamaicensis*)

Natural history

David Pavlik

- Red-tailed Hawks are commonly seen perched along roadways or soaring overhead in open areas.
- Red-tailed Hawks breed from central Alaska east through central Quebec and the Maritime Provinces and south through most of Central America and the Caribbean. The species occupies much of its breeding range in winter.
- Migration of Red-tailed Hawks is prolonged and driven primarily by weather and prey availability in autumn. Northern populations migrate first, departing Canada as early as August (Preston and Beane 2009). Populations in the southern United States and further south are non-migratory but may be joined by northern migrants during winter. Spring migration takes place between February and May (Preston and Beane 2009).
- Red-tailed Hawks feed primarily on mammals, including squirrels and rabbits, captured from hunting perches or on the wing. The species also feeds on reptiles and birds, especially terrestrial species.

Nesting

- Red-tailed Hawks aggressively defend their home ranges from conspecifics. Territorial boundaries often are well-defined features such as rivers or roads. Territorial boundaries are consistent among years, although the identity of the individuals that occupy a given territory may change (Janes 2003).
- Red-tailed Hawks are monogamous. Members of resident populations maintain pair bonds across years, usually until a mate dies. Repairing occurs quickly after the death of a mate (Preston and Beane 2009). It is unknown whether migratory birds maintain pair bonds across years.
- Red-tailed Hawks have one brood per year but will renest after a failed attempt. Most clutches are initiated in mid March. Each contains two or three (sometimes four) eggs that are whitish with variable dark marks (Ehrlich et al. 1988, Preston and Beane 2009).
- Red-tailed Hawks nest in diverse woodlands. The nest tree typically is larger and taller than surrounding trees and is near the edge of a large meadow, agricultural area, or other opening. The species sometimes nests on rock outcrops or buildings.
- The nest is a large, bulky cup of small branches that is lined with finer vegetation. Red-tailed Hawk nests often can be detected from the ground.
- Brood parasitism has not been documented in Red-tailed Hawks.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Red-tailed Hawks increased rangewide and in the Great Basin by an average of almost 2% per year from 1966 to 2012 (Sauer et al. 2014).
- Red-tailed Hawks are a common breeding species in the Great Basin.

Habitat

- Red-tailed Hawks occur in open woodlands, including those in suburbs and cities. In sagebrush steppe, individual birds may occur far from the nearest tree, especially where fences or utility poles serve as hunting perches.

Identification

- Red-tailed Hawks are bulky and broad-winged. The subspecies that occurs in the Great Basin, *B. j. calurus*, has three color morphs and a full continuum of intermediate forms. All adults have pale, barred flight feathers; a brick-red tail; and wings with a solid, dark trailing edge. Light-morph birds (about 80% of individuals) have brown heads and backs; a whitish breast and belly; and a well-defined band of thick, dark streaks across the belly. Intermediate-morph birds are darker overall, with a solid dark belly and a dark reddish upper breast. The body and wings of dark-morph birds (the scarcest form) are solidly blackish-brown, often with no visible contrast between the belly and upper breast. Females are larger than males. Juvenile birds have pale tails with low contrast, brownish bars, and more white mottling on their backs and underwing coverts than adults.
- Red-tailed Hawks are smaller than Golden Eagles and are bulkier and have relatively shorter tails than *Accipiter* species. Three other *Buteo* (Ferruginous Hawk, Rough-legged Hawk, and Swainson's Hawk) occur in the western Great Basin. Adult Red-tailed Hawks have reddish tails. Juvenile birds are best distinguished by their belly bands, evenly barred tails and flight feathers, and unfeathered tarsi. In flight, light-morph Red-tailed Hawks have dark marks on the leading edge of their underwing (patagium). All morphs have broad wings with bulging secondaries.
- The most common vocalization is a loud, raspy scream that fades toward the end, *cheeeeeaaa*. The vocalization of Red-tailed Hawks usually is longer and hoarser than that of other *Buteo*. Shorter versions of the scream sometimes are repeated.

Response to human activity or natural disturbances

- The distribution and abundance of Red-tailed Hawks likely increased in the 19th and 20th centuries due to deforestation and fire suppression that increased the area of its habitat and reduced the area of habitat of its congeners; Red-tailed Hawks replaced those congeners in many areas (Preston and Beane 2009).
- Red-tailed Hawks are relatively tolerant of human development and disturbance.

Data gaps

- Red-tailed Hawks are well-studied, but the relations among subspecies and the total abundance of the species are uncertain. Populations in Central America and the Caribbean have not been studied as thoroughly as those in the United States and Canada (Preston and Beane 2009).

American Kestrel (*Falco sparverius*)

Natural history

Dan Irizarry

- American Kestrels are small, colorful falcons frequently seen perched on roadside utility wires in open areas.
- American Kestrels are widespread birds of prey that breed throughout most of the United States and Canada. The proportion of birds that migrate decreases from north to south. The species is resident but uncommon in the Great Basin (Smallwood and Bird 2002).
- Feeds primarily on insects and small vertebrates that are spotted from a high, exposed perch and then tackled with agile, direct flight.

Nesting

- American Kestrels are primarily monogamous. They sometimes form pair bonds during winter, although extraparental assistance and copulation have been documented (Smallwood and Bird 2002).
- Territory size and overlap is poorly understood and likely varies considerably as a function of food and nest-site availability. Estimates of nest density range from 0.11–24.7 nests per km^2 (Bird and Palmer 1998).
- American Kestrels nest in holes created by woodpeckers or in natural cavities. The species also uses man-made nest boxes. Most nests have exposed entrances with minimal concealing vegetation (Rohrbaugh and Yahner 1993), and are located near large (>20 hectare) open areas in which the birds can hunt (Smallwood and Bird 2002).
- No nesting material is brought to the cavity. Females make a rough scrape in existing nest material or the cavity substrate before laying eggs (Smallwood and Bird 2002).
- American Kestrels generally have one brood per season. They lay four or five eggs, which vary in color (Smallwood and Bird 2002).
- Nesting dates vary from mid March at the southern end of the species' range to late May at the northern end of the range (Smallwood and Bird 2002).
- No known instances of brood parasitism, although nesting cavities and incubation duties sometimes are shared with Eastern Screech-Owls (Breen and Parrish 1996).

Status and trend

- The abundance of American Kestrels likely increased substantially in the 18th and 19th centuries as widespread deforestation created habitat for the species. Changing land-use patterns, including urbanization and reforestation, coincided with stabilization of abundance (Smallwood and Bird 2002).
- Breeding Bird Survey data suggest that the rangewide abundance of American Kestrels declined by an average of 2.5% per year from 1966 to 2012. Abundance in the Great Basin and Sierra Nevada also declined (Sauer et al. 2014).
- Local abundance is relatively stable among years.

Habitat

- American Kestrels require large, open areas for hunting. They use almost any such area regardless of dominant vegetation, including shrublands, golf courses, agricultural fields, and marshes. They often hunt from tall perches provided by trees or utility wires. The introduction of nesting boxes has allowed the species to colonize previously unoccupied open spaces that lack natural cavities.
- American Kestrels were scarce in mixed woodland in the eastern Sierra Nevada and Wassuk Range. The species is more abundant at lower elevations in the region. The small number of detections in the eastern Sierra Nevada may reflect a lack of nesting cavities in close proximity to foraging areas.

Identification

- American Kestrels are the smallest North American raptors, and easily recognizable. Both sexes have rusty tails and backs, bluish crowns, a streaked breast, and two vertical black streaks across a white face. Males are distinguished from females by bluish, rather than rusty, wings.
- The only other raptor close in size, the slightly larger Merlin, is always much darker, has a less distinct facial pattern, and lacks reddish tones. American Kestrels may be mistaken for large passerines or doves when perched, but their long, pointed wings in flight and sharp-hooked bills distinguish them as falcons.
- The most commonly heard vocalization is a loud *klee* repeated three to six times, often in flight. Other vocalizations made by interacting pairs and near the nest include quieter whinnies and chitters (Willoughby and Clade 1964).

Response to human activity or natural disturbances

- American Kestrels were hunted widely until the 1930s. Some illegal hunting likely still occurs, but is not considered a major threat (Smallwood and Bird 2002).
- Reproduction decreased in response to use of DDT and other pesticides during the 20th century, but increased following limitations on use of pesticides.
- Mortality from vehicular strikes is frequently documented. The species' use of roadside utility wires for hunting perches may increase the probability of such strikes (Smallwood and Bird 2002).
- Land-use change can have a considerable affect on local populations, either positive or negative.

Data gaps

- Post-fledgling dispersal and mortality are poorly understood due to the species' long-distance migrations (Smallwood and Bird 2002).

Killdeer (*Charadrius vociferous*)

Natural history

David Pavlik

- Killdeer are common in diverse open areas, and are easily detected by their loud, conspicuous alarm calls and displays.
- Killdeer breed from central Canada south through the conterminous United States, most of Mexico, and the Caribbean. The species' migration is poorly understood, but Killdeer are not present in Canada, the upper Great Plains and Midwest, and most of New England during winter. Northern migrants apparently overlap with resident birds in the southern United States and Mexico and occur as far south as Peru and Chile (Jackson and Jackson 2000).
- The species is present in the western Great Basin year-round, although its abundance appears to decrease during winter. This decrease is likely due to some individuals moving out of areas with snow and others migrating south.
- Killdeer are early migrants, often arriving on their northern breeding grounds in early March. Autumn migration appears to coincide with reduction in availability of water in the arid west and first snowfall in the north, but peak movements typically occur in August or September (Jackson and Jackson 2000).
- Killdeer feed on terrestrial invertebrates, especially earthworms, beetles, and snails, and occasionally on small vertebrates and plants (Jackson and Jackson 2000).

Nesting

- Male Killdeer defend their mates and territories around their nest sites during the breeding season. Resident birds in the southern United States have been observed defending territories year-round (Myers et al. 1979).
- Killdeer are monogamous, and some pairs remain together for multiple years (Lennington and Mace 1975).
- When a perceived threat, including humans, approaches a Killdeer nest, a parent performs an elaborate broken-wing display, running along the ground away from the nest with a wing extended in an attempt to draw the threat away from the nest.
- Killdeer will renest as many as six times in a season to replace failed nests. Northern breeding populations rarely raise more than one brood per year, but southern resident birds may raise as many as three broods in a year (Schardien 1981). In the Great Basin, eggs usually are laid in late March. Each clutch consists of four tan or dull yellow eggs (Jackson and Jackson 2000).
- Killdeer nest on the ground in areas with almost no visual obstructions or concealing vegetation (Kantrud and Higgins 1992). The nest is a shallow scrape that is lined with assorted material after egg laying begins. Killdeer often place white objects in their nests, including shells, cigarette filters, bone, and pebbles (Jackson and Jackson 2000).
- Brood parasitism has not been documented.

Status and trend

- The abundance of Killdeer decreased across their range from 1966 through 2012, including average declines of 2-4% per year in the Great Basin and Sierra Nevada (Sauer et al. 2014). The reasons for these declines are unclear, but the species remains common and abundant across most of its range.
- We rarely detected Killdeer in the Wassuk Range and did not detect them in the eastern Sierra Nevada.

Habitat

- Killdeer occur in almost any open area with low or no vegetation, generally near wet areas. The species occupies many human-altered landscapes, including golf courses, sewage ponds, and gravel road beds.
- In the western Great Basin, Killdeer are associated with wet areas at lower elevations or with agriculture.

Identification

- Killdeer are medium-sized, long-winged, and long-tailed. The back, rump, and wing coverts are brown or reddish brown. The flight feathers are blackish with a broad, white horizontal stripe. The head is brown and the neck has a white collar. The face has a white supercilium, lores, and forehead. The belly and breast are white with two horizontal black bands across the upper breast. Adult males and females are similar. Juveniles leave the nest at a young age and are much smaller than adults. Older juveniles are similar in size to smaller plover species but have a more disheveled appearance.
- Killdeer are the only plovers in most of the western Great Basin. The much rarer Snowy Plover may overlap at low elevations but is smaller and paler.
- The most common vocalization is a high, repeated *deeee* or *tendeee*, often made by agitated birds. Variations of these sounds are also used as display songs.

Response to human activity or natural disturbances

- Killdeer have benefited from human clearing of forests and activities that leave extensive bare ground, especially in eastern North America.
- Pesticides may cause direct mortality of Killdeer and reduce the abundance of their invertebrate prey (Jackson and Jackson 2000).

Data gaps

- Killdeer are well studied in the United States and Canada, but there is little information on their wintering biology in Central and South America.

Wilson's Snipe (*Gallinago delicata*)

Natural history

Fyn Kind

- Wilson's Snipes are secretive. They often crouch in vegetation and flush only when approached closely.
- Wilson's Snipes breed in Alaska, Canada except the Arctic Archipelago, the Pacific Northwest, the Sierra Nevada, throughout the northern Great Basin, and the Rocky Mountains south through Colorado. The species winters in its breeding range in the United States south to Colombia and Venezuela, in the eastern half of the United States as far north as Iowa, and along the Atlantic seaboard north to Massachusetts.
- Most populations of Wilson's Snipe are migratory. Some birds in southeast Alaska, British Columbia, and the western United States are resident, but it is unclear what proportion of birds in these areas during winter are migrants from the north. Most migrants arrive on their breeding grounds in March or April (Mueller 1999).
- Autumn migration is protracted. Individuals may linger in the north until the ground freezes, sometimes remaining further north than usual during mild winters. Southbound migration is typically from August to November (Mueller 1999). The species may move long distances during winter in response to severe weather.
- Wilson's Snipes feed on moist, open ground or in shallow water where they insert their entire bill into the mud to probe for insect larvae, mollusks, and crustaceans.

Nesting

- Males defend breeding territories, which do not include foraging areas, by song flights and by sparring with intruder males (Tuck 1972). The species is mostly solitary outside of the breeding season but forms loose flocks in winter near exceptional feeding areas or when soft soil is limited.
- Although monogamous, extra-pair copulations are common (Mueller 1999).
- Nests are constructed in shallow scrapes on the ground in wet areas, often close to the margin of standing water and in clumps of thick vegetation (Tuck 1972).
- Unlike most shorebirds, Wilson's Snipes weave a nest from grasses (Mueller 1999).
- Wilson's Snipes are believed to have one brood per year but will renest after failed attempts. Four (sometimes two or three) eggs, which are olive-brown with dark brown spots, are laid from March through July (Ehrlich et al. 1988, Mueller 1999).
- Parasitism by Brown-headed Cowbirds has not been documented.

Status and trend

- Breeding Bird Survey data suggest that rangewide abundance of Wilson's Snipes was stable from 1966 to 2012. Abundance in the Great Basin decreased by an average of over 1% per year during that period (Sauer et al. 2014).
- Wilson's Snipe is one of the most abundant shorebird species in North America. Abundance estimates range from about 5 million to 80 million (Mueller 1999).

Habitat

- Wilson's Snipes occur in wet areas with patchy vegetation, including sedge bogs, fens, some swamps, and the moist edges of larger bodies of water. The species rarely occurs in areas with thick, tall vegetation such as *Phragmites*.
- Wilson's Snipes were scarce in the eastern Sierra Nevada, and we did not detect them in the Wassuk Range.

Identification

- Wilson's Snipes are chunky and medium-sized with outsized bills. The back and wings have an intricate but cryptic brown, black, and buff pattern. Four buffy, longitudinal stripes usually are visible on the upperparts of resting birds. The head has thick, alternating brown and black stripes. The underparts and throat are whitish with dark brown bars that fade toward the belly. The orange tip of the tail is visible in flight. The appearance of all ages and both sexes is similar.
- The body shape and habitat of Wilson's Snipes are different from those of other sandpipers in the Great Basin. Long-billed Dowitchers have a bill with a similar shape but are larger, have longer legs, and occur in mudflats and in shallow water at lower elevations during migration.
- Wilson's Snipes do not have a true song but produce a winnowing sound with their outer tail feathers and wings in flight that serves a similar territorial and breeding function. The winnow is a hollow, tremulous whistle, *huhuhuhuhuhu*, that resembles the calls of some relatively small owls.
- Wilson's Snipes make a harsh flight call, *scresh*, when flushed and a repeated *tik tik tik* from perches or on the ground during the breeding season. This call may function as an alarm or warning (Mueller 1999).

Response to human activity or natural disturbances

- The effects of hunting are unclear. Estimates of annual harvest range from 500,000 to 900,000 birds (Mueller et al. 1999). Bent (1927) described a large decrease in the species' abundance from hunting in the late 1800s and early 1900s.
- Wilson's Snipes are negatively affected by loss of wetlands, especially their wintering habitat. The majority of wintering birds in the United States may use pastures and rice fields (Tuck 1972).

Data gaps

- The rangewide abundance of Wilson's Snipe, local trends in abundance, and drivers of abundance are poorly understood.
- Females have much longer bills than males, but few other consistent differences. The biological significance of this difference is unknown (Mueller 1989).

Mourning Dove (*Zenaida macroura*)

Natural history

Sam Heinrich

- Mourning Doves are among the most familiar birds in North America. They frequently are seen foraging in the open or perched on utility wires.
- Mourning Doves breed throughout southern Canada, the conterminous United States, and most of Mexico. They occupy nearly the same areas during winter but are absent from the northern Great Plains, and winter migrants reach most of South America (Otis et al. 2008).
- Migration patterns vary latitudinally. Northern birds may migrate hundreds or thousands of miles, mid-latitude birds are short-distance migrants, and birds that breed in the southern United States and Mexico are resident (Otis et al. 2008).
- Mourning Doves are granivorous and often feed on crops. They feed in areas with bare ground or short vegetation because their short legs limit their mobility in taller vegetation.

Nesting

- Prior to pair-bond establishment, males defend a small territory around their song perch. After a pair bonds, a nesting territory is established. Males chase conspecific intruders and other bird species, especially nest predators. Mourning Doves are monogamous and may have the same mate for multiple seasons (Otis et al. 2008).
- Many Mourning Doves have multiple broods per year. Broods are separated by approximately 30 days (Otis et al. 2008). In the western Great Basin, nesting begins in April or May and can continue through August. Most clutches include two eggs (Ehrlich et al. 1988). Larger clutches are assumed to be the result of conspecific brood parasitism (Weeks 1980).
- Nests are constructed on almost any relatively flat platform, including the ground, tree branches, and man-made structures. The nest is a flimsy, loose cup of twigs that the female constructs around her body.
- Interspecific brood parasitism has not been documented. Conspecific brood parasitism is rare (Weeks 1980).

Status and trend

- Trends in abundance of Mourning Doves are inconsistent across its range, but Breeding Bird Survey data suggest that the species' abundance in the Great Basin decreased by an average of 1-2% per year from 1966 to 2012 (Sauer et al. 2014).
- Mourning Dove is among the most abundant species of bird in North America, with an estimated 200-350 million individuals (Otis et al. 2008).

Habitat

- Mourning Doves occupy almost all land-cover types with the exception of dense forest interiors.
- The species was common in the Wassuk Range and less common in the eastern Sierra Nevada.

Identification

- Mourning Doves are medium-sized doves with long, pointed tails. The birds are uniformly gray-brown, with black spots on the wing coverts and behind the eye. The tail is gray-brown with white tips. Males and females are similar in appearance.
- Mourning Doves are smaller than the two introduced species of columbid in the western Great Basin, Rock Pigeon and Eurasian Collared-Dove. Eurasian Collared-Dove is local and usually is restricted to areas of human activity, but its abundance is increasing. Mourning Doves lack a distinctive dark collar. Their tails are longer and have smaller white tips than those of Eurasian Collared-Doves.
- Mourning Doves' song is typical of columbids in its deep, owl-like quality. Song structure varies but is usually a slow *oooah, oooh, ooh, ooh*. The wings produce a whistling sound in flight that is strongest at take-off.

Response to human activity or natural disturbances

- Autumn harvest of the species in the United States is estimated at 20 million birds or 7% of the population (Dolton and Rau 2006). Nevertheless, the relation between hunting and population dynamics is uncertain (Otis et al. 2008).

Data gaps

- Mourning Doves are extensively studied, but there are gaps in knowledge about effects of harvest (Otis et al. 2008).

Northern Saw-Whet Owl (*Aegolius acadicus*)

Natural history

David Pavlik

- Northern Saw-Whet Owls are secretive and nocturnal, and their distribution is not fully understood.
- The species is believed to breed from southeast Alaska and coastal British Columbia east to central Canada and south to the Great Lakes, New England, and the mountains of the western United States. The species is believed to winter across its breeding range and throughout most of the conterminous United States (Rasmussen et al. 2008).
- The species probably breeds at higher elevations in most mountain ranges in the western Great Basin, but its exact distribution is not known.
- Some individuals rangewide are resident. Many birds in the West are believed to move to lower elevations during winter (Rasmussen et al. 2008). The species irrupts about every four or five years (Rasmussen et al. 2008). Spring and autumn migrations usually peak in May and October, respectively (Rasmussen et al. 2008).
- Northern Saw-Whet Owls feed almost exclusively at night, hunting from low branches or fence posts near forest edges or in woodlands. Most prey are small mammals, which are detected by sound and then ambushed. Small birds and large insects occasionally are taken, especially during migration (Rasmussen et al. 2008).

Nesting

- Territoriality is poorly understood. Nests appear to be well-spaced given the bird's small size, but these observations may reflect low detection probability and low breeding density rather than the true size of territories (Rasmussen et al. 2008).
- Northern Saw-Whet Owls are believed to be primarily monogamous, but polygyny has been reported in areas of relatively high density (Marks et al. 1989).
- The number of broods per year has not been evaluated in the wild. Many captive pairs initiate a second brood after fledging of the first (Krahe 2001).
- Egg laying begins between late February and early July across the breeding range, with most of the later dates believed to correspond to second broods (Rasmussen et al. 2008). Most clutches contains five or six eggs (Ehrlich et al. 1988).
- Northern Saw-Whet Owls nest in the abandoned cavities of large woodpeckers (Pileated Woodpeckers or Northern Flickers), nest boxes, and occasionally natural cavities (Rasmussen et al. 2008).
- The species does not add nesting material to the cavity but often will lay eggs in nesting material left over from previous occupants (Rasmussen et al. 2008).
- Brood parasitism has not been documented.

Status and trend

- Northern Saw-Whet Owl abundance is not measured by the Breeding Bird Survey. The large number of individuals banded during migration suggests high abundance (Rasmussen et al. 2008).

Habitat

- Northern Saw-Whet Owls occur in diverse land-cover types. Birds generally use different tree types for roosting and nesting. During the day, they roost in dense conifers. Many nests are in aspen or other deciduous trees.
- During winter, the species typically occurs in dense conifers. Individual birds will return to the same daytime roost for weeks or months.
- We rarely detected Northern Saw-Whet Owls in the Wassuk Range and did not detect them in the eastern Sierra Nevada, but our surveys were not designed to detect noctural species.

Identification

- Northern Saw-Whet Owls have large, round heads and no ear tufts. The back and wings are brown, with white spots on the scapulars and wing coverts. The head is blackish-brown with white flecks and a pale brown facial disk. The facial disk has a white v-shape that extends from above the nostrils to above the eyes, which are bright yellow. The breast and belly are whitish with broad, vertical brown streaks. Adult males and females are similar. Juveniles are similar to adults but have pale brown, unstreaked breasts, no spots on the scapulars, and blackish facial disks.
- Most other owl species in the western Great Basin are much larger than Northern Saw-Whet Owls. Western Screech-Owls are similar in size but have prominent ear tufts and are more uniformly patterned. Northern Pygmy-Owls are active during the day, smaller, and have a longer tail and less distinct facial disk.
- Northern Saw-Whet Owl song is a repeated, low whistle, *toot toot toot*, with about two seconds between notes. Northern Pygmy-Owl song is similar but the notes are more emphatic, repeated faster, and sometimes paired.

Response to human activity or natural disturbances

- Timber harvest can have a negative effect on Northern Saw-Whet Owls given their occupancy of old-growth forests and use of snags (in which Northern Flickers excavate cavities) for nesting (Rasmussen et al. 2008).

Data gaps

- Variation in breeding behavior and ecology of Northern Saw-Whet Owls is not well understood (Rasmussen et al. 2008). Many gaps remain in understanding of the geographic range, migration, and annual variation in distribution of Northern Saw-Whet Owls (Rasmussen et al. 2008).

Common Nighthawk (*Chordeiles minor*)

Natural history

Ernie Miller

- Common Nighthawks are often seen patrolling the skies in search of insects on warm summer nights.
- Common Nighthawks breed throughout most of Canada and the United States, with the exception of high latitudes and portions of the southwestern United States. The species has been confirmed breeding south to Panama and may breed as far south as Colombia (Brigham et al. 2011).
- Common Nighthawks are believed to winter primarily in South America, but their distribution is unclear due to limited study and the difficulty of distinguishing them from Lesser Nighthawks (Brigham et al. 2011).
- Common Nighthawks have one of the longest migrations of any North American land bird. Most individuals do not arrive in the Great Basin until late May or early June, and most depart from the region by late July (Brigham et al. 2011).
- Primarily crepuscular, feeding occasionally during the day and rarely at night. They capture flying insects on the wing. Their altitude while hunting varies from less than 1 m over water to more than 80 m above forest canopies (Brigham 1990).

Nesting

- The territoriality and mating system of Common Nighthawks is largely unknown. Territorial defense by males has been documented but appears inconsistent. The species is generally solitary during the breeding season, but males are sometimes documented roosting together (Brigham et al. 2011).
- Common Nighthawks nest directly on the ground or on flat, gravel roofs. No nest is constructed and the site usually has minimal vegetation.
- On the basis of the species' short breeding season, Common Nighthawks are presumed to be single-brooded across their range, but it has been speculated that more-southern breeding populations may have two broods. Individual females may reuse the same nest site for consecutive years. Each clutch consists of two pale eggs with heavy, dark spots (Brigham et al. 2011).
- Brood parasitism has not been documented.

Status and trend

- Because they are crepuscular, Common Nighthawks and other nightjars may not be well documented by standard ornithological survey methods, including those of the Breeding Bird Survey. Nevertheless, Breeding Bird Survey data suggest that the rangewide abundance of Common Nighthawks decreased by an average of 1-2% per year from 1966 to 2012 (Sauer et al. 2014).
- We detected the species infrequently in the eastern Sierra Nevada and Wassuk Range, but these records may not accurately reflect local abundance.

Habitat

- Common Nighthawks use diverse habitats for roosting, nesting, and foraging. Nesting requires patches of bare ground, but the patches can be small and within a mosaic of taller vegetation. The species roosts on horizontal tree limbs, man-made structures, and often on bare ground; it rarely roosts or nests in dense forest.

Identification

- Common Nighthawks have cryptic plumage and are difficult to see during the day. Most of the body is covered with mottled black, brown and gray marks. In flight, a striking, white bar on each wing and a pale throat patch are the only noticeable features on a drab, dark silhouette. Adult females have buffy throat patches, whereas adult males have white patches. Immature males and females have lighter-colored plumage and their throat patches are small or absent (Brigham et al. 2011).
- In the western Great Basin, Common Nighthawks are most likely to be confused with Common Poorwills. At rest, Common Poorwills appear to have a shorter tail and wing projection and a comically large head. In flight, Common Poorwills are less graceful than Common Nighthawks and have a choppier flight, whereas the flight of Common Nighthawks is more acrobatic and falcon-like. Common Poorwills do not have white underwing markings.
- Common Nighthawks also may be confused with White-throated Swifts, which have a similar shape. However, the swifts are smaller than Common Nighthawks and their wing beats are so rapid they often blur together. No raptor species has prominent, white bars on the underwing and no species of owl is as agile in flight.
- Common Nighthawks do not have a true song. The most common vocalization is a harsh, nasal *peeent* by males on the wing during breeding season. Males also make an abrupt, loud, booming *hooov* at the end of their steep display dives, produced by air rushing through their flexed wing feathers.

Response to human activity or natural disturbances

- Common Nighthawks frequently nest on flat, gravel roofs in urban areas. They cannot nest on buildings with pitched or rubber roofs. The species also may be affected by use of pesticides that reduce prey abundance (Brigham et al. 2011).

Data gaps

- The migration and winter biology of Common Nighthawks is not well understood. Little is known about the abundance of the species, especially in the northern portion of its breeding range (Brigham et al. 2011).

White-throated Swift (*Aeronautes saxatalis*)

Natural history

Carl Jackson

- White-throated Swifts generally occur near extensive cliffs, bluffs, or canyons.
- Breeds from eastern Washington and Idaho south through the Great Basin, Sierra Nevada, Rocky Mountains, coastal California, southern deserts, Baja California south to Oaxaca, and some highlands in Central America. The species winters in coastal and southern California east through southern Nevada, Arizona, New Mexico, and west Texas and throughout its breeding range in Mexico and Central America (Ryan and Collins 2000). A disjunct wintering population occurs in the Texas panhandle (Seyfert 1993).
- The species is common but local in canyons of the western Great Basin.
- Northern populations, including those in the Great Basin, are migratory. Southern populations are believed to be resident. The wintering grounds of northern populations are not known but are believed to overlap with the habitat of southern resident birds. Spring migrants arrive from mid April to early May and autumn migrants depart from late September through October (Ryan and Collins 2000).
- Populations typically return to the same breeding sites and wintering roosts every year. At least one breeding site was used for at least 54 years (Dobkin et al. 1986). Whether individual birds return to the same sites each year is unclear.
- White-throated Swifts are insectivorous. They capture flying insects on the wing and often hunt in small groups high above the ground (Bent 1940). The species' winter diet has not been studied.

Nesting

- Whether White-throated Swifts are territorial is unknown. They nest singly or in small groups and winter in roosts of hundreds of birds (Ryan and Collins 2000).
- White-throated Swifts have courtship flights in which a male and female interlock their feet high in the air and tumble towards the ground, sometimes falling hundreds of meters before separating just above the ground. They are believed to be monogamous, but little is known about breeding behavior (Bent 1940).
- White-throated Swifts nest on vertical rocks or man-made structures, often on shelves within cracks or fissures.
- The nest is a shallow, flattened cup that may include grass, hair, feathers, and man-made items. The nest materials are glued together and to the rock by saliva. White-throated Swifts fly as far as 12 km to retrieve nesting material (Bent 1940).
- White-throated Swifts begin laying eggs in mid May or early June (Ryan and Collins 2000). The species has one brood per year. Each clutch contains four or five (sometimes three or six) whitish eggs (Bent 1940, Ehrlich et al. 1988).
- Parasitism of nests by Brown-headed Cowbirds has not been documented.

Status and trend

- Because White-throated Swifts have a patchy distribution and tend to breed in areas that are difficult to access, they not sampled effectively by the Breeding Bird Survey. The limited data suggest a decrease in abundance (Sauer et al. 2014).
- We rarely detected White-throated Swifts in the Wassuk Range and did not detect them in the eastern Sierra Nevada.

Habitat

- White-throated Swifts generally roost at elevations of 1000 to 3500 m but often travel far in search of food. In the Great Basin, small groups often fly up and down canyons and feed above the riparian zone.
- White-throated Swifts are not sampled well with point counts, and their occupancy and abundance in the western Great Basin may be higher than we estimated.

Identification

- White-throated Swifts are medium-sized apodids. The body is blackish except for contrasting whitish patches on the face, throat, center of the breast and belly, sides of the rump, and trailing edge of the secondaries and tertials. Adult males and females are identical. Juveniles have duller white patches and paler heads.
- White-throated Swifts are distinguished from all other swifts in the United States by their black and white plumage. Vaux's Swifts, which migrate through the Great Basin, are much smaller and paler. Black Swifts, rare and local breeders in the Great Basin, are uniformly dark and larger than White-throated Swifts.
- White-throated Swifts may be confused with swallows in flight and sometimes co-occur with swallows while foraging. White-throated Swifts have longer, leaner wings, are slightly larger, appear darker below, fly with choppier wingbeats and more erratic changes of direction, and generally forage higher above the ground.
- White-throated Swifts are not known to have a true song. They frequently make a long, descending *he he he he kir kir kir krsh krsh* call on the wing. The vocalization, initially high and twittering, descends into a complex and chaotic finish. The calls often echo from canyon walls, and the birds may be heard before they are seen.

Response to human activity or natural disturbances

- White-throated Swifts have adapted to roost in man-made structures, including bridges and overpasses. Mining, rock climbing, and the demolition of old structures (e.g., bridges, overpasses) may be stressors (Collins and Johnson 1982).

Data gaps

- Little is known about the biology and ecology of White-throated Swifts, especially during winter.

Calliope Hummingbird (*Selasphorus calliope*)

Natural history

David Pavlik

- The smallest birds that breed in the United States and Canada, Calliope Hummingbirds are more tolerant of cool climates than most of their larger-bodied relatives.
- Calliope Hummingbirds breed from the mountains of interior British Columbia south along the Sierra Nevada, in the Rocky Mountains of Idaho and Montana, and in the Wasatch Range in Utah. They are scarce and local breeders in some mountain ranges in northern Nevada. The species usually occurs at elevations between 1200 m and 3400 m, but breeds at elevations as low as 165 m in the northern end of its range (Bent 1940).
- Calliope Hummingbirds winter in Mexico from Sinaloa and Durango south to Oaxaca (Calder and Calder 1994).
- Calliope Hummingbird is a poorly understood species. The migratory route is believed to be oval, with birds traveling up the Sierra Nevada in spring and following the Rocky Mountains south in autumn (Phillips 1975).
- Calliope Hummingbirds feed on insects, nectar, and sap. Flying insects are captured by hawking: birds sit on an exposed perch, then fly out to capture winged insects. Calliope Hummingbirds frequently drink sap and capture insects at holes on tree trunks made by sapsuckers (Calder and Calder 1994).

Nesting

- Calliope Hummingbirds are highly territorial during the breeding season and antagonistically chase conspecific males, other hummingbird species, and species as large as Red-tailed Hawks. The species behaves as a subordinate toward larger hummingbird species during migration and winter (Calder and Calder 1994).
- Little is known about nesting. Each clutch consists of two small, white eggs (Calder and Calder 1994).
- The species typically nests in conifers where an overhanging branch insulates the nest and protects it from precipitation and predation (Calder and Calder 1994).
- The cup-shaped nests of Calliope Hummingbirds are often constructed on the base of an old pine cone and held together with spider silk. The outside of the cup is camouflaged with moss and lichen, whereas the interior is lined with soft, insulating plant material (Bent 1940).

- Whether Brown-headed Cowbirds parasitize Calliope Hummingbird nests is unknown, but is unlikely given the small size of the hummingbirds' nests.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Calliope Hummingbirds decreased by an average of 0.3% per year across their range between 1966 and 2012, with larger decreases near the edges of the species' range. Over the same period, abundance decreased in the Sierra Nevada by an average of 6% per year and increased in the Great Basin by 3% per year (Sauer et al. 2014).
- Calliope Hummingbirds were uncommon in the eastern Sierra Nevada. We did not detect them in the Wassuk Range.

Habitat

- Calliope Hummingbirds inhabit relatively cool wet meadows, riparian corridors, and open woodlands, usually above 1500 m during the breeding season. They occupy some lower elevations during migration, and may visit feeders and gardens.

Identification

- A small, plump hummingbird. The back is a glossy bronze-green and the tail feathers are bronze-green with rust-colored bases. The breast and belly are grayish with a cinnamon wash across the flanks. The male's gorget is metallic purple with elongated feathers that extend onto the side of the neck. By contrast, the female's throat is pale gray to white and lightly flecked with metallic bronze. The appearance of immature birds is similar to that of adult females.
- In the western Great Basin, Calliope Hummingbirds may be confused with Broad-tailed and Rufous Hummingbirds. The shape and color of the male's gorget is distinctive. Females lack the rust-colored undertail coverts and metallic central throat spot of female Rufous Hummingbirds. Female Calliope Hummingbirds are difficult to distinguish from female Broad-tailed Hummingbirds. The most reliable way to distinguish between the two species is by Calliope Hummingbirds' proportionally smaller tail that does not extend beyond the folded wingtips.
- Vocalizations are infrequent and have not been well studied. Typical of hummingbirds, the species twitters during antagonistic encounters and makes a buzz near the end of its display dive that may be a combination of vocalization and wing noise (Calder and Calder 1994).

Response to human activity or natural disturbances

- Hummingbird feeders may provide supplementary food that increases the abundance of local populations above natural carrying capacity, but few empirical data exist to test this hypothesis. The species has been documented in early successional shrubs after trees were clear-cut, but the long-term effects of timber harvest on the species are unknown (Calder and Calder 1994).

Data gaps

- Calliope Hummingbird is one of the least studied hummingbird species in the United States. Studies have not been conducted on the species' survival, recruitment, developmental biology, molt, or phylogeny (Calder and Calder 1994).

Broad-tailed Hummingbird (*Selasphorus platycercus*)

Natural history

Erik Enbody

- A bold, active hummingbird of the Mountain West whose loud territorial patrols are often interrupted by spectacular display dives.
- Summer resident in the central and southern Rocky Mountains and the mountains of the Intermountain West. The entire United States population winters in montane regions of Mexico, where the birds join resident populations of Broad-tailed Hummingbirds.
- Common at intermediate and high elevations throughout the central Great Basin; less abundant near the western edge of the region.
- Arrives in the Great Basin from late April to early May and departs in August.
- Feeds primarily on nectar but also will capture small insects, especially when feeding young.

Nesting

- Males are highly territorial and have been documented chasing intruders off their territories as frequently as 40 times per hour (Calder and Calder 2013). Territories are defended from both rival males and other hummingbird species. Mean territory size is approximately 4300 square meters, varying as a function of food availability and density (Miller and Inouye 1983).
- Broad-tailed Hummingbirds are promiscuous and have minimal pair bonds. Females are attracted to territories by nectar sources and male display flights. Males do not engage in nest construction, incubation, or rearing of nestlings but allow females to nest and feed within their territory. Territories are established on the basis of the presence of nectar sources. Territories with high flower densities may support ten or more females and their nests in addition to the attendant male.
- Timing of breeding coincides with local flowering events. Males may scout higher-elevation territories prior to flowering events, flying up to 6 km daily from lower-elevation food sources (Calder and Calder 2013).
- Lays one clutch of two white eggs per season (Ehrlich et al. 1988).
- The species' hemispherical cup nest is constructed from plant material and spider silk and often coated in lichen for camouflage. Females select sites that allow easy access but are protected by an overhanging branch or other structure. Often nests in conifers or aspens but will utilize almost any tree or shrub that provides adequate structure (Calder and Calder 2013).
- Brood parasitism has not been documented in Broad-tailed Hummingbirds.

Status and trend

- Hummingbird abundances are not well captured by the Breeding Bird Survey. Nevertheless, Breeding Bird Survey data suggest a decline in abundance from 1966-2012 (Calder and Calder 2013, Sauer et al. 2014).
- Harsh winters may dramatically increase annual mortality of Broad-tailed Hummingbirds (Bailey and Niedrach 1965). Local density of hummingbirds is difficult to estimate and varies as a function of nectar availability.

Habitat

- Broad-tailed Hummingbirds occupy a variety of wooded habitats in montane areas to elevations over 3000 m. Often associates with conifers but also found in riparian systems.
- We detected Broad-tailed Hummingbirds frequently in the Wassuk Range, but they were scarce in the eastern Sierra Nevada.

Identification

- A medium-sized hummingbird. Both sexes have iridescent green backs and a faint buffy wash on the flanks. Males have deep red gorgets that are restricted to the throat area. Females and young birds lack colored gorgets and must be separated carefully from cogeners on the basis of physical proportions.
- The males' circular red gorget (not extending onto the sides of the neck as in male Anna's, Costa's and Calliope Hummingbirds) and lack of rust color on their backs are distinctive. In the western Great Basin, females are most likely to be confused with female Calliope Hummingbirds. The latter have proportionally shorter tail feathers that do not project beyond the folded wing tips when perched.
- Males are most readily detected by the buzzing trill produced by wings in flight, differentiated from the wing sounds of other hummingbird species by its shrill pitch and high volume. Females produce a quieter wing trill that is less distinctive.
- Broad-tailed Hummingbirds do not sing. Both sexes make a variety of liquid chips, and males make a repeated chitter call in response to territorial intruders (Calder and Calder 2013).

Response to human activity or natural disturbances

- Hummingbird feeders support artificially high local densities and may alter distribution patterns, especially before and after local flower sources are available.
- Mortality from vehicle and window strikes often is reported (Calder and Calder 2013).

Data gaps

- The migratory routes and winter range of Broad-tailed Hummingbirds are poorly understood (Calder and Calder 2013).
- It is unknown how changes in phenology of flowering plants may affect Broad-tailed Hummingbirds and whether the timing of migration and breeding is changing as climate changes (Calder and Calder 2013).

Lewis's Woodpecker (*Melanerpes lewis*)

Natural history

David Pavlik

- Lewis's Woodpeckers are unique among woodpeckers with repect to their colorful plumage, nesting biology, and feeding behavior.
- Lewis's Woodpeckers are patchily distributed across the mountains of the western United States and southern British Columbia. Their distribution is closely associated with the distribution of ponderosa pine.
- In the Great Basin, the species mostly occurs in the mountain ranges of northern Nevada and the eastern Sierra Nevada.
- Birds in the northern half of the species' range are migratory, joining resident birds in the southern portion of the species' range during winter. Migratory birds arrive on their breeding grounds in May and depart in late August or September (Vierling et al. 2013).
- Lewis's Woodpeckers are omnivorous. Unlike most other woodpeckers, they rarely digs in tree bark for burrowing arthropods, and often catch flying insects on the wing. Plant matter consumed by the species includes acorns, which are often cached in a tree cavity for winter; cultivated nuts; and fruit.

Nesting

- Lewis's Woodpeckers defend nesting territories in summer and acorn stores in winter. Territories are restricted to the immediate vicinity around a nest or store and do not include foraging areas (Vierling et al. 2013).
- Pair bonds and mating systems have not been studied with marked birds. The species is presumed to be monogamous, as are most other woodpeckers.
- Lewis's Woodpeckers rarely excavate their own cavities. Instead, they usually are secondary cavity nesters. They will nest in live or dead snags, including those in burned areas (Vierling et al. 2013).
- Lewis's Woodpeckers have one annual brood of six or seven (sometimes five to nine) white eggs (Bent 1939, Ehrlich et al. 1988). Egg laying usually occurs in late May in the Great Basin (Bock 1970).
- Brood parasitism has not been documented in Lewis's Woodpeckers.

Status and trend

- Breeding Bird Survey data suggest that Lewis's Woodpeckers are declining in abundance rangewide, with an average annual decline of 3% per year from 1966 to 2012 (Sauer et al. 2014).
- The species' local abundance can change dramatically from year to year. That variability, combined with its low density rangewide, makes accurate estimation of abundance difficult (Bock 1970, Vierling et al. 2013).

Habitat

- Lewis's Woodpeckers occur in open ponderosa pine woodlands, lowland riparian areas with cottonwood, or recently burned woodlands. The species also sporadically occurs in other woodland types, including those dominated by oaks and pinyon and juniper (Bock 1970).
- Lewis's Woodpeckers were uncommon in woodlands in the eastern Sierra Nevada. We did not detect them in the Wassuk Range.

Identification

- Lewis's Woodpeckers are large woodpeckers with distinctive plumage. The crown, nape, back, wings, and rump are dark green. The face is dark red, with a broad gray collar between the head and body. The breast and belly are salmon colored.
- Lewis's Woodpeckers are not likely to be confused with any other species. The species has an even, rowing flight pattern that is unusual for a woodpecker and may suggest a corvid at a distance.
- Lewis's Woodpeckers vocalize infrequently and only during the breeding season. Breeding birds make a *churrr* call and a soft rattle.

Response to human activity or natural disturbances

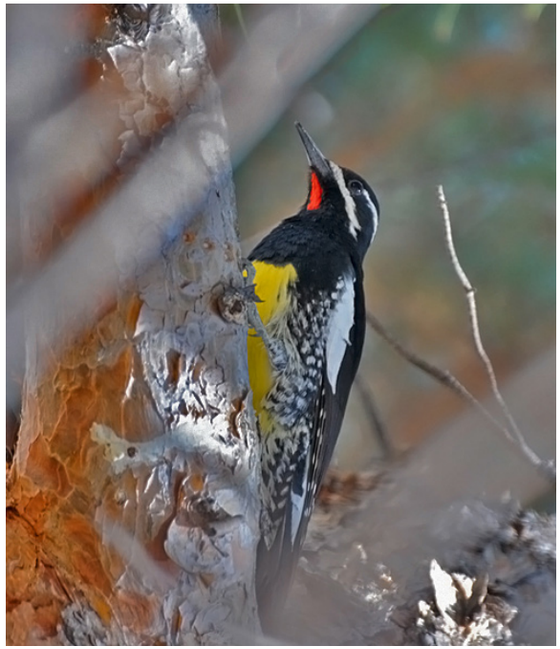
- Lewis's Woodpeckers often feed in commercial fruit and nut groves, where they may be exposed to biocides. The effects of these toxins are unknown (Vierling et al. 2013).
- Habitat loss may pose a considerable threat to Lewis's Woodpeckers given their specific nesting habitat.

Data gaps

- Few studies have been conducted on Lewis's Woodpeckers. Little is known about their breeding, survival, distribution, migration, and the effects of changes to their habitat (Vierling et al. 2013).

Williamson's Sapsucker (*Sphyrapicus thyroideus*)

Natural history



David Pavlik

- Williamson's Sapsuckers are resident from southern British Columbia south through the Cascade Mountains and Sierra Nevada. Breeding populations occur in the Rocky Mountains and in some mountain ranges in the Great Basin and southern California. The species also winters in the highlands of central Mexico and locally in southern and coastal California (Gyug et al. 2012).
- Williamson's Sapsuckers are rare in the western Great Basin east of the Sierra Nevada. Some individuals in the western Great Basin are elevational migrants (Gyug et al. 2012).
- Williamson's Sapsuckers primarily forage on live conifers. Outside the breeding season, the majority of the species' diet is sap and phloem fiber, supplemented with fruit (Stallcup 1968, Gyug et al. 2012). During the breeding season, Williamson's Sapsuckers also consume and feed ants to nestlings (Stallcup 1968).

Nesting

- Williamson's Sapsuckers are territorial during the breeding season (Gyug et al. 2012). They are monogamous, and some pairs reunite on the same breeding territory in sequential years (Crockett 1975). The species has been reported as non-territorial in migration, but little is known about winter territoriality of residents.
- In the Sierra Nevada, most nests are in lodgepole pine; some are in other conifers and aspen. The species nests in conifers with the largest diameter within a given stand. Nest trees often have core rot or are snags (Gyug et al. 2009).
- Williamson's Sapsuckers usually excavate a new nest cavity each year, but many pairs use the same tree for multiple years (Gyug et al. 2012). Unpaired males often will excavate cavities and maintain territories (Crockett and Hansley 1977).
- Williamson's Sapsuckers have one brood per year, and begin nesting in late April or May (Gyug et al. 2012). Each clutch includes five or six (sometimes three to seven) pure white eggs (Bent 1939, Ehrlich et al. 1988).
- Parasitism by Brown-headed Cowbirds has not been documented.

Status and trend

- The Breeding Bird Survey does not effectively sample Williamson's Sapsuckers across their range. The species generally is inconspicuous during June (Crockett 1975, Gyug et al. 1012). Breeding Bird Survey data suggest that in California and the Sierra Nevada, the abundance of Williamson's Sapsuckers increased by an average of 3-5% per year from 1966 to 2012 (Sauer et al. 2014).
- The species is listed as endangered under Canada's Species at Risk Act. NatureServe considers Williamson's Sapsucker to be imperiled (S2) in Nevada, Utah, and Wyoming and vulnerable (S3) in California (Gyug et al. 2012).

Habitat

- Williamson's Sapsuckers occur in dry montane coniferous woodlands from 1000–3500 m elevation. In areas where they co-occur with Red-naped Sapsuckers, they breed close to coniferous areas, whereas Red-naped Sapsuckers breed close to mixed or deciduous forest (Gyug et al. 2012).
- We rarely detected Williamson's Sapsuckers in the eastern Sierra Nevada and did not detect them in the Wassuk Range.

Identification

- Adult male Williamson's Sapsuckers have a black back, tail, wings, head, and upper breast. The rump and wing coverts are bright white and the belly is yellow. The face has a bright white moustachial stripe, a bright white supercilium extending from the eye to the nape, and a red throat and chin. Juvenile males have whitish throats, paler bellies, and more white on the nape.
- Adult females have fine brown, black, and white bars on the back, wings, and tail. The rump is bright white but, unlike those of the males, the wings of females do not have contrasting coverts. The upper breast is mottled blackish, the belly is yellowish, and the head is brown with indistinct markings. Juvenile females are similar to adults, but their upper breast is brown rather than black.
- Adult males have more black on the head than other *Sphyrapicus*. Lewis's and White-headed Woodpeckers have different head patterns. Females may be confused with Northern Flickers but are smaller, have a relatively smaller bill, and have more black on the back. Females also may be confused with other juvenile *Sphyrapicus*, but have a paler head with a weaker pattern.
- Williamson's Sapsucker's contact call is a loud, clear *KWeaa*, similar to that of other *Sphyrapicus* but usually less nasal and whining. Its drumming has a staccato pattern similar to that of its congeners, but typically starts with a more rapid burst.

Response to human activity or natural disturbances

- Williamson's Sapsuckers respond little to thinning of woodlands by up to 75% if some snags remain. They do not occur in recent, intense burns (Gyug et al. 2012).

Data gaps

- The species' breeding biology in the Sierra Nevada has not been studied.
- Habitat attributes, territoriality, survival, and wintering habits of Williamson's Sapsuckers are not well understood (Gyug et al. 2012).

Red-naped Sapsucker (*Sphyrapicus nuchalis*)

Natural history

Frank Fogarty

- Until 1983, Red-breasted, Red-naped, and Yellow-bellied Sapsuckers were considered to be three forms of single species, Yellow-bellied Sapsucker.
- Red-naped Sapsuckers breed from southeast British Columbia south along the eastern slope of the Cascade Mountains to northern California. The species also breeds throughout the Rocky Mountains and the Great Basin. Breeding populations in the western Great Basin are scattered and local. The species winters from southern California east through western Texas, in Baja California, and in most of northern Mexico.
- Red-naped Sapsuckers are short-distance migrants. They arrive on their breeding grounds in the Great Basin in mid April or May and depart for autumn migration between August and early October.
- Red-naped Sapsuckers feed on conifers early in the spring and on deciduous trees after they leaf out at the beginning of the bird's breeding season (Walters et al. 2014). The species consumes insects, sap, and fruit. Sap is collected by drilling small wells on the trunks of trees. The wells often attract and trap insects on which the birds also feed.

Nesting

- Red-naped Sapsuckers defend territories that include nest trees and trees with sap wells. Territories vary in size and are irregular in shape (Walters et al. 2014).
- The monogamous species can maintain pair bonds among years (Fleury 2000).
- Nest sites appear to be chosen on the basis of proximity to foraging sites (Crockett and Hadow 1975). The species nests in coniferous and deciduous woodlands, but typically constructs cavities in live deciduous trees with heart rot or in dead conifers. Many nest cavities are reused for multiple years (Walters et al. 2014).
- The eggs are laid in a bed of wood chips at the bottom of the cavity. Red-naped Sapsuckers have one annual clutch of four or five (sometimes three to seven) pure white eggs (Howell 1952, Ehrlich et al. 1988, Walters et al. 2014). In Nevada, egg laying begins in late May or early June (Fleury 2000).

- Brood parasitism has not been documented.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Red-naped Sapsuckers increased rangewide by an average of over 1% per year from 1966 to 2012, but the species' scarcity in the western Great Basin makes estimation of trends in abundance on the basis of the Breeding Bird Survey difficult (Sauer et al. 2014).

Habitat

- Red-naped Sapsuckers breed in deciduous or mixed woodlands that are not dominated by oaks. It the Great Basin, they usually occur in areas with large stands of aspen, often where willows are nearby. They are rare along the western edge of the Great Basin, where Red-breasted Sapsuckers are more common.

Identification

- Red-naped Sapsuckers are medium-sized woodpeckers. The back, tail, and wings are black with whitish spots. The wings have a large white patch that appears to be a vertical line when the wings are folded. The belly is yellowish-white with diffuse, blurry streaks. The upper breast is black. The throat is red and is bordered by a broad white line that extends up the side of the neck through the lores. The face has a broad white postocular line, which has an upper and lower black border; the border sometimes is infused with red. The forehead and nape are mostly red.
- The wings of juvenile birds are similar to those of adults but without red plumage. The bodies and heads of juveniles are dark gray with scattered white markings.
- Adult Red-naped Sapsuckers are similar to adult Red-breasted Sapsuckers, but the latter have more-extensive red and little black or white on the head. Juvenile Red-naped and Red-breasted Sapsuckers can be difficult to distinguish, but the former generally are paler and have a more pronounced whitish postocular line.
- Red-breasted Sapsuckers and Red-naped Sapsuckers hybridize extensively. Hybrids are relatively common in the western Great Basin, and their appearance usually is intermediate between the two parent species. Some individuals, especially females with worn plumage, may be difficult to identify as either species or a hybrid.
- *Sphyrapicus* do not have a true song. The most common contact call is a loud *QUEEah*. Species in the genus also make a soft, whiny *weeka weeka weeka* that is similar to the contact call of Northern Flickers but squeakier.
- All *Sphyrapicus* have distinctive drumming patterns, typically a short burst of rapid taps followed by slower, irregular taps that often are paired.

Response to human activity or natural disturbances

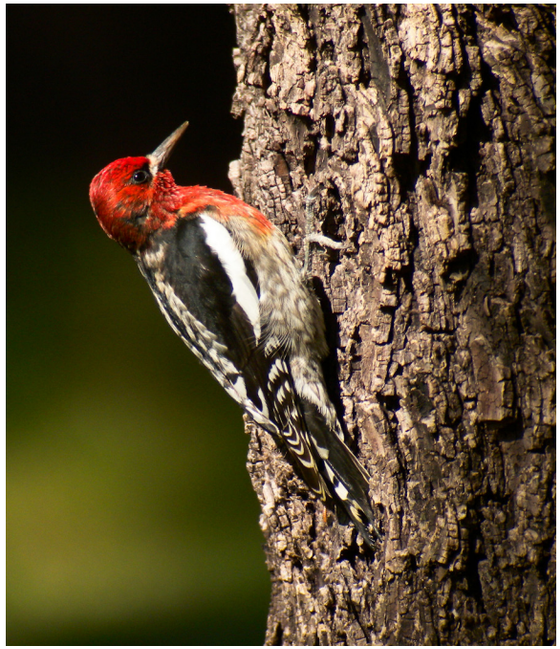
- Red-naped Sapsuckers historically were considered pests in fruit orchards. The species is especially sensitive to loss and degradation of its habitat in the Great Basin, where patches of habitat are small and scattered (Dobkin et al. 1995).

Data gaps

- *Sphyrapicus* physiology has not been studied. Little is known about Red-naped Sapsucker ecology in winter or how they select trees or shrubs in which they excavate sap wells (Walters et al. 2014).

Red-breasted Sapsucker (*Sphyrapicus ruber*)

Natural history



Len Blumin

- Until 1983, Red-breasted, Red-naped, and Yellow-bellied Sapsuckers were considered to be three forms of a single species, Yellow-bellied Sapsucker.
- Red-breasted Sapsuckers breed from southeast Alaska south through western British Columbia, western Washington and Oregon, the northern Coast Ranges in California, and the Sierra Nevada. In winter, the species occurs in coastal British Columbia, all of its breeding range in the conterminous United States, and throughout non-desert California.
- The northern subspecies of Red-breasted Sapsucker moves to coastal regions in August and returns to its breeding grounds in interior British Columbia in March. Some populations of the southern subspecies, which occurs south of Oregon, are resident, whereas members of other populations are elevational or short-distance migrants (Walters et al. 2014).
- Red-breasted Sapsuckers forage in old-growth or other mature forests. The species feeds on insects, sap, and fruit. Sap is collected by drilling small wells on the trunks of trees. The wells often attract and trap insects on which the birds also feed.

Nesting

- Red-naped Sapsuckers defend small territories that include the vicinity around their nest tree and sap wells. These territories are advertised with calls early in the breeding season (Walters et al. 2014).
- The species is monogamous, and pair bonds often are reestablished for consecutive breeding seasons (Walters et al. 2014).
- Red-breasted Sapsuckers excavate nest cavities in snags or dead portions of live trees. Wood chips from the excavation are used as a platform for the eggs in the base of the cavity (Walters et al. 2014).
- Red-breasted Sapsuckers have one brood per season, beginning in late April or early May. Each clutch consists of four or five (sometimes six or seven) white eggs (Short 1982, Ehrlich et al. 1988).
- Brood parasitism has not been documented in Red-breasted Sapsuckers.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Red-breasted Sapsuckers is stable rangewide with some local increases (Sauer et al. 2014).
- The species is a common breeder in the eastern Sierra Nevada and Wassuk Range.

Habitat

- Red-breasted Sapsuckers occur in woodlands across their range. They are most common in areas with conifers and abundant snags, including areas that recently burned.

Identification

- Red-breasted Sapsuckers are medium-sized woodpeckers. The back, tail, and wings are black with whitish spots. The wings have a large white patch that appears to be a vertical line when the wings are folded. The belly is yellowish-white with diffuse, blurry streaks. The upper breast and head are bright red, with a black spot in front of the eye and a white loral line extending below the eye. Adult males and females are identical. The wings of juvenile birds are similar to those of adults but without red plumage. The bodies and heads of juveniles are dark gray with scattered white markings.
- Adult Red-breasted Sapsuckers are similar to adult Red-naped Sapsuckers, but the latter have more-extensive black markings and less red on the head. Juvenile Red-breasted Sapsuckers can be difficult to distinguish from juvenile Red-naped Sapsuckers but typically are darker, especially on the head.
- Red-breasted Sapsuckers and Red-naped Sapsuckers hybridize extensively. Hybrids are relatively common in the western Great Basin, and their appearance usually is intermediate between the two parent species. Some individuals, especially females with worn plumage, may be difficult to identify as either species or a hybrid.
- The voices of all *Sphyrapicus* are nearly identical. *Sphyrapicus* do not have a true song. The most common contact call is a loud *QUEEah*. These species also make a soft, *whiny weeka weeka weeka* that is similar to the contact call of Northern Flickers, but squeakier.
- All *Sphyrapicus* have distinctive drumming patterns, usually a short burst of rapid taps followed by slower, irregular taps that often are paired.

Response to human activity or natural disturbances

- Little is known about the response of Red-breasted Sapsuckers to anthropogenic or human disturbances.

Data gaps

- Few studies of Red-breasted Sapsuckers have been conducted and their basic physiology, ecology, and behavior are not well understood (Walters et al. 2014).

Hairy Woodpecker (*Picoides villosus*)

Natural history

Kameron Perensovich

- Hairy Woodpecker is one of the most widespread woodpecker species in North America. Their familiar, rattling calls are heard in diverse forests and woodlands.
- Hairy Woodpeckers are resident in nearly all of the conterminous United States except for portions of Texas and the arid Southwest. They also are resident north to the northern boreal regions of Alaska and Canada and south to the mountains of most Central American countries.
- More than 75% of the diet of Hairy Woodpeckers consists of arthropods. The remaining 25% is mostly fruit and seeds (Beal 1911). The species forages on tree trunks, where they glean arthropods from the surface of the tree and use their chisel bill to remove bark and access burrowing arthropods. They occasionally catch flying insects on the wing.

Nesting

- Hairy Woodpeckers are monogamous and sometimes maintain year-round pair bonds (Jackson et al. 2002).
- Hairy Woodpeckers are believed to defend territories year-round, although the size of these territories apparently shifts throughout the year. Territory size is smallest during the breeding season, when adults that are caring for young are not able to forage far from the nest. Low densities in extensive forests also can make accurate measurements of territory size difficult (Lawrence 1967).
- Hairy Woodpeckers defend their territories from multiple congeners (Jackson et al. 2002).
- Hairy Woodpeckers have a single brood per year and typically begin laying eggs in early May. Each clutch consists of four (sometimes three to seven) white eggs (Ehrlich et al. 1988, Jackson et al. 2002).
- Hairy Woodpeckers usually nest in the trunk of a live tree that has fungal heart rot, which enables them to excavate a cavity easily. Cavity openings are 4-5 cm in diameter (Jackson et al. 2002).
- Brood parasitism has not been documented in Hairy Woodpecker nests.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Hairy Woodpeckers is low across a majority of the species' range but is increasing in most regions, including the Great Basin and the Sierra Nevada (Sauer et al. 2014).

Habitat

- Hairy Woodpeckers occur in diverse forests and woodlands. The species is less common in relatively small or fragmented habitat patches.
- We frequently detected the species in land-cover types with trees in the Wassuk Range and eastern Sierra Nevada.

Identification

- Hairy Woodpeckers are medium-sized and primarily black and white. The color of the underparts varies geographically, from bright white in eastern North America to smoky gray on the Pacific Coast. The back is black with a broad white vertical strip in the center of the back. The wings are black with white horizontal bars. The head is black with a broad white supercilium and malar stripe. The sides of the nape also are white. Adult males have a red patch at the rear of the crown that distinguishes them from adult females. Juvenile birds, especially males, may have reddish feathers on the forecrown.
- Hairy Woodpeckers are often confused with Downy Woodpeckers, which have similar plumage but are smaller. Relative to Downy Woodpeckers, Hairy Woodpeckers have a larger, heavier bill; do not have black spots on the white outer tail feathers; and have a prominent black shoulder spur that extends onto the white breast.
- The call of Hairy Woodpeckers, a loud *peek*, is similar to the call of Downy Woodpeckers but lower in pitch. The most common vocalization is a short rattle preceded by one or two call notes. Downy Woodpeckers make a similar rattle, but usually begin with more than two call notes.

Response to human activity or natural disturbances

- Timber harvest and forest fragmentation are associated with decreases in the abundance of Hairy Woodpeckers. Minimum patch sizes of four hectares are needed to maintain breeding populations of the species (Jackson et al. 2002).

Data gaps

- Few studies have been conducted on the breeding biology of Hairy Woodpeckers (Jackson et al. 2002).

White-headed Woodpecker (*Picoides albolarvatus*)

Natural history

Simon Wray

- White-headed Woodpeckers are the only birds in North America with a black body and white head.
- White-headed Woodpeckers have a fragmented range that partially corresponds to the distribution of extensive montane pine forest, although they are absent from some apparent habitat. The species is resident in the Okanagan Valley of British Columbia south into central Washington; western Idaho; the Blue, Ochoco, and Cascade Mountains of Oregon; and the Coastal Ranges and Sierra Nevada in California. There also are populations in the highest mountains of southern California (Garrett et al. 1996).
- The species is widespread on the west slope of the Sierra Nevada but uncommon and local on the east slope.
- White-headed Woodpeckers are resident throughout their range.
- White-headed Woodpeckers feed on arthropods and pine seeds year-round (Garrett et al. 1996). The species primarily forages on the trunks and branches of coniferous trees. They searche for insects on and under the bark and cling to cones while extracting seeds.

Nesting

- The summer breeding territories of White-headed Woodpeckers are embedded within individuals' home ranges. Little is known about the boundaries of home ranges. Home ranges may not be defended, but the species often chases conspecifics and other cone-feeding species from trees in which they are feeding (Garrett et al. 1996). The extent of territoriality in winter is unknown.
- White-headed Woodpeckers are monogamous, and pair bonds probably are maintained year-round (Robinson 1957).
- White-headed Woodpeckers excavate a new nest cavity each breeding season. Most nest cavities are in conifer snags at an average of 2.5-3.5 m above the ground (Garrett et al. 1996). Little is known about whether nest materials are added to the cavity.

- White-headed Woodpeckers are believed to have one brood per year. Four to five whitish eggs are laid in June. Reported clutches of seven to nine eggs may be the result of conspecific brood parasitism (Garrett et al. 1996), but such brood parasitism has not been documented.

Status and trend

- Few Breeding Bird Survey routes are located in White-headed Woodpecker habitat. Moreover, the species is uncommon and breeds in low densities across its range. Therefore, trends in cannot be inferred from the Breeding Bird Survey.
- White-headed Woodpeckers are most abundant on the west slope of the Sierra Nevada. The species is uncommon to rare elsewhere in its range (Garrett et al. 1996, Sauer et al. 2014).

Habitat

- White-headed Woodpeckers occur in montane coniferous forests that are dominated by pines. On the east slope of the Sierra Nevada they occurs in Jeffrey, lodgepole, and western white pine but not in pinyon pine. Elsewhere in its range the species occurs in areas dominated by ponderosa pine, sugar pine, and other pine species (Garrett et al. 1996).
- The species was rare in the eastern Sierra Nevada and we did not detect it in the Wassuk Range, which is beyond the eastern boundary of the species' distribution.

Identification

- White-headed Woodpeckers are medium-sized Picids. The crown, face, throat, and bases of the primaries are white. The rest of the body is flat black. Adult males and females are similar, but males have a red patch at the rear of the crown. Most juveniles have a reddish patch in the center of the crown.
- Lewis's Woodpeckers and Williamson's Sapsuckers are the only other Picids in the Great Basin with bodies that can appear entirely dark. Lewis's Woodpeckers are pale gray and have a darker head than White-headed Woodpeckers. Male Williamson's Sapsuckers have a black head with bold white lines and a red throat.
- White-headed Woodpeckers, like most Picids, do not have a true song. The most common vocalizations are its contact call, *peetik* or *peettitik*, and its rattle call, which is an extended version of the contact call, *peetikikikikikik*. All vocalizations are similar to those of other *Picoides*.

Response to human activity or natural disturbances

- White-headed Woodpeckers are sensitive to reductions in snag density and fire suppression (Garrett et al. 1996).
- White-headed Woodpecker has been designated as a species of conservation concern by several states and the U.S. Fish and Wildlife Service.

Data gaps

- Many aspects of White-headed Woodpecker biology and ecology are unknown. The species may have a substantial probability of extirpation outside of California (Garrett et al. 1996).

Northern Flicker (*Colaptes auratus*)

Natural history

Alan Vernon

- Northern Flickers are easily recognized in flight on the basis of their rowing wingbeats and flashes of white and pink.
- Northern Flickers breed from the treeline in Alaska and Canada south throughout the conterminous United States with the exception of parts of southern California, New Mexico, and Texas. The species also breeds in Baja California, central Mexico, the highlands of Central America, and the Caribbean.
- Most northern populations are migratory, and the species does not occur in most of Canada or Alaska during winter. Migratory birds join residents in the southern United States and northern Mexico during winter (Wiebe and Moore 2008).
- Northern Flickers feed primarily on ants during summer. Unlike most woodpeckers, they rarely forage on trees. They capture prey by hoping along bare ground or probing ant hills with their bills. They usually forage in areas with minimal ground cover and with trees to which they can retreat from predators. During winter, the species eats fruit and arthropods (Wiebe and Moore 2008).

Nesting

- Northern Flickers nest in tree cavities. They defend the entire tree that contains the nest cavity but do not defend a feeding territory, which may reflect the unpredictable distribution of ant colonies (Elchuk and Wiebe 2003). Antagonistic behavior towards secondary cavity nesters varies; multiple species sometimes nest in the same tree (Salt 1985). The distance between nests may vary as a function of the density of trees in which nests can be built (Wiebe and Moore 2008).
- Northern Flickers typically are monogamous, but up to 5% of females are polyandrous in areas with a high ratio of males to females (Wiebe 2005). The species is solitary during non-breeding seasons but will forage in loose groups.
- Northern Flickers most commonly nest in snags or in dead portions of live trees, especially aspen and other species in which heart rot is common (Wiebe and Moore 2008), in open woodlands. In the Great Basin and other arid regions with few trees, Northern Flickers sometimes nest in large sagebrush or in other shrubs with relatively wide trunk diameters.
- Northern Flickers nest in existing cavities to a greater extent than other woodpecker species. In some populations, up to 45% of nests are built in existing cavities (Wiebe and Moore 2008). Newly excavated cavities are curved downward and quite large. Eggs are laid on the cavity floor, often in a bed of woodchips.
- Northern Flickers have one brood per year and typically lay eggs in May (Wiebe and Moore 2008). Individual clutches contain five to eight (sometimes three to 12) pinkish-white eggs (Moore and Koenig 1986, Ehrlich et al. 1988).
- Northern Flicker nests may contain the eggs of other cavity nesters, likely reflecting displacement by Northern Flickers of another species (Wiebe 2000). Conspecific brood parasitism appears to be common, but few data are available.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Northern Flickers declined rangewide by an average of more than 1% per year from 1966 to 2012. The Great Basin is one of the few regions in which the species' abundance remained relatively stable (Sauer et al. 2014). Reasons for the decline in abundance are not well understood but may be related to competition with other cavity nesting species, especially European Starlings (Wiebe and Moore 2008).

Habitat

- Northern Flickers usually occur in open woodlands or near forest edges but also occupy other areas with scattered trees and open ground. In the western Great Basin, the species occurs in almost all land-cover types, but is less common in alpine areas and extensive shrubsteppe.
- We detected the species regularly in all land-cover types in the Wassuk Range and eastern Sierra Nevada.

Identification

- The back and the top of the wings of this large woodpecker are grayish-brown with widely spaced, horizontal brown bars. The rump is bright white and conspicuous in flight. The breast and belly are brownish-white with scattered circular black spots. The upper breast has a large black chevron. The feather shafts on the underside of the wings and tail are bright salmon on birds in the western United States. The head is brownish. Adult males in the western United States have a distinctive red malar stripe.
- Northern Flickers' large bills and ground foraging may suggest a corvid, but no corvids in the Great Basin have similar plumage.
- The song of Northern Flickers is a long, even *wik wik wik wik wik* that often lasts for 10-15 seconds. Its most common call note is a loud, harsh *KLEER*. The species also makes a squeaky, rolling *wicka wicka wicka* or *flicka flicka flicka*.

Response to human activity or natural disturbances

- Northern Flickers appears to respond well to human disturbance and nests in urban areas, but removal of snags reduces the extent of their nesting habitat.

Data gaps

- Reasons for the decline in abundance of Northern Flickers since at least the mid 20th century are not well understood (Wiebe and Moore 2008).

Olive-sided Flycatcher (*Contopus cooperi*)

Natural history

Erik Enbody

- Olive-sided Flycatchers usually perch on top of the tallest snag in the immediate vicinity.
- Olive-sided Flycatchers breed throughout Alaska and Canada south through the Cascade Mountains, Sierra Nevada, Rocky Mountains, and mountain ranges in the Great Basin. The species winters in the highlands of Central and South America.
- Olive-sided Flycatchers are uncommon breeders in the eastern Sierra Nevada and rare and local breeders elsewhere in the western Great Basin.
- Olive-sided Flycatchers have the longest migration of any North American flycatcher (Murphy 1989). The species typically arrives in the Great Basin in May and departs for autumn migration in late August or early September (Altman and Sallabanks 2012).
- The species feeds exclusively on flying insects, especially Hymenoptera (Beal 1912). Birds sit on a prominent perch, often the highest point in the surrounding canopy, from which they fly out and capture prey on the wing.

Nesting

- Olive-sided Flycatchers maintain large territories, especially in extensive forests with scattered open areas and snags. In the Sierra Nevada, territory size averages 45 hectares (Bock and Lynch 1970). The species is primarily monogamous, with polygyny made difficult by the wide spacing of breeding pairs (Altman and Sallabanks 2012).
- Olive-sided Flycatchers lay a single brood per year, typically in June in the Great Basin (Bent 1942). Each clutch includes four (sometimes three) pale eggs (Ehrlich et al. 1988). Each egg has a ring of dark spots around the large end (Altman and Sallabanks 2012).
- Nests are constructed in conifers at a variety of heights, usually far from the trunk on a horizontal branch with some overhanging cover (Altman and Sallabanks 2012). The nest is a loosely constructed cup of twigs, relatively small given the size of the birds, and lined with lichen or other soft plant material (Bent 1942).
- Only four cases of Olive-sided Flycatcher brood parasitism by Brown-headed Cowbirds have been documented, possibly because Olive-sided Flycatchers aggressively defend their nests and because there is minimal overlap in the home ranges of the two species (Altman and Sallabanks 2012).

Status and trend

- Breeding Bird Survey data suggest that the rangewide abundance of Olive-sided Flycatchers declined by an average of 3.6% per year from 1966 to 2012. During that time frame, the species' abundance declined by 1.6% in the Great Basin and 3.7% in the Sierra Nevada (Sauer et al 2014).
- The species' highest abundance occurs in the Cascade Mountain and Sierra Nevada, which are also the regions with the largest declines in abundance (Altman and Sallabanks 2012). The reasons for these declines are not well-understood, but fire exclusion may play a role.

Habitat

- Olive-sided Flycatchers occur in montane coniferous forests, generally above 1000 m in elevation. The species tends to occur near edges or openings caused by disturbance, especially fire and timber harvest, or along boundaries with lakes and rivers. Their abundance is high in some areas after fire, possibly because of the availability of prominent snags that serve as hunting perches; limited canopy cover, which facilitates aerial hunting; and a high abundance of flying insects.
- We rarely detected the species in the eastern Sierra Nevada and did not detect it in the Wassuk Range.

Identification

- A large, stocky, short-tailed, and large-headed flycatcher. The head, back, wings, and tail are dark olive brown. The throat, breast, and belly are white. Strong, olive brown streaks on the flanks often converge at the top of the breast.
- Olive-sided Flycatchers are most likely to be confused with their smaller congener, Western Wood-Pewee. The breast pattern of Western Wood-Pewees has less contrast than that of Olive-sided Flycatchers, its body is more delicate, and its bill is smaller. *Empidonax* flycatchers are much smaller than Olive-sided Flycatchers and have shorter wings with stronger wingbars.
- Olive-sided Flycatcher song is a loud *quick THREE BEERS*. The first phrase is lower and softer than the harsh, rolled whistles that follow. The most commonly heard call is a loud, mellow *pip pip pip*, often repeated after a short pause.

Response to human activity or natural disturbances

- Olive-sided Flycatchers respond positively to timber harvest, but their abundance has decreased despite the apparent increase in the extent of their habitat in western North America over the last 50 years. Loss of winter habitat may be driving declines in abundance, but this hypothesis has not been tested (Altman and Sallabanks 2012).

Data gaps

- The ecology and survival of this species across its range of habitats and the drivers of its decline in abundance are not well understood.

Western Wood-Pewee (*Contopus sordidulus*)

Natural history

James N. Stewart

- Western Wood-Pewees are vocal, active Tyrannids that occur in woodlands. Its nearly identical congener, Eastern Wood-Pewee, does not occur in the Great Basin.
- Western Wood-Pewees breed from eastern Alaska east through Saskatchewan, south to west Texas, and west to the Pacific coast, with the exception of the Central Valley and parts of the arid Southwest. The species breeds throughout the highlands of Mexico and Central America south to Costa Rica.
- The winter range of Western Wood-Pewees has been difficult to identify given that Western and Eastern Wood-Pewee co-occur in winter. Specimens can be identified, but silent birds in the field are nearly indistinguishable. Western Wood-Pewees winter at elevations above 1000 m from Costa Rica south through Venezuela or Peru (Bemis and Rising 1999).
- Spring migrants arrive in Nevada from late April to early June (Behle 1967). Autumn migration typically peaks in August.
- Western Wood-Pewees are insectivorous, feeding chiefly on flying insects. They capture prey by sitting on an exposed perch, then sallying out. Individuals usually return to the same perch repeatedly. Little is known about the species' winter diet.

Nesting

- Western Wood-Pewees are territorial, frequently singing from exposed song perches and chasing conspecifics that intrude. Males sometimes grapple bills with intruders and attempt to pull them away from the nest (Bemis and Rising 1999).
- The species is believed to be monogamous (Bemis and Rising 1999).
- Western Wood-Pewees nest in trees. In the Great Basin, they usually nest in cottonwood, aspen, or pinyon pine.
- The nest is a compact, woven cup placed in or above the fork of a branch. It is constructed from small-diameter plant material, especially grasses, and animal hair and is bound together with spider silk (Bent 1942).
- Western Wood-Pewees have a single brood per season. Egg laying begins in June (Bemis and Rising 1999). Each clutch contains three (sometimes two or four) eggs that are creamy with few spots (Harrison 1979, Ehrlich et al. 1988).
- An estimated 5-16% of Western Wood-Pewee nests are parasitized by Brown-headed Cowbirds (Friedmann and Kiff 1985, Bemis and Rising 1999).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Western Wood-Pewees decreased rangewide by an average of 1.6% per year from 1966 to 2012. The Great Basin was one of the only ecoregions in which the species appeared to increase in abundance, by an average of 1.3% per year (Sauer et al. 2014).
- Western Wood-Pewees were common in the eastern Sierra Nevada and Wassuk Range.

Habitat

- The primary habitat requirement of Western Wood-Pewees is tree presence, and they occur in all but the densest forests and woodlands. They often use snags or large dead branches within their territories as hunting perches. In valleys in the Great Basin, they often occur on ranches and at other sites with planted trees.

Identification

- Western Wood-Pewee is a small flycatcher, slightly larger and stockier than *Empidonax* but much smaller than *Myiarchus*, *Sayornis*, or *Tyrannus*. The back, wings, head, and tail are a dark brownish-gray. The wings are slightly darker, with two narrow, low-contrast whitish bars. The bill is larger and heavier than those of *Empidonax* and is dark. At least the basal half of the lower mandible is yellowish. The belly and breast are whitish. Its flanks and upper breast are greyish and form a vest. Juveniles have bolder wingbars and more yellow on the lower mandible.
- Western Wood-Pewees are difficult to distinguish from *Empidonax*. Vocalizations are distinct, and Western Wood-Pewees have a minimal eye ring, smudged undertail coverts, and a much longer primary projection (the distance from the tip of the longest secondary to the longest primary) than any *Empidonax*.
- The songs of the Tyrannidae, unlike those of most songbirds, do not appear to be learned. The resulting vocal consistency among individuals and populations is useful for distinguishing among the many similar species in this family.
- Western Wood-Pewee song is a husky whistle, *pee-yur*. The species also makes a clearer whistle, *peeaa*, that is quite similar to vocalizations of Eastern Wood-Pewee. The most common calls are a flat, abrupt *brip* and a sputtering, staccato twitter.

Response to human activity or natural disturbances

- Western Wood-Pewees may benefit from reduction of understory and thinning of the tree canopy. The species responds negatively to clear-cutting and to livestock grazing in riparian canyons (Bemis and Rising 1999).

Data gaps

- Breeding behavior of Western Wood-Pewees has not been well studied. Almost every aspect of their winter ecology is unknown, including their winter distribution, stopover sites, and migration routes (Bemis and Rising 1999).

Gray Flycatcher (*Empidonax wrightii*)

Natural history

Matt Grube

- Gray Flycatchers are drab flycatchers generally associated with uplands in the Great Basin, and are often the only species of the sometimes inscrutable genus *Empidonax* present in their habitat.
- Gray Flycatchers breed throughout the Great Basin, north through eastern Washington, and into southeastern British Columbia. The species winters in northern and central Mexico.
- Most spring migrants arrive in the Great Basin in May and depart between mid August and mid September (Schlossberg and Sterling 2013).
- The diet of Gray Flycatchers has not been quantitatively studied on its breeding grounds, and little information exists on their winter diet. The species is presumed to be entirely insectivorous, as are its congeners, during summer (Schlossberg and Sterling 2013).

Nesting

- Few studies have been conducted on the breeding biology of Gray Flycatchers and their behavior has not been studied. The species is believed to be monogamous.
- Egg laying occurs from mid May to June in the Great Basin. Believed to have two broods in most of its range, usually with three to five clean-white eggs (Ehrlich et al. 1988, Schlossberg and Sterling 2013).
- Nests are placed at the base of a branch or on a fork in pines or junipers, and less often in large sagebrush.
- Nests are cup-shaped, constructed from woven bark and other plant materials, and lined with grass and feathers (Schlossberg and Sterling 2013).
- Brown-headed Cowbird parasitism of Gray Flycatcher nests has been reported infrequently (Schlossberg and Sterling 2013). However, the recent expansion of Brown-headed Cowbirds throughout the western range of Gray Flycatchers may require a reevaluation of the extent of brood parasitism.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Gray Flycatchers increased by an average of 2-3% per year across their range and in the Great Basin from 1966 to 2012. Over the same period, the species' abundance in the Sierra Nevada increased by an average of almost 6% per year (Sauer et al. 2014).
- Gray Flycatchers were abundant in the Wassuk Range. We did not detect them in the eastern Sierra Nevada, although they were common in other nearby areas.

Habitat

- Gray Flycatchers occur in both shrubsteppe and arid, open pine or juniper woodlands with a sagebrush understory. The species is more abundant in shrubsteppe where sagebrush grows to tree height or scattered juniper are present.

Identification

- Members of the genus *Empidonax*, including Gray Flycatchers, have similar plumage. All are small with pale breasts, two whitish wingbars, and back colors that range from pale gray-green to yellow-green. These species are best distinguished by their distinctive, simple vocalizations along with subtle differences in plumage.
- Three other *Empidonax* breed in the western Great Basin: Cordilleran Flycatcher, Dusky Flycatcher, and Pacific-slope Flycatcher. Relative to Cordilleran and Pacific-slope Flycatchers, the plumage of Gray Flycatchers has almost no green or yellow. Gray Flycatchers are extremely similar to Dusky Flycatchers and best separated by habitat and vocalizations, although the two species overlap in both riparian areas and uplands. Gray Flycatchers also can be confused with Western Wood-Pewees, which are slightly larger and have smudgy breasts, weaker wingbars, and much larger primary projections.
- The song of Gray Flycatchers has two parts that are interspersed randomly with pauses between phrases. The individual elements resemble the phrases of Dusky Flycatchers and other *Empidonax* but the song is less structured. The first part, a harsh, rolled *jrr-vrip* or *jrrr*, is repeated more frequently than the second part, a high whistle *tidoo*. The call note of Gray Flycatchers is a dry *whit*, quite similar to that of Dusky Flycatchers.

Response to human activity or natural disturbances

- One study documented that the number of Gray Flycatcher nests was lower near areas in which sound levels from natural gas wells were relatively high than in quieter areas. Nesting success was higher in areas with high sound levels, possibly due to predators avoiding the sound (Schlossberg and Sterling 2013).
- Abundance of Gray Flycatchers decreases substantially after fire in shrubsteppe systems (Russell et al. 2013).

Data gaps

- Gray Flycatcher ecology is poorly understood, especially in shrubsteppe. Interactions and overlap with Dusky Flycatchers also have not been well studied. The amount and quality of Gray Flycatcher habitat is affected by cattle grazing, expansion of non-native invasive species, timber harvest, fire, and natural-resource extraction.

Dusky Flycatcher *(Empidonax oberholseri)*

Natural history

Frank Fogarty

- Small and drab but quite vocal, Dusky Flycatchers are nearly ubiquitous in riparian zones within mountain ranges in the Great Basin.
- Dusky Flycatchers breed from the southern Yukon south to northern Arizona and east to Montana and northern New Mexico. Most of the species' range is east of the coastal ranges, but it breeds at low densities in coastal Oregon and Washington. Its winter range primarily falls within the highlands of central Mexico and southeast Arizona.
- Dusky Flycatchers usually arrive on their breeding grounds in the western Great Basin in mid May and depart in August (Pereyra and Sedgwick 2015).
- Dusky Flycatchers feed on arthropods during the breeding season, often capturing flying insects on the wing (Pereyra and Sedgwick 2015). No data exist on their winter diet.

Nesting

- Most Dusky Flycatchers are monogamous, but 10-12% of nests were reported to have two attendant males (Pereyra and Sedgwick 2015).
- The species is territorial, with an average territory size of less than a hectare. Males tend to guard their mates and do so primarily through vocalizations, rather than actively evicting males from a discrete territory. Interspecific territoriality occurs with other *Empidonax*, especially with Gray Flycatchers in the Great Basin (Johnson 1963, Pereyra and Sedgwick 2015).
- Dusky Flycatchers have one to three broods. Egg laying begins in June. Each clutch consists of three to five cream or dull white eggs (Bent 1942, Pereyra and Sedgwick 2015).
- In the Great Basin, Dusky Flycatchers nest in riparian shrubs, especially willow and chokecherry, and sometimes in aspen, mountain mahogany, and sagebrush. Most nests are placed at the joint of a stem in dense foliage. The nest is cup-shaped and made of grass and other shredded plant fibers (Pereyra and Sedgwick 2015).
- Dusky Flycatchers frequently are parasitized by Brown-headed Cowbirds. Heath et al. (2010) estimated that 37% of nests in the eastern Sierra Nevada were parasitized, with less than 7% of parasitized nests yielding fledglings.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Dusky Flycatchers decreased rangewide and in the Great Basin by an average of <1% per year from 1966-2012 (Sauer et al. 2014).
- Dusky Flycatchers were common in the eastern Sierra Nevada and Wassuk Range.

Habitat

- In the Great Basin, Dusky Flycatchers are most common in riparian areas and pockets of mountain mahogany. They also occur in sagebrush and other upland vegetation adjacent to riparian areas, especially when those areas are in relatively narrow canyon bottoms.

Identification

- *Empidonax* species have similar plumage. All are small with pale breasts, two whitish wingbars, and back colors that range from pale gray-green to yellow-green. These species are best distinguished by their distinctive, simple vocalizations.
- Three other *Empidonax* breed in the western Great Basin: Cordilleran, Gray, and Pacific-slope Flycatchers. Relative to Cordilleran and Pacific-slope Flycatchers, the plumage of Dusky Flycatchers has much less yellow or green, especially on the breast and throat. Dusky Flycatchers have the shortest primary projection and the smallest bills of these four *Empidonax*, but the distinctions are difficult to evaluate in the field. Gray Flycatchers are extremely similar to Dusky Flycatchers and best separated by habitat and vocalizations, although the two species can overlap near riparian areas and in uplands. Dusky Flycatchers also can be confused with Western Wood-Pewees, which are slightly larger and have smudgy breasts, weaker wingbars, and much larger primary projections.
- The most distinctive vocalization of Dusky Flycatchers is a loud *deer* or *dee-bic*, made throughout the day during the breeding season and heard more often than the song. The song of Dusky Flycatchers is similar to that of Gray Flycatchers but is less harsh and usually has a more consistent and even structure. Songs have three phrases, a rolling *prill-it*, a low *prrrt*, and a much higher *tseeet*. Dusky Flycatchers also frequently make a quiet *whit* call note that is nearly identical to those of Gray Flycatchers and several other *Empidonax*.

Response to human activity or natural disturbances

- In the Great Basin, grazing by cattle can degrade riparian understory that is used by Dusky Flycatchers. Cessation of grazing in these areas is associated with local increases in abundance of Dusky Flycatchers (Earnst et al. 2012).
- If climate change results in contraction of riparian zones, the extent of Dusky Flycatcher habitat may decrease throughout the Intermountain West.

Data gaps

- The wintering ecology of Dusky Flycatchers has not been well studied.
- Competition and habitat partioning with other *Empidonax* is not fully understood.

Pacific-slope Flycatcher (*Empidonax difficilis*)

Natural history

Tom Benson

- The range of Pacific-slope Flycatchers does not appear to extend beyond the western edge of the Great Basin. Thier range east of the crest of the Sierra Nevada is poorly understood given the difficulty of differentiating them from their sister species, Cordilleran Flycatcher.
- Pacific-slope Flycatchers breed along the Pacific coast from southeast Alaska to southern California, with a disjunct resident population in southern Baja California. The species winters in Baja California and along the Pacific slope of Mexico (Lowther 2000).
- Pacific-slope Flycatchers arrive on their breeding grounds in the Sierra Nevada from late April through mid May. Autumn migration begins between mid August and mid September (Lowther 2000).
- Pacific-slope Flycatchers are insectivorous. The species captures flying insects from the air or gleans arthropods from vegetation.

Nesting

- The mating systems and territoriality of Pacific-slope Flycatchers have not been well studied. The species is believed to be primarily monogamous and has been documented aggressively defending territories from conspecifics, but there are few data on territory size (Lowther 2000).
- In regions in which Pacific-slope and Cordilleran Flycatchers and other *Empidonax* occur, the species do not appear to overlap at the local level (Johnson 1978, 1980).
- Pacific-slope Flycatchers on the Pacific coast of California regularly have two broods per season. The number of broods produced by birds in the Sierra Nevada is not well documented. Most clutches contains four eggs that are whitish with brown spots (Lowther 2000).
- Pacific-slope Flycatchers nest in forked tree branches, cavities, rock outcroppings, and manmade structures, all of which provide support below and behind the nest (Lowther 2000).
- The nest is a compact, spherical cup constructed mainly from lichen, moss, and strips of bark. Nests near manmade structures often contain string, paper, and other human debris (Davis et al. 1963).
- Parasitism of Pacific-slope Flycatcher nests by Brown-headed Cowbirds is rare (Lowther 2000).

Status and trend

- Trends in abundance of Pacific-slope Flycatchers are inconsistent across their range (Sauer et al. 2014). Breeding Bird Survey data do not distinguish between Cordilleran and Pacific-slope Flycatchers in areas of potential sympatry, making trends in the Sierra Nevada difficult to elucidate.

Habitat

- Throughout their range, Pacific-slope Flycatchers occur in humid, dense forest. In the Sierra Nevada, the species occurs along heavily wooded streams (Johnson 1980). Differences between Pacific-slope Flycatcher and Cordilleran Flycatcher habitat in the eastern Sierra Nevada are not well understood.
- The species was rare in the eastern Sierra Nevada and we did not detect it further east, where it may be replaced by Cordilleran Flycatcher.

Identification

- All *Empidonax* are small with pale breasts, two whitish wingbars, and back colors that range from pale gray-green to yellow-green. The species are best distinguished by their distinctive, simple vocalizations and subtle differences in plumage.
- Three other *Empidonax* breed in the western Great Basin: Cordilleran, Dusky, and Gray Flycatcher. Relative to Dusky and Gray Flycatchers, Pacific-slope Flycatchers usually have a more intense green or yellow wash across the entire body and slightly longer primaries. Cordilleran and Pacific-slope Flycatchers can only be distinguished by their vocalizations. Pacific-slope Flycatchers may be confused with Western Wood-Pewees, which are slightly larger and grayer and have smudgy breasts, fainter wingbars, and a longer primary extension than any *Empidonax*.
- The song of Pacific-slope Flycatchers is extremely similar to the song of Cordilleran Flycatchers. It has three parts and often is characterized as *psSEET pstick seet*. The first syllable of the second part of the Cordilleran Flycatcher's song is higher in pitch than the second, whereas the second syllable of the Pacific-slope Flycatcher's song is higher than the first. The songs can be difficult to distinguish in areas where both species occur (Lowther 2000).
- Male Pacific-slope Flycatchers make a strongly upslurred *pee-ist*. Females make a *seet* similar to the third part of the species' song.

Response to human activity or natural disturbances

- Little is known about the effects of human activities on this species.

Data gaps

- Not only is little known about the ecology of Pacific-slope Flycatchers, but their relations with Cordilleran Flycatchers are poorly understood. No distinguishing morphological characteristics have been identified, and the genetics of the two putative species, especially in areas where both occur, have not been extensively sampled (Lowther 2000).

Cordilleran Flycatcher (*Empidonax occidentalis*)

Natural history

Frank Fogarty

- Formerly designated as a subspecies of Western Flycatcher, which no longer is recognized as a species. Field identification of Cordilleran Flycatchers, always challenging, has been complicated by these taxonomic revisions.
- Cordilleran Flycatchers breed throughout the Rocky Mountains and eastern Great Basin, with local breeding populations in the central and western Great Basin. It is also resident in the mountains of north-central Mexico. During the winter, individuals that breed in the United States join birds that are resident in the mountains of Mexico (Lowther 2000).
- The species arrives on its northern breeding grounds in April or early May. Autumn migration takes place from mid August to late September (Lowther 2000).
- Cordilleran Flycatchers are insectivorous, catching flying insects that they ambushe from a perch or gleaning arthropods from vegetation.

Nesting

- The mating systems and territoriality of Cordilleran Flycatchers have not been well studied. The species is believed to be primarily monogamous and has been documented aggressively defending territories from conspecifics, but there are few data on territory size (Lowther 2000).
- Many aspects of the nesting biology of Cordilleran Flycatchers, including the number of broods laid per year in the central and northern portions of their range, have not been studied. Clutches contains four whitish eggs with brown spots (Lowther 2000).
- Cordilleran Flycatcher nests typically are constructed in indentations or partial cavities in rocks, man-made structures, fallen logs, live trees, or stream banks.
- The nest is a spherical cup, constructed primarily with moss and often held together with spider silk (Rowley 1966).
- Parasitism of Cordilleran Flycatcher nests by Brown-headed Cowbirds has been documented, but the extent and effects of such parasitism are unknown.

Status and trend

- Breeding Bird Survey data indicate that trends in abundance of Cordilleran Flycatchers across their range are inconsistent. The low number of detections in many areas make apparent trends difficult to interpret (Sauer et al. 2014).
- The species is rare and local in the western Great Basin, where the extent of its overlap with Pacific-slope Flycatchers makes identification difficult.

Habitat

- In the Great Basin, Cordilleran Flycatchers occupy dense stands of trees, almost always near a flowing watercourse. In the central Great Basin, they occur almost exclusively along streams with thick stands of water birch, and appear to avoid willow-dominated systems.
- Cordilleran Flycatchers were uncommon and local in the eastern Sierra Nevada. We did not detect them in the Wassuk Range.

Identification

- Members of the genus *Empidonax*, including Cordilleran Flycatchers, have similar plumage. All are small with pale breasts, two whitish wingbars, and back colors that range from pale gray-green to yellow-green. These species are best distinguished by their distinctive, simple vocalizations along with subtle differences in plumage.
- Three other *Empidonax* breed in the western Great Basin: Dusky Flycatchers, Gray Flycatchers, and Pacific-slope Flycatchers. Relative to Dusky Flycatchers and Gray Flycatchers, Cordilleran Flycatchers have a more intense green or yellow wash across the entire body and its primaries extend slightly longer. Cordilleran Flycatchers and Pacific-slope Flycatchers can only be distinguished by their vocalizations. Cordilleran Flycatchesr also may be confused with Western Wood-Pewees, which are slightly larger flycatchers that are grayer overall with a smudgy breast, fainter wingbars, and a longer primary projection than any *Empidonax*.
- The song of Cordilleran Flycatchers is extremely similar to the song of Pacific-slope Flycatchers. It has three parts and often is characterized as *psSEET pstick seet*. The first syllable of the second part of the Cordilleran Flycatcher's song is higher in pitch than the second, whereas the second syllable of the Pacific-slope Flycatcher's song is higher than the first. This distinction is subtle and the songs are difficult to distinguish in areas where both species occur (Lowther 2000).
- Some males make a distinctive, two-note *tee-seet* position call throughout the day. Other males make a slurred *tsweep*, nearly identical to the male Pacific-slope Flycatcher's call note.

Response to human activity or natural disturbances

- Little is known about effects of humans on this species.

Data gaps

- Little is known about the ecology of Cordilleran Flycatchers and their relations with Pacific-slope Flycatchers. No distinguishing morphological characteristics have been identified, and the genetics of the two putative species, especially in areas where both occur, have not been extensively sampled (Lowther 2000).

Ash-throated Flycatcher (*Myiarchus cinerascens*)

Natural history

David Pavlik

- A large and raucous flycatcher, Ash-throated Flycatcher is the only member of the genus *Myiarchus*, whose species are notoriously difficult to distinguish, that regularly occurs in the Great Basin.
- The species' breeding range extends from southern Washington to central Texas and northern Mexico. It is common in the Sonoran and Mojave Deserts and in oak woodlands on the Sierra Nevada's western slope. It is rare to uncommon at study sites in the Sierra Nevada and Wassuk Range, and in central Nevada.
- Ash-throated Flycatchers winter primarily along the Pacific slope of Mexico, including Baja California, and in lowlands on the Gulf of Mexico.
- Like all members of the family Tyrannidae, Ash-throated Flycatchers are insectivorous and capture prey on the wing. The species often hunts from prominent, exposed perches, flying out after sighting prey.

Nesting

- Ash-throated Flycatchers are monogamous and usually defend a territory that includes their nest site and foraging areas. The size of this territory and its overlap with other territories varies, likely as a function of prey abundance and the availability of nesting cavities (Cardiff and Dittman 2002).
- Ash-throated Flycatchers generally do not have two broods, particularly north of the Sonoran Desert. The clutch consists of four or five (sometimes as few as two or as many as seven) whitish eggs. Eggs are laid in May or June in the Great Basin (Ehrlich et al. 1988, Cardiff and Dittman 2002).
- Ash-throated Flycatchers nest in natural cavities or cavities created by woodpeckers. Females line the cavity with plant material, feathers, and animal hair.
- Parasitism of Ash-throated Flycatchers by Brown-headed Cowbirds has not been documented (Cardiff and Dittmann 2002).

Status and trend

- Breeding Bird Survey data suggest that trends in abundance of Ash-throated Flycatchers over the past 50 years varied among regions, but abundance generally increased, particularly in the southern Great Basin (Sauer et al. 2014). Reasons for these increases are not well understood.
- We rarely detected Ash-throated Flycatchers in the eastern Sierra Nevada and the Wassuk Range and generally did not detect them until late June, suggesting that individuals may be dispersing from the south. It is unclear why the species has not been detected in many apparent habitats in the western Great Basin.

Habitat

- Ash-throated Flycatchers are associated with dry, open woodlands and shrublands given an adequate number of cavities and primary cavity nesters (e.g. woodpeckers).

Identification

- A large flycatcher, roughly the size of a bluebird but with longer wings and tail and a crested head. The back and head are brown. The throat and chest are gray, turning to lemon yellow towards the belly and legs. The wings and tail are rust-colored. Plumages are similar across sexes and age classes.
- In the western Great Basin, the species is most similar to Western Kingbirds and Say's Phoebes. Ash-throated Flycatchers' large size, yellow belly, and rusty flight feathers distinguish them from other flycatcher species.
- The most common display call is a deep, watery, two-note *ka-brick*. The species' higher, louder two-note *ha-wheer* is characterized by many birdwatchers as *chill beer*. These two-note calls may be followed by a watery gurgle. Birds frequently recite just the introductory note of these calls, and a lower *br-ick*.

Response to human activity or natural disturbances

- Mortality of Ash-throated Flycatchers that became trapped in plastic PVC pipes used as mining-claim stakes recently was documented, although population-level effects are unclear.
- Densities of Ash-throated Flycatchers are much lower in urban areas, even those with extensive vegetation, than in rural areas (Cardiff and Dittmann 2002).
- The lack of oak regeneration west of the Sierra Nevada due to intensive grazing by domestic livestock may limit cavity availability in future decades.

Data gaps

- Ash-throated Flycatchers are fairly well-studied in the Sonoran Desert, where they are one of the most common species. Data on the species' current status in the Great Basin are more limited.

Plumbeous Vireo (*Vireo plumbeus*)

Natural history

Carla Kishinami

- Plumbeous Vireos tend to stay well-concealed within dense conifers. They often are detected by their constant bouts of song throughout the breeding season.
- Plumbeous Vireos breed throughout the Intermountain West from northern Nevada and Utah south through northern New Mexico and Arizona. They also breed in the mountains of southern New Mexico, the Trans-Pecos region of Texas, and the Sierra Madre of Mexico. Plumbeous Vireos primarily winter along the Pacific slope of Mexico from Sonora south to Oaxaca.
- The species reaches its breeding grounds in the Great Basin in May and departs for autumn migration in September (Goguen and Curson 2012).
- The diet of Plumbeous Vireos has not been studied quantitatively but is believed to be >95% arthropods during the summer, similar to its congeners. Fruit and seeds may be a larger percentage of its winter diet (Goguen and Curson 2012).

Nesting

- Plumbeous Vireos are monogamous. Males defend territories of 0.5 to 2 hectares from conspecific males. Some territoriality during winter has been observed, but winter behavior is not well understood (Goguen and Curson 2012).
- Plumbeous Vireos have one brood per year. In the Great Basin, they begin laying eggs in late May or early June. Clutches include four (sometimes three or five) eggs that are whitish with brown spots (Ehrlich et al. 1988, Goguen and Curson 2012).
- In the western Great Basin, Plumbeous Vireo nests usually are constructed in pinyon. The nest is an open cup suspended below two or three branches that form a fork. The nest is woven from bark and grass, held together with silk from spider webs or insect cocoons, and often coated with moss and lichen for camouflage.
- Across the species' range, a high proportion of broods are parasitized by Brown-headed Cowbirds or Bronzed Cowbirds (Goguen and Curson 2012).

Status and trend

- Abundance of Plumbeous Vireos is not well-estimated by the Breeding Bird Survey because few routes are within its range and the species previously was included within Solitary Vireo, which no longer is recognized as a species. The Breeding Bird Survey data suggest that local trends are inconsistent and rangewide abundance decreased over 3% per year from 1966 to 2012 (Sauer et al. 2014).

Habitat

- Dry, montane coniferous and mixed woodlands, especially those dominated by ponderosa or pinyon pine and juniper, above 1000 m (Goguen and Curson 2012).
- The species was common in the Wassuk Range and uncommon in the eastern Sierra Nevada, which is near the western edge of its range.

Identification

- Plumbeous Vireos are medium-sized vireos. The head and back are gray with minimal contrast between the back and nape. The wings and tail are blackish-gray with two white wingbars. The breast and belly are whitish, sometimes with a faint olive wash on the flanks. The face has a broad, white eye ring and supraloral line with a thin, dark loral line. Immature birds may have a slight greenish-yellow tinge to the upper parts and flanks.
- Five species of vireos breed in the western Great Basin. Bell's, Gray, and Warbling Vireos are distinguished from Plumbeous Vireos by their plain facial patterns and different habitat. Plumbeous and Cassin's Vireos are difficult to differentiate and may co-occur in parts of the eastern Sierra Nevada. Plumbeous Vireos usually occupy woodlands that are more arid than those occupied by Cassin's Vireos and are grayer overall, with less contrast between the crown and back. The edges of the secondaries are dark in Plumbeous Vireos and yellow in Cassin's Vireos. Most Plumbeous Vireos do not have yellow on the flanks but some immature birds have a faint, yellow wash, typically duller than that of Cassin's Vireos.
- Like many vireos, Plumbeous Vireos sing throughout the day during the breeding season. The song, *chree, chroo, chree, chro,* is slow and burry, and each phrase includes two to four notes. Most pauses between phrases are longer than one second. The song is generally lower, harsher, and contains simpler phrases than that of Cassin's Vireos, but some songs may be indistinguishable. A complex alternate song, sung without pause, is a jumble of chattering notes and phrases from the primary song.
- Calls of Plumbeous Vireos are harsh, descending chatter notes in rapid succession, similar to the calls of Cassin's Vireos and other congeners.

Response to human activity or natural disturbances

- The abundance of Plumbeous Vireos increases when woodlands are thinned or following mild- to moderate-severity fire (Goguen and Curson 2012). Their abundance declines sharply with any degree of development (Jentsch et al. 2008)

Data gaps

- Little is known about the wintering ecology of Plumbeous Vireos and the overlap of its range with Cassin's Vireos to the north and west. The high proportion of nests that are parasitized by Brown-headed Cowbirds suggests that the species may have source and sink populations (Goguen and Curson 2012).

Cassin's Vireo (*Vireo cassinii*)

Natural history

Matt Grube

- Cassin's Vireos often stay well-hidden within vegetation.
- Cassin's Vireos breed in mountains from southern British Columbia south to southern California. The species' range in the Great Basin does not extend east of the Sierra Nevada. Cassin's Vireos winter throughout central and southern Mexico, mostly along the Pacific slope, with a small population remaining in the southwestern United States. A subspecies is resident on the southern tip of Baja California (Goguen and Curson 2002).
- Spring migrants arrive in the Sierra Nevada from late April through mid May. Individuals leave the Sierra Nevada from early August to early October (Goguen and Curson 2002). In general, the species' migration is not well understood.
- Cassin's, Plumbeous, and Blue-headed Vireos previously were classified as subspecies of Solitary Vireo, which no longer is recognized as a species. These taxa are difficult to differentiate outside of their respective breeding ranges.
- From March through November, Cassin's Vireos are almost entirely insectivorous, foraging for arthropods in the understory (Beal 1907). The species' winter diet has not been studied but may include fruit (Goguen and Curson 2002).

Nesting

- The mating systems and territoriality of Cassin's Vireos have not been studied. At least some males defend territories from rival males (Goguen and Curson 2002).
- Nests usually are constructed in the middle or lower limbs of trees or near the top of shrubs or saplings. The nest is a woven basket of plant material that is suspended by its rim from two or three twigs (Goguen and Curson 2002).
- Each clutch consists of four (sometimes three or five) eggs, which are whitish and sometimes have brown spots (Bent 1950, Ehrlich et al. 1988). Most Cassin's Vireos lay a single brood per season. In the Sierra Nevada, egg-laying dates range from early May to late June (Goguen and Curson 2002).
- Parasitism of Cassin's Vireos by Brown-headed Cowbirds is more prevalent than parasitism of most co-occurring host species. In one study in the Sierra Nevada, an estimated 25% of Cassin's Vireo nests were parasitized, as compared to 3.8% for all passerine species in the region (Purcell and Verner 1999).

Status and trend

- Cassin's Vireo is one of the few migratory songbirds that appeared to be increasing in abundance across most of its range from 1966 to 2012. Breeding Bird Survey data suggest that the species' abundance has been relatively stable rangewide and in the Sierra Nevada since 2002 (Sauer et al. 2014).

Habitat

- Occupies coniferous and deciduous woodlands, and is most common in dry, open woodlands. In the Sierra Nevada, the species is most abundant in ponderosa pine and mixed woodland (Beedy 1981, Goguen and Curson 2002).
- The species was uncommon in the eastern Sierra Nevada. We did not detect it in the Wassuk Range.

Identification

- A medium-sized vireo with a dull, greenish back; gray crown and face; and white eye ring and supralores. The white throat contrasts with the darker cheeks. The belly and breast are white with a greenish wash on the flanks. The wings are darker than the back, with two white wing bars and yellow edging visible on the folded secondaries. The crowns of immature birds may be greener than that of adults and may blend with the back.
- Five species of vireos breed in the western Great Basin. Bell's, Gray, and Warbling Vireos have plainer facial patterns than Cassin's Vireos and different habitat. Plumbeous and Cassin's Vireos are difficult to differentiate and may co-occur in parts of the eastern Sierra Nevada. Plumbeous Vireos tend to occupy woodlands that are more arid than those occupied by Cassin's Vireos. Most Plumbeous Vireos are grayer, with less contrast between their crown and back. The edges of the secondaries are dark in Plumbeous Vireos and yellow in Cassin's Vireos. Most Plumbeous Vireos do not have yellow on the flanks, but some immature birds have a faint, yellow wash, duller than that of Cassin's Vireos.
- Cassin's Vireos sing throughout the day during the breeding season. The song, *ch-ree, ree-e-eu, ree-u-yuh, ree-uh,* is slow and burry, and each phrase has two to four notes (Howell and Webb 1995). Pauses between phrases typically are longer than one second. Individual phrases rarely are repeated within a song. The song of Cassin's Vireos is less burry and higher in pitch than that of Plumbeous Vireos, and contains phrases that are more complex, but some songs may be indistinguishable.
- Call notes of Cassin's Vireos are harsh, descending chatter notes made in rapid succession, similar to the calls of Plumbeous Vireos and other congeners.

Response to human activity or natural disturbances

- Clear-cutting results in loss of habitat for Cassin's Vireos. The effects of thinning vary. Activities that facilitate increases in abundance of Brown-headed Cowbirds may have a negative effect on Cassin's Vireos (Goguen and Curson 2002).

Data gaps

- The breeding biology and winter ecology of Cassin's Vireos is not well understood (Goguen and Curson 2002).

Warbling Vireo (*Vireo gilvus*)

Natural history

Frank Fogarty

- Warbling Vireos are incessant singers, even during midday when most other songbirds are silent.
- Warbling Vireos breed from southern Yukon Territory and southeast Alaska east through the southern Prairie Provinces to New England and south through most of the conterminous United States except for the arid Southwest, southern Great Plains, Southeast, and mid Atlantic. The species also breeds in the highlands of central Mexico. It winters throughout western Mexico and parts of Central America.
- Warbling Vireos are among the most abundant bird species in riparian areas across the western United States and Canada, including the Great Basin.
- Warbling Vireos arrive on their breeding grounds in the western Great Basin from late April to May and depart for autumn migration in August and September. Breeding populations in Mexico likely are sedentary or elevational migrants (Gardali and Ballard 2000).
- Warbling Vireos are primarily insectivorous. They glean insects from foliage within the canopy. They occasionally forage in shrubs and closer to the ground, and rarely consume plant matter (Gardali and Ballard 2000).

Nesting

- Multiple adjacent territories, which average about 1.5 hectares, may be established within one stand of trees. The species is monogamous (Gardali and Ballard 2000).
- Egg laying occurs between late April and late July. Populations in the western United States and Canada sometimes have two broods per season, although the proportion of pairs in the Great Basin that have two broods is unclear (Gardali and Ballard 2000).
- Warbling Vireos nest in tall deciduous trees. In the Great Basin, they often nest in aspen. Nests typically are built near the tip of a long, horizontal branch and suspended from a fork at two or three points of contact. The nest is a globular, open cup woven from grass, bark, lichen, and animal hair (Howes-Jones 1985).
- Each clutch contains four (sometimes three) eggs, which are white with a few dark spots (Bent 1950, Ehrlich et al. 1988).
- Many Warbling Vireo nests are parasitized by Brown-headed Cowbirds (Friedmann 1963). In the southern portion of the species' range, their nests also may be parasitized by Bronzed Cowbirds (Gardali and Ballard 2000).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Warbling Vireos increased rangewide by an average of <1% per year and in the Great Basin by an average of >2% per year from 1966 to 2012. Abundance appears to be stable or increasing in almost every state and ecoregion.
- Increases in abundance in the eastern United States and Canada have been attributed to reforestation and to the clearing of coniferous forests and subsequent expansion of deciduous woodland, respectively. Local declines may be related to loss of riparian habitat in the western United States and expansion of Brown-headed Cowbirds in California (Gardali and Ballard 2000).

Habitat

- Warbling Vireos occur in areas with extensive stands of large deciduous trees and few conifers, often near water. The species appears to be unaffected by understory structure and composition, and occurs in both forest edges and interiors (Gardali and Ballard 2000). In the Great Basin, Warbling Vireos mainly occur in aspen or cottonwood along riparian corridors.
- Warbling Vireo was one of our most frequently detected bird species in the eastern Sierra Nevada and Wassuk Range.

Identification

- Warbling Vireos are medium-sized vireos that are best distinguished from their congeners by their relative lack of markings. The back, wings, tail, and head are light olive-brown and the belly, breast, and throat are whitish with a faint yellow wash on the flanks. The facial supercilium and lores are whitish and low contrast.
- Three other species of vireos occur in the western Great Basin: Cassin's, Plumbeous, and Gray. Cassin's and Plumbeous Vireos have bolder facial markings and white wingbars. Gray Vireos are grayer with a longer tail and different habitat.
- Warbling Vireo song is a rapid, repetitive warble, *reederee reederee reederee rreee*, often ending on a buzzy, descending note. The song is distinct from those of other vireos and reminiscent of a warbler or cardueline finch.
- The most common call is a nasal, whining *meeew* or *meewsh*. The species also makes a dry, abrupt *jit* and a wren-like chatter, especially when agitated.

Response to human activity or natural disturbances

- In addition to the hypotheses noted above, decreases in abundance of Warbling Vireos have been associated with spraying of herbicides within their habitat (Gardali and Ballard 2000).

Data gaps

- Drivers of local trends in Warbling Vireo populations are not fully understood. Little is known about the species' wintering ecology (Gardali and Ballard 2000).

Pinyon Jay (*Gymnorhinus cyanocephalus*)

Natural history

Matt Grube

- Pinyon Jays occur in loud, nomadic flocks that travel over large areas in search of abundant pine seeds.
- Pinyon Jays are resident in the Great Basin and on the western slope of the Rocky Mountains from southern Montana south to New Mexico.
- The species is non-migratory but expands to areas beyond its usual range during years with poor pine-cone crops (Westcott 1964).
- Pinyon Jays are omnivorous. In addition to pine seeds, a major component of their diet, the species consumes other seeds, fruit, arthropods, and small vertebrates, including lizards and nestling birds (Balda 2002).

Nesting

- Pinyon Jays are monogamous and usually maintain pair bonds for life, although no studies have assessed the frequency of extra-pair copulations (Balda 2002).
- Pinyon Jay flocks maintain large home ranges. However, these home ranges do not appear to have fixed boundaries, and neighboring flocks often interact where their home ranges overlap. Individual pairs are not territorial but will defend gathered nesting material (Balda 2002).
- The timing of Pinyon Jay nest construction and egg laying is synchronized within flocks but varies among flocks. The presence of green pine seeds initiates breeding in a given region. Pairs raise one brood per year, but pairs with failed nests may form satellite colonies and attempt to renest (Balda 2002).
- Pinyon Jays place their nests in coniferous trees. In the Great Basin, these trees include ponderosa pine, pinyon pine, and juniper.
- The nest is a large, bulky cup with three parts: a platform of large twigs, an intermediate layer of woven grass and bark, and an inner lining of fine vegetation, animal hair, and feathers (Balda and Bateman 1972).
- Each clutch consists of four or five (rarely three) pale, bluish eggs with reddish spots (Ehrlich et al. 1988, Balda 2002).
- Parasitism of Pinyon Jay broods by Brown-headed Cowbirds has not been documented, possibly because Pinyon Jays breed earlier than Brown-headed Cowbirds (Balda 2002).

Status and trend

- Breeding Bird Survey data suggest that abundance of Pinyon Jays declined rangewide and in the Great Basin by a statistically significant average of 4-5% per year from 1966 to 2012 (Sauer et al. 2014). However, the large home range and flocking behavior of Pinyon Jays makes it difficult to accurately assess local abundance with traditional survey methods.
- The species appears to be uncommon in the eastern Sierra Nevada and Wassuk Range, although its detection probability may be low.

Habitat

- In the Great Basin, Pinyon Jays typically occur in pinyon and juniper woodlands, although they can occur in any land-cover type given their wide foraging range and omnivory.

Identification

- Pinyon Jays are medium-sized, short-tailed corvids with long, sharply pointed bills. The entire body is washed in deep blue, with blurry whitish streaks on the throat and upper breast. The plumage of males and females is identical. Juvenile birds are dull gray, whereas the plumage of older immature birds is similar to that of adults but duller.
- In the western Great Basin, Steller's Jays and Western Scrub-Jays are the only other blue Corvids. Steller's Jays have a prominent crest and black markings on the head. Western Scrub-Jays have a longer tail and extensive gray and white in their plumage.
- Pinyon Jays do not have a true song. The most commonly heard vocalization is a plaintive *oy oy oy* that is softer than the vocalizations of most other corvids. Like most Corvids, Pinyon Jays communicate with conspecifics with a variety of calls, including a harsher, rising *kwee kwee kwee*.

Response to human activity or natural disturbances

- Pinyon Jays are quite tame and often forage near human development, where mortality from guns and domestic cats has been documented (Balda 2002).
- Pinyon and juniper woodlands, the primary habitat of Pinyon Jays, were classified as noncommercial by the United States Forest Service. Over 1 million hectares of this land-cover type were converted to grassland for cattle grazing in the mid 20th century (Balda 2002).

Data gaps

- Most research on Pinyon Jays has been conducted in the southern half of their range (Balda 2002). Relatively little is known about their complex social structure and the coevolution of the species with several species of pine, for which it is a primary seed disperser.

Steller's Jay (*Cyanocitta stelleri*)

Natural history

Dan Irizarry

- Steller's Jays are handsome, loud birds that inhabit forests in the western United States and Canada. They are tame and inquisitive. Steller's Jays often investigate humans in their territories and readily use urban food sources, including bird feeders.
- Steller's Jays are resident from southern coastal Alaska south through western British Columbia, western Washington and Oregon, the Coastal Range, and the Sierra Nevada. They also occur in the Rocky Mountains and throughout mountainous regions in Mexico and Central America.
- Most Steller's Jays are believed to be resident, although birds in northern and high-elevation areas of the species' range are probably elevational migrants (Walker et al. 2014). Immature birds sometimes irrupt. Irruptions usually begin in late summer and likely are driven by food shortages (Vander Wall and Balda 1981).
- Steller's Jays are omnivorous. They feed on seeds, fruit, arthropods, and small vertebrates, including nestling birds and eggs. Acorns are a major component of the species' diet in many areas (Walker et al. 2014).

Nesting

- Individual pairs of Steller's Jays are highly territorial in the immediate vicinity of their nests, but dominance hierarchies operate away from nests (Brown 1963, Brown 1964). Steller's Jays are monogamous and remain on their territories year-round. Males guard their mates prior to egg laying (Brown 1963).
- Steller's Jays are believed to be single-brooded and to begin laying eggs in April or May. Each clutch contains four (rarely as few as two or as many as six) eggs, which are bluish-green with colored spots (Ehrlich et al. 1988, Walker et al. 2014).
- Steller's Jays nest in diverse land-cover types, including areas with human development. The species typically nests in trees or large shrubs but also nests in man-made structures (Bent 1946).
- The bulky nest is placed on a horizontal branch. The nest is made of twigs, bark, and other plant material and often is held together with mud. The interior is lined with finer plant material (Bent 1946).
- Parasitism of Steller's Jay broods has not been documented.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Steller's Jays is stable rangewide and in the Great Basin (Sauer et al. 2014).
- The species was common in the eastern Sierra Nevada and Wassuk Range.

Habitat

- Steller's Jays occur in coniferous and mixed forests and woodlands. Their highest densities are in fragmented forests with extensive edges and openings (Walker et al. 2014).

Identification

- Steller's Jay is a large, distinctive passerine. The head, upper back, and upper breast are blackish, fading to a deeper blue on the remainder of the body, wings, and tail. Adult males and females are identical. Juveniles are similar to adults but paler overall. No other Corvid in the Great Basin has either a crest or plumage that is exclusively black and blue.
- Steller's Jays do not have a true song and, like most Corvids, have an extensive repertoire of non-musical vocalizations. A harsh, drawn-out *shaarh* is common; it is less squeaky than the calls of Western Scrub-Jays but not as dry and raspy as those of Clark's Nutcrackers. The species also makes a repeated *shrek shrek shrek*. The species' whistles and popping noises sometimes are strung together in a quiet, Mimid-like series that may function as a song.

Response to human activity or natural disturbances

- No effects of human alteration of forests on Steller's Jays are known, although clear-cutting likely reduces the extent of habitat.

Data gaps

- Steller's Jays are common and have been studied across their range, but knowledge of their breeding and social behavior, annual movements, and survival is incomplete (Walker et al. 2014).

Western Scrub-Jay (*Aphelocoma californica*)

Natural history

Tim Lenz

- Western Scrub-Jay includes three recognized subspecies that are closely related to Island Scrub-Jay and Florida Scrub-Jay (Peterson 1992, Curry et al. 2002). The western Great Basin is the western boundary of the interior subspecies (Woodhouse's), which intergrades with the coastal subspecies (California) near Reno and Carson City, Nevada (Peterson 1991).
- Western Scrub-Jays occur from western Oregon south through most of California and Baja California, throughout the Great Basin and southern Rocky Mountains, east to central Texas, and south through the highlands of Mexico (where the third subspecies, Sumichrast's, occurs).
- Most Western Scrub-Jay populations are nonmigratory, although some may be elevational migrants. Many individuals wander during autumn and winter, especially in years with poor acorn crops (Curry et al. 2002).
- Western Scrub-Jays are omnivorous, feeding on arthropods and fruit during summer and seeds, especially acorns, during autumn and winter. The species also captures small vertebrates, including snakes, lizards, nestling birds, and occasionally adult birds (Curry et al. 2002).

Nesting

- Western Scrub-Jays maintain one territory year-round that includes both a nest site and trees that provide winter food. The species is monogamous and maintains pair bonds year-round (Curry et al. 2002).
- Unlike most *Aphelocoma*, California and Woodhouse's Western Scrub-Jays do not breed cooperatively (Curry et al. 2002). Sumichrast's Western Scrub-Jay breeds cooperatively (Burt and Peterson 1993).
- Nests are placed in dense foliage in trees or shrubs, typically within 4 m of the ground. In the Great Basin, the trees in which Western Scrub-Jays place their nests include serviceberry, elderberry, and pinyon pine (Bent 1946, Curry et al. 2002).
- The nest is a large, bulky cup made of large twigs. The inner lining contains smaller twigs, softer plant material, and often animal hair (Bent 1946).
- Western Scrub-Jays have a single brood per season. They lay eggs from April to early May. Each clutch contains two (rarely three to six) variably colored eggs (Ehrlich et al. 1988, Curry et al. 2002).
- Parasitism of Western Scrub-Jay nests by Brown-headed Cowbirds has not been documented. The species readily rejects Brown-headed Cowbird eggs in experiments (Rothstein 1982).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Western Scrub-Jays is stable rangewide, but varies among locations (Sauer et a. 2014). The Breeding Bird Survey does not report trends at the subspecies level.

Habitat

- Western Scrub-Jays occur in areas with abundant oaks or pinyon pines. In the Great Basin, Woodhouse's Western Scrub-Jays mainly occur in pinyon and juniper woodlands that are drier or lower in elevation than the habitats of other corvids, especially Clark's Nutcrackers and Steller's Jays, although the species may co-occur.
- We frequently detected Western Scrub-Jays in the Wassuk Range, but did not detect them in the eastern Sierra Nevada.

Identification

- Western Scrub-Jays are small to medium-sized Corvids with long tails and no crests. Woodhouse's Western Scrub-Jays have a gray-blue back; blue wings, rump, undertail coverts, tail, nape, and crown; and a pale gray belly and breast. The face is blackish gray with a thin, white supercilium and a low contrast, whitish chin and throat. The border between the throat and upper breast has a faint, diffuse bluish band that often is broken in the center. California Western Scrub-Jays have stronger facial markings with more contrast, a well-defined blue breast band, white undertail coverts, and a darker brown back.
- Juveniles are grayish with blue flight feathers and tails.
- Two other blue Corvids, Pinyon Jay and Steller's Jay, occur in the Great Basin. Pinyon Jays have a shorter tail and are uniformly blue with no facial markings. Steller's Jays have a large crest and a blackish head.
- Like most Corvids, Western Scrub-Jays have a diverse repertoire of non-musical vocalizations. The most common vocalizations are a harsh, scolding *shreennk* and a rapid, repeated *wenk wenk wenk*. The vocalizations of the Woodhouse's Western Scrub-Jays tend to be lower and hoarser than those of California Western Scrub-Jays. The species rarely sings and its song has been described as a quiet, unstructured series of soft notes (Curry et al. 2002).

Response to human activity or natural disturbances

- Western Scrub-Jays respond well to human disturbance and often colonize residential areas, although large areas of the species' habitat may have been lost to development (Curry et al. 2002).

Data gaps

- Taxonomic relations within *Aphelocoma* and within Western Scrub-Jay remain unresolved despite numerous studies of the genetics, appearance, and distribution of the subspecies and species in this complex.

Clark's Nutcracker *(Nucifraga columbiana)*

Natural history

Frank Fogarty

- Clark's Nutcrackers are racous Corvids. Their loose flocks often are observed flying among ridgetops in the Great Basin. The species is named after the explorer William Clark, who collected the first specimen of the bird during the expedition he led with Meriwether Lewis (Davis and Stevenson 1934).
- Clark's Nutcrackers are resident in mountains from central British Columbia south through the Rocky Mountains into New Mexico and west through the Great Basin.
- The species inhabits higher elevations during summer than during winter.
- Clark's Nutcrackers primarily feed on conifer seeds. Like most Corvids, they are opportunistic foragers and also will feed on arthropods, small vertebrates, and carrion.

Nesting

- Clark's Nutcrackers are monogamous. Some members of the species defend nesting territories from conspecifics, although this defense is inconsistent. The species forms foraging flocks of up to 200 birds throughout the year (Tomback 1998).
- Nests typically are built on the fork of a horizontal outer branch of a tree. Nests often are built on the leeward sides of trees, which gives the nests some protection from strong winds (Tomback 1998).
- Nests consist of a platform and an inner cup. The platform is constructed of large twigs woven securely through tree branches. The inner cup is held within the platform and made of softer plant material (Mewaldt 1956).
- Clark's Nutcrackers nest earlier than most passerines. Egg-laying dates usually range from mid March to mid April (Tomback 1998). The species lays one clutch of two to four eggs per year (Ehrlich et al. 1988). The eggs are pale green (Bent 1946).
- Parasitism of the species' nests by Brown-headed Cowbirds has not been documented.

Status and trend

- Breeding Bird Survey data indicate that the abundance of Clark's Nutcracker is stable across its range. These data also suggest that the species' abundance in the Great Basin increased by an average of 2.3% per year from 1968 through 2012 (Sauer et al. 2014).
- Clark's Nutcrackers were common and abundant in the eastern Sierra Nevada and Wassuk Range.
- The abundance of local populations of Clark's Nutcracker fluctuates annually, likely reflecting changes in seed availability (Tomback 1998).

Habitat

- Clark's Nutcrackers breed in open, coniferous forests and woodlands from elevations of 1000 m to treeline, depending on local climate (Tomback 1998).
- Clark's Nutcracker flocks forage over areas as large as 200 hectares and feed in almost any land-cover type in montane areas (Tomback 1998).

Identification

- Clark's Nutcrackers are large, short-tailed passerines. The plumage of adults and immature birds is similar. The body and head are pale gray, the wings are black with white secondary feathers, and the tail is black with white outer feathers. Clark's Nutcrackers are relatively plain in appearance when perched. Black and white patches on the wings and tail give the species a striking appearance in flight.
- Clark's Nutcrackers are unlikely to be confused with any other North American bird. The shape and behavior of the species is similar to that of other Corvids but its gray, black, and white plumage is distinctive. Its short tail and its bill shape are suggestive of a woodpecker, which William Clark initially mistook it for, but the species perches upright and does not cling to tree trunks.
- Like most Corvids, Clark's Nutcrackers do not have a true song. The species' most common vocalization is a very loud *kraaak* or *kraaa* that can be heard more than a kilometer away. The kraaa is repeated rapidly by agitated birds. Siblings or mated pairs make a sweeter, rising *chirrup* sound (Tomback 1998).

Response to human activity or natural disturbances

- Clark's Nutcrackers are tame and tolerant of humans in their habitat, especially in parks and similar areas in which they frequently are fed by people. Loss of whitebark pine may have a negative effect on the species, but this relation is not well studied (Tomback 1998).

Data gaps

- Little is known about the species' social and breeding behavior, factors affecting survival, and responses to blister rust on whitebark pine (Tomback 1998).

American Crow (*Corvus brachyrhynchos*)

Natural history

Norman Welsh

- Although common and widespread across much of North America, American Crows are much less abundant across much of the Great Basin and the southwestern deserts.
- American Crows have both sedentary and migratory populations (Verbeek & Caffrey 2002). They are resident in most of their range in the United States.
- American Crows are opportunistic omnivores that feed on everything from seeds and fruit to carrion to small vertebrates, including nestling birds of other species.

Nesting

- American Crows are monogamous. Many pairs stay together for multiple breeding seasons.
- The territory sizes of American Crows are highly variable, likely due to the species' ability to adapt to and to nest in diverse habitats with varying levels of resource availability. Reported territory sizes range from <1 hectares to 278 hectares, and territories sometimes overlap in areas of high density (Verbeek & Caffrey 2002).
- American Crows produce one brood per season but may renest if the first attempt fails. They lay four to six (rarely three or seven) pale blue or green eggs (Ehrlich et al. 1988, Verbeek & Caffrey 2002).
- American Crows build their nests in a wide variety of tree species. They construct a large nest, primarily with twigs and sticks, generally close to the trunk and well-hidden in the upper third of a large tree (Verbeek & Caffrey 2002).
- Most broods are laid between mid March and April, but broods can be laid as early as mid February in warmer portions of the species' range (Verbeek & Caffrey 2002).
- Few instances of Brown-headed Cowbird parasitism have been reported.

Status and trend

- Breeding bird survey data suggest that American Crows are abundant and increasing in abundance across much of their range, including an average annual increase of 1.7% in the Sierra Nevada from 1966 to 2012 (Sauer et al. 2014).
- The species' colonization of cities and towns may give the impression that its abundance has dramatically increased, but this perception may be a reflection of changes in distribution rather than actual increases in abundance (Mcgowan 2001).

Habitat

- American Crows readily colonize areas with human activity, especially agricultural and suburban areas. Their two primary habitat requirements are open ground for foraging and the presence of trees or other structure for roosting and nesting (Verbeek & Caffrey 2002).
- American Crows are scarce in many arid ecosystems with few trees and in which high shrub cover limits ground foraging. In the Great Basin, they mainly occur near human development or extensive riparian systems.
- We rarely detected American Crows in the eastern Sierra Nevada and Wassuk Range.

Identification

- American Crows are large, glossy black birds. They are easily detected by their vocalizations, presence in groups, and tendency to feed in open areas. There is little difference in plumage among age and sex classes.
- In the Great Basin, American Crows most commonly are confused with the much larger Common Ravens. Ravens rarely form groups large groups during the breeding season (by contrast, flocks of American Crows may contain dozens of individuals) and have larger, more powerful bills relative to their body size than American Crows. American Crows also can be confused with Brewer's Blackbirds, which are much smaller and have pale eyes, a more delicate bill, and quite different vocalizations.
- The classic vocalization of American Crows is a throaty, hoarse *cawh*. They produce an impressive variety of other vocalizations, including many bizarre sounds that seem more mechanical than avian.

Response to human activity or natural disturbances

- American Crow is an intelligent, adaptable species that often colonizes urban and agricultural areas. Overall, their abundance and probability of persistence likely have increased in response to human activity.
- American Crow is one of the few passerines species that is hunted legally in the United States, although hunting may not significantly decrease its abundance.

Data gaps

- Taxonomy of subspecies and relations with North American congeners remain unclear and contentious, especially in the western portion of the continent.

Common Raven (*Corvus corax*)

Natural history

David Pavlik

- Common Raven is a large, iconic species. Extirpated or rare throughout most of the eastern United States by the mid 20th century, the species has rebounded throughout New England and the southern Appalachians since the 1950s.
- Common Ravens are resident throughout nearly all of Alaska, Canada, the western United States, and Mexico. In the eastern United States, the species' range is mostly limited to the upper Great Lakes, New England, and the Appalachian Mountains, with recent expansions into the mid Atlantic coastal plain.
- Common Raven is one of the most widespread bird species in the world, occurring on every continent in the northern hemisphere.
- Common Ravens are non-migratory, even in the northern latitudes. Some individuals wander widely during winter and after the breeding season, often occurring in locations outside of the species' breeding range.
- Common Ravens have a diverse and locally variable diet. The species feeds on carrion, small vertebrates, eggs, arthropods, fruit, and vegetation.

Nesting

- Common Ravens are monogamous and often maintain pair bonds throughout the year. The duration of pair bonds is unclear despite the conventional wisdom that the species mates for life (Boarman and Heinrich 1999).
- Common Ravens are territorial, and both sexes will chase and attack conspecific intruders. The species also is antagonistic toward other bird species in its territory, especially other corvids that may prey on their eggs (Boarman and Heinrich 1999). When not nesting, Common Ravens often form conspecific flocks of variable size. The species does not join flocks of other Corvids or blackbirds.
- Territory size increases as food and nest-site availability increases, with documented sizes from 4 km^2 to hundreds of km^2 (Boarman and Heinrich 1999).
- Common Ravens have one brood per year and lay clutches of four to six (rarely three or seven) large, variably colored eggs (Ehrlich et al. 1988). Most clutches are laid between mid March and mid April (Boarman and Heinrich 1999).
- Nests are constructed on substrates including large trees, cliffs, and man-made structures. Nests have a woven base of large twigs and a cup of smaller, woven twigs that is lined with hair or soft plant material (Boarman and Heinrich 1999).
- Parasitism of Common Raven broods has not been documented.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Common Ravens increased across most of the United States from 1966 to 2012. Some of the largest increases, an estimated average of 3 to 8% per year, occurred in the Great Basin and the Sierra Nevada (Sauer et al. 2014). However, the species may not be detected effectively by the Breeding Bird Survey given its large home range and tendency to aggregate around large food sources such as landfills, carcasses, or towns (Boarman and Heinrich 1999). Its increase in abundance may reflect recolonization of its historic range (Boarman and Heinrich 1999).

Habitat

- Common Ravens are common in diverse land-cover, often in complex terrain that provides thermals for soaring. They are more abundant around development and roads in the western United States than in the eastern United States.
- Common Ravens occured at low densities in most land-cover types in the Wassuk Range and eastern Sierra Nevada.

Identification

- Common Ravens are large corvids, similar in size to Red-tailed Hawks. The plumage, legs, and bill of males, females, and juveniles are black. The bill is massive and powerful. In flight, Common Ravens' protruding head, long tail, and long wings give them a distinctive cross shape.
- Common Ravens are most likely to be confused with the much smaller American Crow. American Crows have different vocalizations and smaller bills relative to their bodies. In flight, the tails of American Crows are rounded whereas the tails of Common Ravens are wedge-shaped. Soaring Common Ravens may be confused with eagles but have longer bills and black rather than brown plumage.
- Most Corvids, including Common Ravens, do not have a true song. The most common vocalization is a loud, deep *kraaah* or *brrronk*. At least 33 other vocalizations have been documented (Boarman and Heinrich 1999). Many appear to convey social cues, but their context is not well understood.

Response to human activity or natural disturbances

- Common Ravens generally adapt well to human land use, especially in the arid western United States. In the eastern United States they mostly occupy extensive wilderness areas, although this pattern appears to be shifting. Few other effects of humans in North America are documented (Boarman and Heinrich 1999).

Data gaps

- Several elements of Common Ravens' biology and ecology are not well known, including their social behavior, post-breeding dispersal, genetic structure, and variation in their responses to human development across their range (Boarman and Heinrich 1999).

Tree Swallow (*Tachycineta bicolor*)

Natural history

Frank Fogarty

- The local distribution and abundance of Tree Swallows is associated with the presence of natural cavities and woodpeckers.
- Tree Swallows breed from treeline in Alaska and Canada south through California and east through northern Georgia and South Carolina. The species winters in southern and central California, southern Arizona, the Gulf Coast, Florida, and the Atlantic coast north to Maryland.
- With the exception of resident birds in southern California, Tree Swallows are migratory (Butler 1988). The species arrives in its breeding range in March. Autumn migration peaks in September in most areas (Winkler et al. 2011).
- Tree Swallows feed primarily on flying insects that they capture during acrobatic flight. They also feed on plant matter, especially fruit (Beal 1918). This flexibility allows the species to migrate north early in the year and winter at high elevations.

Nesting

- Tree Swallows defend their nesting cavity and the immediate surroundings. Territory size decreases as the density of cavities increases (Winkler et al. 2011).
- Tree Swallows are primarily monogamous, although a small percentage of males have been reported as polygamous (Ferretti and Winkler 2009).
- Tree Swallows begin laying eggs in May. Northern populations are single-brooded; second broods are common for southern populations (Winkler et al. 2011). The number of broods per season has not been studied in the western Great Basin.
- Each clutch consists of four to six (rarely seven) unmarked white eggs (Ehrlich et al. 1988, Winkler et al. 2011).
- Tree Swallows nest in natural tree cavities, woodpecker holes, nest boxes, and other manmade structures. The species usually nests in areas with large open spaces and nearby water for foraging, but also nests in forest edges and open woodlands (Winkler et al. 2011).
- The woven-cup nest, usually of grass from near the cavity (Stocek 1970), is lined with feathers that cover the eggs when the parents are absent (Winkler et al. 2011).
- Parasitism of Tree Swallow nests by Brown-headed Cowbirds is rare (Friedmann 1963, Winkler et al. 2011).

Status and trend

- Breeding Bird Survey data suggest that the rangewide abundance of Tree Swallows declined by an average of 1.2% per year from 1966 to 2012. However, the species appears to be stable across the Great Basin (Sauer et al. 2014).
- We detected Tree Swallows infrequently in the eastern Sierra Nevada and did not detect them in the Wassuk Range.

Habitat

- Tree Swallows occur in marshes, meadows, and lakeshores. They have colonized new areas after nest boxes were added (Winkler et al. 2011).
- In the western Great Basin, abundance of Tree Swallows is probably limited by the availability of water and by competition with other species that nest in tree cavities, especially Northern Flickers, Mountain Bluebirds, and Violet-green Swallows. Tree Swallows are rare in the western and central Great Basin east of the Sierra Nevada.

Identification

- Tree Swallows are medium-sized swallows with broad, shallowly forked tails. The back, wing coverts, nape, face, and crown are glossy blue-green, and brightest on adult males. The flight feathers are dark gray. The belly, breast, throat, and chin are clean white. The degree of iridescence on adult females varies from similar to males to a flat, charcoal color. Juveniles are similar to dull adult females.
- Bank, Barn, Cliff, Northern Rough-winged, and Violet-green Swallows also occur in the western Great Basin. Unlike adult Bank and Northern Rough-winged Swallows, female and juvenile Tree Swallows have clean white throats and upper breasts. Northern Rough-winged Swallows' throats and the breast bands of Bank Swallows are off-white. Barn Swallows' belly and breast are washed with orange and they have a much longer and more forked tail. Cliff Swallows are darker above and have distinctive facial patterns. Violet-green Swallows' white throat extends up on the face and encompasses the eye, and the sides of their rumps are white.
- The sweet, whistley song is a long string of chirps, whines, and gurgles (Sharman et al. 1994) that varies among populations and individuals. Bank and Northern Rough-winged Swallows' songs are less variable and harsher. Barn Swallows make a creaky rattle. Violet-green Swallows make sharper and fewer types of notes.
- The most common call is a high, liquid chirp that is less harsh than the call of Violet-green Swallows. Tree Swallows also make a staccato chatter when agitated.

Response to human activity or natural disturbances

- Exposure to toxicants in wetlands can reduce reproduction (Winkler et al. 2011).
- Loss of wetlands may reduce the extent of habitat for Tree Swallows.

Data gaps

- Tree Swallows are one of the most extensively studied species of wetland birds, primarily because they will nest in boxes that can be accessed easily.
- Changes in rangewide distribution of the species, such as its simultaneous decline in abundance in Canada and expansion of its breeding range in the southeastern United States, are not well understood (Winkler et al. 2011).

Violet-green Swallow (*Tachycineta thalassina*)

Natural history

Linda Tanner

- Violet-green Swallows are loud, gregarious birds that occupy mountain canyons and open, wet woodlands.
- Violet-green Swallows breed from central Alaska, south throughout western Canada and the United States, east to the front range of the Rocky Mountains, and south through Baja California and central Mexico. The species winters in southern California, Baja California, Mexico, and most of Central America.
- This species usually is the most common swallow in most of the Great Basin.
- Violet-green Swallows arrive on their Great Basin breeding grounds in April and departs for autumn migration in September (Brown et al. 2011). Some populations in Mexico and Baja California are resident or elevational migrants (Bent 1942).
- Violet-green Swallows feed on flying insects that are captured on the wing. The species often forages in small groups over water or above the canopy of aspen stands and riparian areas in the Great Basin.

Nesting

- Little is known about breeding in Violet-green Swallows. The species often nests colonially, especially when cavities are clustered. Individuals are aggressive towards intruders near the cavity, but the extent of territoriality is unknown. The species is believed to be monogamous, but its mating system has not been directly studied.
- Most Violet-green Swallows are believed to have one brood, although second broods have been reported (Brown et al. 2011). Egg laying begins in April or May and each clutch contains four to six white eggs (Bent 1942).
- Most nests are in colonies of up to one to two dozen pairs. Violet-green Swallows nest in woodpecker holes, natural cavities, and nest boxes. When nesting in trees, the species usually builds its nest in open woodlands or near edges. In areas of the Great Basin with few tree cavities, they sometimes nest with White-throated Swift colonies in crevices on vertical canyon walls.
- The nest is a loose cup of fine plant material, especially grasses. It is lined with feathers of other species that are collected from the ground (Combellack 1954).

- Parasitism of Violet-green Swallow nests by Brown-headed Cowbirds has not been documented, but few studies have examined the contents of active nests.

Status and trend

- Breeding Bird Survey data suggest that abundance of Violet-green Swallows is relatively stable in the Great Basin and rangewide, although sharp declines may have occurred in New Mexico, Oregon, and California (Sauer et al. 2014).

Habitat

- Violet-green Swallows occur in open woodlands near water. In the Great Basin, they most often are associated with aspen in canyons at elevations from 2000 to 3500 m (Brown et al. 2011).
- Violet-green Swallows were common in the eastern Sierra Nevada and Wassuk Range.

Identification

- Violet-green Swallows are small swallows with short, forked tails. When perched, the wingtips project further beyond the tail tip than do those of other swallows except Barn Swallows. The crown, nape, back, and upperwing coverts are bright, glossy green. Adult females are duller green above than adult males but rarely as drab as adult female Tree Swallows. The flight feathers and tail are blackish-green and the belly, breast, throat, and face are clean, bright white. The white undertail coverts extend up onto the sides of the rump. Juveniles are similar to adult females but have more-drab plumage, a dusky face, and grayish-white underparts.
- Five other swallow species occur in the western Great Basin: Bank, Barn, Cliff, Northern Rough-winged, and Tree Swallows. Bank Swallows have browner upperparts and a distinct dark breast band. Barn and Cliff Swallows have different facial patterns and are deep blackish-blue above. Northern Rough-winged Swallows are larger with relatively broader tails and a low-contrast facial pattern. Tree Swallows are most similar to Violet-green Swallows but are darker green, white does not extend above the eye, and the sides of their rumps are green in flight. Some juvenile and female birds may be difficult to distinguish.
- It is unclear whether the species has a true song (Brown 1983). Most vocalizations made on the wing string together chirps and creaking chitters in a variable, song-like pattern. The call note is a hard, high *chip* or *chip-lip*.

Response to human activity or natural disturbances

- Few studies have examined the effects of human activity on Violet-green Swallows. Erskine (1979) suggested that populations in Canada have been reduced by competition with non-native House Sparrows.

Data gaps

- In contrast to the congeneric Tree Swallow, few studies of Violet-green Swallows have been conducted. Little is known about their breeding, physiology, migration, and other aspects of their natural history (Brown et al. 2011).
- Competition between Violet-green Swallows and Tree Swallows, which have similar breeding habitats, is not well understood.

Cliff Swallow (*Petrochelidon pyrrhonota*)

Natural history

David Pavlik

- Breeds throughout the United States, Mexico, and all but the highest latitudes in Canada. Most birds likely winter in southern Brazil and Argentina (Brown and Brown 1995).
- Locally common only near nesting habitat.
- Spring migrants usually arrive in the Great Basin by late April. Autumn migration begins immediately after the juveniles fledge and thus depends on the timing of nesting. Peak migration is typically in August (Brown and Brown 1995).
- Cliff Swallows forage on the wing for flying insects, usually at altitudes of 50 m or higher (Brown and Brown 1995).

Nesting

- Cliff Swallows are socially monogamous, with each nest occupied by one male and one female, and territorial in the immediate vicinity of the nest. However, both sexes regularly mate with multiple other individuals. Fights over nests are frequent and physical; individuals occasionally are killed (Brown and Brown 1995).
- Colonies are constructed in cliffs, caves, bridges, culverts, and building eaves. Nests require a perpendicular angle between a vertical surface and a horizontal overhang. Nests may be stacked vertically. Avoidance of wooden bridges may reflecting those substrates' inability to support a nest (Brown and Brown 1995).
- Nests are large, jug-shaped, and constructed almost entirely of mud. Both sexes collect pellets of mud, which they mold onto the nest with their bills. Nests are filled with grass or other soft vegetation. Adults maintain nests throughout the breeding season by adding mud (Brown and Brown 1995).
- Most clutches are laid in June. Each clutch consists of four to six (sometimes one to three) eggs that are whitish with brown spots (Ehrlich et al. 1988, Brown and Brown 1995). Larger clutches may be the result of conspecific brood parasitism, which is common, but only within the same colony (Brown and Brown 1989).
- Intraspecific brood parasitism is rare. House Sparrow and House Finch eggs have been recorded in Cliff Swallow nests (Brown and Brown 1995). Parasitism by Brown-headed Cowbirds has not been documented. Most individuals that parasitize the nests of conspecifics also maintain a nest, so parasitism may increase reproductive success.

Status and trend

- Abundance of Cliff Swallows may not be well documented by the Breeding Bird Survey because the distribution of the species is quite patchy. The species' abundance across its range appears to be stable, but increasing in the Great Basin and decreasing in the Sierra Nevada (Sauer et al. 2014).
- Cliff Swallows were uncommon to rare in the Wassuk Range. We did not detect them in the eastern Sierra Nevada. The species is more abundant in river valleys in the Great Basin, especially near bridges.
- The location of colonies varies among years, leading to considerable annual variation in local abundance (Brown and Brown 1995).

Habitat

- Most colonies are located near open areas that serve as foraging habitat and near a water source that provides mud, but some colonies may be several kilometers away from a mud source (Coffey 1980, Brown and Brown 1995).

Identification

- Cliff Swallows are stocky and have a dark blue back, wings, and tail. The rump is a pale, brownish orange. The underwings are gray, the belly is whitish, and the undertail coverts are whitish with gray spots. The head is a deep chestnut with a dark blue cap and throat and a bright white forehead patch. A pale, gray collar extends from the breast around the nape, separating the dark head from the body. In flight, relative to other swallows, Cliff Swallows appear to have a square tail and a thick neck. Juveniles lack the white forehead patch and have dark facial markings.
- Cliff Swallows' pale, contrasting rump distinguishes it from other swallows in the western Great Basin. Violet-green Swallows have rumps with bright white sides, but have more contrast between their bright white bellies and dark topsides than Cliff Swallows and more extensive white on their faces.
- Cliff Swallows often sing in flight near the nesting colony and less often when foraging. The song is harsher than that of most other swallows, difficult to hear, and includes creaks and rattles. The song is similar to that of Barn Swallows but generally shorter and has simpler phrases. The call note is a soft, husky *verrrt*.

Response to human activity or natural disturbances

- The net effect of human development likely has been positive because human structures are used as colony sites (Brown and Brown 1995). In the northeastern United States, declining abundance has been linked to competition with and nest predation by House Sparrows. Removal of House Sparrows near Cliff Swallow colonies can lead to substantial increases in colony size (Krapu 1986).

Data gaps

- Little work has been conducted on the two southwestern subspecies, which have different migratory patterns and nesting phenology (Brown and Brown 1995).
- Little is known about Cliff Swallows in their winter range or about the species' social behavior on its wintering grounds. Individual birds may form breeding colonies with the same birds for multiple years (Brown and Brown 1995).

Mountain Chickadee (*Poecile gambeli*)

Natural history

Frank Fogarty

- Mountain Chickadees are small, loud songbirds common in almost all woodlands in the Great Basin.
- Mountain Chickadees are resident in the mountains of interior British Columbia, southwestern Alberta, Washington, Oregon. and the Great Basin. They also occur throughout the Rocky Mountains. Severe weather or food limitation may lead to irruptions outside of the species' usual range (Mccallum et al. 1999).
- Mountain Chickadees are opportunistic, and their diet varies as a function of which foods are available. During summer, Mountain Chickadees primarily eat insects, and feed arthropods to their nestlings (Mccallum et al. 1999). During winter, insects are supplemented with other arthropods and conifer seeds. The species readily will use bird feeders year round.

Nesting

- Mountain Chickadees remain in groups of two or three pairs of adults and their young year-round. These groups defend foraging territories, which average 6.5 hectares, from other conspecific groups (Hill and Lein 1989). The species is monogamous and forms pair bonds late in the winter. Once pair bonds are established, each male begins to defend a nesting territory within the group's foraging territory. These nesting territories are defended until eggs hatch, after which other adults are allowed into the territory (Mccallum et al. 1999).
- Mountain Chickadees nest in natural cavities, cavities that have been abandoned by primary cavity nesters, and nest boxes. Mountain Chickadees appear to be outcompeted by other secondary cavity nesters (e.g., House Wrens, Pygmy Nuthatches, and Violet-green Swallows) where their habitats overlap (Mccallum et al. 1999).
- The nest has a base of soft, woody material and a cup made of animal hair that usually is gathered from predator scat or owl pellets (Dahlsten and Copper 1979).
- Mountain Chickadees lay one brood per year. The clutch includes six to eight white eggs with reddish spots. If a pair's first clutch fails, it is likely to nest again. In the western Great Basin, most eggs are laid from mid May through early July (Bent 1946).
- There is one reported parasitism of a Mountain Chickadee nest by Brown-headed Cowbirds (Brockner 1984).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Mountain Chickadees declined rangewide and in the Sierra Nevada by an average of 1.5% per year from 1966 to 2012. During that same period of time, abundance across the Great Basin was relatively stable (Sauer et al. 2014).
- The species was abundant in both the eastern Sierra Nevada and Wassuk Range.
- Annual abundance at individual sites varies, possibly due to availability of seeds or other food sources (Dahlsten and Copper 1979, Mccallum et al. 1999).

Habitat

- The species occurs in almost all montane woodlands, but is more common in areas dominated by conifers.

Identification

- Mountain Chickadees are small, active songbirds. Mountain Chickadees have gray backs, wings, and tails. The breast and belly are grayish-white, sometimes with an olive wash on the flanks. The nape, cap, eye-line, and chin are black. The remainder of the face and the supercilium are white. Males and females have similar plumage.
- Mountain Chickadees are quite similar in appearance to other *Poecile*, but no other species occur in the western Great Basin. Bushtits are superficially similar but lack the prominent black and white facial markings of Mountain Chickadees.
- The song of Mountain Chickadees similar to that of other *Poecile* but typically has a more varied structure. The song is a series of three (sometimes as many as six) clear, high whistles, *feee bee bee*. Mountain Chickadees also make a call similar to but harsher than that of other *Poecile*, *chicka chicka dzee dzee dzee*.

Response to human activity or natural disturbances

- Local abundance of Mountain Chickadees may be increased by the presence of nest boxes and bird feeders. The species has mixed responses to timber management, but clear-cutting removes habitat in the short term (Mccallum et al. 1999).

Data gaps

- Mountain Chickadees are abundant and well-studied, although most work has relied heavily on populations that inhabit nest boxes.

Bushtit (*Psaltriparus minimus*)

Natural history

Dan Irizarry

- Bushtits are hyperactive, nearly always in flocks, and remarkably tame.
- Bushtits are resident from southern Washington south to the Mexican border and east to Colorado. They are absent from the highest mountain ranges in Colorado, New Mexico, Arizona, and California and from arid lowlands in the Southwest. Bushtits also occur in the mountains of Baja California, central Mexico, and Guatemala (Sloane 2001).
- The species is primarily non-migratory, but populations in larger mountain ranges move to lower elevations during the winter (Swarth 1914).
- Bushtits feed on arthropods gleaned from foliage, especially scale insects (Coccidae). The amount of plant matter consumed by Bushtits varies from almost none in spring and summer to half of their diet in autumn and winter (Beal 1907).

Nesting

- Bushtits maintain flocks of 10 to over 40 birds year-round, which is unusual for songbirds. Individuals remain with their flock for multiple years. During the winter, flocks are non-territorial and wander extensively in search of food (Ervin 1977).
- During the breeding season, Bushtit flocks maintain and defend foraging territories of approximately 100 hectares. Individual mated pairs sometimes defend a small area around their nest tree prior to egg laying. Multiple pairs of Bushtits may share a nest, especially where predation is high (Sloane 1992, 1996).
- Bushtits nest from 1 to 30 meters above the ground in trees and shrubs. A mated pair will attach spider silk to various parts of a given tree until enough accumulates in one spot to begin nest construction (Addicott 1938).
- Nests are elaborate, long (15 to 30 cm), dangling sacks made of spider silk and vegetation, suspended from two or more points of a tree or shrub and camouflaged with material from that plant. A small, circular entrance at the top of the nest is protected by an overhanging flap (Sloane 2001).
- The timing of egg laying ranges from late February to July (usually in April in California; Bent 1946), and may be correlated with weather (Sloane 2001).

- Broods consist of five to seven (sometimes three to ten) very small, white eggs (Ehrlich et al. 1988). Most Bushtits have two broods per year. Two females attend some large broods (Sloane 2001).
- Parasitism by Brown-headed Cowbirds is rare. Successful rearing of a Brown-headed Cowbird nestling by Bushtits never has been documented (Sloane 2001). Conspecific brood parasitism has been reported (Sloane 1996).

Status and trend

- Abundance of Bushtits is difficult to assess given their large home ranges in summer and nomadic movements in winter. Their abundance in California appears stable, and the species' range is expanding northward (Sloane 2001).
- The species' annual local abundance can fluctuate substantially. Warm, wet winters (which reduce the insulating effect of snow on vegetation) and dry summers (associated with reductions in the abundance of arthropods) have been linked with decreases in abundance of Bushtits (Sloane 2001).

Habitat

- In the Great Basin, Bushtits most often are encountered in pinyon and juniper woodlands, but also occur in riparian areas and open shrublands. The species may be absent from some habitat during certain years (Harrap and Quinn 1995).
- Bushtits are common throughout the Great Basin, including the Wassuk Range. However, the species was scarce in the eastern Sierra Nevada.

Identification

- A small, nondescript, and long-tailed bird. Sexes can be differentiated on the basis of iris color: adult males have a dark brown iris, whereas adult females have a pale grayish to white iris. The back, crown, and wings are brownish-gray and unmarked. The face, throat, and underside are a paler gray. Body parts without plumage are black. The bill is small and thin, and the legs are long relative to body size.
- In the western Great Basin, most likely to be confused with Blue-gray Gnatcatchers. Blue-gray Gnatcatchers have more contrast between their slate-blue backs and pure white undersides, and tails with striking black and white below; they do not form flocks during the breeding season, and are highly territorial.
- Unlike most passerines, Bushtits do not sing but make a variety of short call notes that are used to communicate with other flock members. The most common call is a dry, hard *spit* or *tsit*, often given rapidly and simultaneously by multiple birds.

Response to human activity or natural disturbances

- Bushtits are well-adapted to living in suburban areas. Their abundance may have increased in the 1900s in response to the clearing of dense forests (Sloane 2001).

Data gaps

- Little is known about the demography of Bushtit flocks, particularly the survival and dispersal of juveniles, and about the species' complex social systems, especially with respect to breeding. There is some evidence of geographic variation in mating systems (Sloane 2001).

Red-breasted Nuthatch (*Sitta canadensis*)

Natural history

David Pavlik

- Red-breasted Nuthatches' loud calls and active foraging make them conspicuous.
- Resident from southeast Alaska east through central Canada to the Great Lakes, New England, and the Maritime Provinces. They also are resident in the mountains of Washington, Oregon, and California; the Rocky Mountains; and portions of the Great Basin.
- The species is a common resident of the eastern Sierra Nevada but is rare and local further east in the Great Basin during the summer.
- The northernmost populations appear to be partial short-distance migrants, whereas the majority of the populations are non-migratory. Birds at higher elevations may be elevational migrants (Ghalambor and Martin 1999). The species irrupts about biennially, during which its winter range extends much further south.
- During the breeding season, Red-breasted Nuthatches consume mostly arthropods. They capture the arthropods by crawling along tree trunks and branches and probing in bark furrows, pine needle clusters, and cones. During winter, the species feeds primarily on conifer seeds.

Nesting

- Red-breasted Nuthatches are territorial during the breeding season. Territory size likely is a function of snag density (Steeger and Hitchcock 1998). In winter, many resident pairs maintain the same territory, whereas migrants may join multiple species in feeding flocks and rarely are territorial (Ghalambor and Martin 1999).
- Red-breasted Nuthatches are monogamous and may maintain pair bonds through winter (Ghalambor and Martin 1999).
- The species nests in snags or dying trees in which a cavity easily can be excavated. Within the cavity, they construct a small cup from hair, feathers, grass, and other soft plant materials. Both parents bring resin to the nest cavity on their bill tips or on strips of bark and coat the cavity entrance.
- Red-breasted Nuthatches usually lay one brood per year between mid April and May; a few second broods have been recorded (Ghalambor and Martin 1999).

- Each clutch contains five or six (sometimes seven or eight) eggs that are cream-colored with reddish spots (Ehrlich et al. 1988, Ghalambor and Martin 1999).
- Parasitism of Red-breasted Nuthatch nests by Brown-headed Cowbirds has been documented twice (Friedmann and Kiff 1985).

Status and trend

- Breeding Bird Survey data suggest that the species' abundance increased rangewide and in the Great Basin by an average of 1-2% per year from 1966 to 2012 (Sauer et al. 2014). At the ecoregion level, the relative abundance of Red-breasted Nuthatches is highest in the Sierra Nevada (Sauer et al. 2014).

Habitat

- Red-breasted Nuthatches occur in woodlands with high percentages of conifers, especially spruce, larch, fir, and cedar (Ghalambor and Martin 1999). Western populations breed in stands of pure conifers, whereas eastern birds may breed in mixed woodlands (Raphael and White 1984). Winter habitat is similar.
- We often detected Red-breasted Nuthatches in woodlands in the eastern Sierra Nevada. We did not detect them in the Wassuk Range.

Identification

- Nuthatches are distinguished by their short tails, large bills, and unique behavior of crawling along tree trunks and branches. Red-breasted Nuthatches have gray-blue backs and wings and rust-colored bellies and breasts. They have a white throat and chin, thick blackish eyeline, white supercilium, and darker cap. The tail is gray-blue with distinctive black and white stripes on the outer tail feathers that flash in flight.
- Adult males have blackish caps, and adult females have dark blue caps that have minimal contrast with the back. Immature birds are duller, especially on the belly.
- Red-breasted Nuthatchs are distinguished from other *Sitta* by their strong facial pattern and extensive red color below. White-breasted Nuthatches are much larger. Brown Creepers forage similarly but are less strikingly marked and longer-tailed.
- The song is a squeaky, nasal *ween ween ween*, repeated at a steady pace. The call note is a harsher *yenk*, often repeated several times. The call notes of White-throated Nuthatches in the Great Basin are shorter, less nasal, and repeated more rapidly.

Response to human activity or natural disturbances

- The amount or quality of breeding habitat may be reduced by human removal of dead or dying trees and by increases in the homogeneity of tree composition and structure (Steeger and Hitchcock 1998).

Data gaps

- No studies of banded birds have been conducted to determine whether individuals return to the same breeding territory during the summer following an irruption. No subspecies have been recognized, which suggests considerable mixing of populations and exchange of genes after irruptions (Ghalambor and Martin 1999).
- The development of young, post-breeding dispersal, and the maintenance of pair bonds among breeding seasons have not been studied (Ghalambor and Martin 1999).

White-breasted Nuthatch (*Sitta carolinensis*)

Natural history

David Pavlik

- The 11 recognized subspecies of White-breasted Nuthatch fall into three groups with distinctive genetics, appearance, and vocalizations (Spellman and Klicka 2007, Grubb et al. 2008).
- White-breasted Nuthatches are resident in the conterminous United States except in parts of the arid southwest, central Great Plains, Texas, Gulf Coast, and Florida. They also are resident in southern Canada and in central Mexico.
- The subspecies group that occurs in the Great Basin, Nelsoni, ranges from the eastern slope of the Sierra Nevada through the Rocky Mountains and Mexico (Spellman and Klicka 2007).
- Most White-breasted Nuthatches are non-migratory, although large irruptions occasionally have been reported in autumn. The details of these movements, including the ages of birds, their origin and destination, and their survival, are unknown (Grubb et al. 2008).
- White-breasted Nuthatches forage by hopping or crawling along the trunks and branches of trees and feeding on arthropods and seeds. The species uses caches to store food in autumn and winter. Each cache is used once, and individuals may scatter dozens of caches throughout their territory (Petit et al. 1989).

Nesting

- White-breasted Nuthatches are territorial year-round. Their 10-20 hectare territories are large for a passerine, yet males aggressively chase conspecific intruders. The species is monogamous and maintains pair bonds among years (Butts 1931).
- White-breasted Nuthatches nest in natural cavities and woodpecker holes, generally those at least 5 m above the ground (Grubb et al. 2008), but rarely in nest boxes. Individuals sometimes use their bills to enlarge existing cavities.
- Most nest cavities are reported to be loosely lined with soft material, including grass, animal hair, feathers, and man-made items (Grubbs et al. 2008).
- White-breasted Nuthatches have one brood per season and have not been reported to renest, even after failed attempts (Grubbs et al. 2008). Each clutch contains five to eight (sometimes three to nine) whitish eggs with red spots (Bent 1948, Ehrlich et al. 1988, Grubbs et al. 2008).
- Parasitism by Brown-headed Cowbirds is rare (Grubbs et al. 2008).

Status and trend

- Breeding Bird Survey data suggest that from 1966 to 2012, the abundance of White-breasted Nuthatches increased by an average of over 2% per year rangewide and in the Great Basin (Sauer et al. 2014).
- In the western Great Basin, White-breasted Nuthatches are most abundant on the east slope of the Sierra Nevada. They are local, low-density breeders in the wooded canyons of some ranges further east in the Great Basin.

Habitat

- The highest densities of White-breasted Nuthatches are in mature deciduous forests. The species also occurs in mixed woodlands. The species usually does not occur in coniferous woodlands although it feeds in conifer stands in which insects are abundant, including stands that recently have burned.

Identification

- A large *Sitta* with a long, heavy bill. The back and wings are bluish-gray, the belly is grayish, the upper breast and face are white, and the grayish undertail coverts are marked with rust. The tail is striped with bluish-gray, black, and white. The stripes rarely are visible except in flight. The nape and crown, which are darker than the back, usually are blackish on adult males and dark gray on adult females. Juveniles have paler crowns than adults. The sex and age of many birds cannot reliably be classified in the field.
- The back color of Nelsoni-group birds in the Great Basin is intermediate between that of Carolinensis- and Aculeata-group birds, but all groups are best distinguished on the basis of their vocalizations.
- Red-breasted Nuthatches are smaller than White-breasted Nuthatches, have more color on their underparts, and have a distinct facial pattern. Brown Creepers have similar foraging habits but a longer tail and brown, cryptic plumage.
- The songs of the three groups of White-breasted Nuthatches are similar: a nasal whistle, *wha-wha-wha-wha*. The Nelsoni group's typical call is a rapid, nasal *yidi yidi yidi yidi*. All three groups make a variety of soft contact calls.

Response to human activity or natural disturbances

- Although White-breasted Nuthatches commonly occupy small, fragmented woodlots, winter survival of the species is positively correlated with the size of forest patches (Doherty and Grubb 2002).
- Removal of snags likely reduces the number of potential nesting cavities.

Data gaps

- Few studies have focused on the breeding biology of White-breasted Nuthatches, possibly because accessing their nests is difficult.
- The taxonomic status of the three groups of subspecies is not fully resolved.

Brown Creeper (*Certhia americana*)

Natural history

Dan Irizzary

- A small bird that is almost exclusively detected as it hops along tree trunks.
- The breeding range of Brown Creepers includes the forests of southern Canada and New England, the Rocky Mountains, the Sierra Nevada, and the west coast from central California to Alaska. Breeding populations in the Great Basin are restricted to mountain ranges with dense tree cover. Populations leave the northern portion of the species' range during winter, moving as far south as the Gulf of Mexico. Populations in the western United States move to lower elevations during winter. Resident populations also inhabit mountains from northern Mexico to northern Nicaragua. In the Great Basin, resident populations may be augmented by migrants from the north during winter (Poulin et al. 2013).
- Brown Creepers feed on arthropods year round. They consume some vegetation during winter (Williams and Batzli 1979). Birds glean prey while crawling along the trunks of large trees. Brown Creepers typically forage at heights of less than 10 m above ground, where bark is most furrowed (Poulin et al. 2013).

Nesting

- Brown Creepers are presumed to be monogamous. Both sexes feed nestlings. Antagonistic interactions with other bird species (e.g., Downy Woodpecker, White-breasted Nuthatch) have been documented (Poulin et al. 2013).
- Brown Creepers lay a single brood of five or six eggs per season (late May to early July). Eggs are white with pink or red-brown speckles. Renesting has been documented after failed nesting (Poulin et al. 2013).
- Brown Creepers build nests in small cavities that are formed by bark peeling away from the trunk. They nest in large trees and usually in trees that are dead or dying.
- Brown Creepers construct a two-tiered nest that is tucked under peeled bark. The base is constructed from twigs and bark and adhered with silk from spider webs or moth cocoons. Projections from the base hold a cup of smaller pieces of bark and wood fiber in the center of the nest (Tyler 1948).

- Brown Creepers rarely host Brown-headed Cowbird eggs (Poulin et al. 2013).

Status and trend

- The abundance of the species is low across its range. Breeding Bird Survey data do not indicate trends in abundance, but the data may be biased by the species' low densities and detection probabilities (Poulin et al. 2013). The highest reported abundance is in the Sierra Nevada physiographic region (Sauer et al. 1999).
- Local abundance is correlated negatively with winter precipitation. Heavy snow can decrease overwinter survival, and heavy rain can reduce nesting success (Davis 1978, Hejl et al. 1988).

Habitat

- Brown Creepers inhabit dense, mature forests and woodlands. They forage in large trees and nest in snags, and their abundance generally is highest in coniferous or mixed stands. In the Sierra Nevada, the species occupies almost all woodlands, especially lodgepole pine and mixed conifers (Beedy 1981, Hejl et al. 1988).
- We frequently detected the species in the Wassuk Range and eastern Sierra Nevada, although it usually was restricted to riparian areas in the Wassuk Range.

Identification

- Cryptic when not in motion. Unlike nuthatches, rarely moves down trunks. The long, downward-curved, wren-like bill and very long tail are distinctive. The uppers are blackish brown with white streaks and the supercilium is faint and whitish.
- Brown Creepers are likely to be confused only with nuthatches, which have similar feeding behavior. All nuthatches have larger, stouter bills and shorter tails than Brown Creepers. Nuthatches feed on twigs and cones in addition to tree trunks.
- The song of Brown Creepers is pleasantly musical but short (1-2 seconds), high, and difficult to hear. The song of Brown Creepers consists of four to nine high, thin notes. The arrangement of phrases is geographically variable but generally characterized as *tsee-tuti-sedu-wee* (Harrap & Quinn 1995). They also make high *tsee* or *tseet* call notes throughout the year that are difficult to distinguish from the calls of Golden-crowned Kinglets (with which they often form mixed winter flocks).

Response to human activity or natural disturbances

- Many collisions of Brown Creepers with windows and other man-made structures, which often lead to mortality, have been documented (Poulin et al. 2013).
- In the western United States, abundance of Brown Creepers is lower in second-growth forests than in old-growth forests (Hejl et al. 1995).
- After severe fires, large snags may provide habitat for Brown Creepers. However, the species' abundance may decline quickly as snags begin to fall and shrubs and smaller trees form an understory. (Huff et al. 1985).

Data gaps

- Major data gaps include factors affecting survival and nest success and effects of habitat fragmentation and reduction in habitat quality (Poulin et al. 2013).
- Non-road based survey methods could improve estimates of local abundance and density (Poulin et al. 2013).

Rock Wren (*Salpinctes obsoletus*)

Natural history

David Pavlik

- Rock Wrens' songs often echo off cliff walls from dramatic outcroppings.
- Rock Wrens breed in extreme southern British Columbia, Alberta, and Saskatchewan; south through eastern Washington, Oregon, California except for the Central Valley and southern deserts, Baja California, and most of Mexico; and east to central Texas and central North Dakota.
- The species is a common breeder throughout the Great Basin.
- Individuals in the northern half of the range are mostly migratory, whereas many southern birds appear to be resident (Lowther et al. 2000).
- Rock Wrens feed mostly on terrestrial arthropods but also capture flying insects and feed on plant material and vertebrates, especially lizards (Lowther et al. 2000).

Nesting

- Males defend foraging and nesting territories, which may include non-habitat due to the irregular distribution of cliffs and other rock features (Merola 1995).
- Rock Wrens are believed to be monogamous (Merola 1995).
- Egg laying has been reported from January to June (Lowther et al. 2000). The species may raise as many as three broods in a year (Merola 1995).
- Nests are in rocky areas and protected by an overhang or built within a crevice. The birds build a path to the nest and line the path with small rocks and twigs. The nest has a flat base of small rocks. The nest itself, a cup of plant material, is lined with grass, moss, hair, or feathers (Harrison 1979).
- Each clutch consists of five or six (sometimes four) eggs (Bent 1948, Ehrlich et al. 1988). The eggs are whitish with small dark spots (Bent 1948.)
- The proportion of Rock Wren nests that are parasitized by Brown-headed Cowbirds varies geographically, likely reflecting different extents to which the ranges of the two species overlap (Lowther et al. 2000).

Status and trend

- Breeding Bird Survey data suggest that the rangewide abundance of Rock Wrens declined by an average of 1.2% per year. The species' abundance in the Great Basin was relatively stable (Sauer et al. 2014).

- Densities of Rock Wrens derived from Breeding Bird Survey data can vary substantially among years at a given location (Lowther et al. 2000).

Habitat

- Rock Wrens occur in a variety of land-cover types and at elevations from sea level to over 3500 m (Lowther et al. 2000). The species' primary requirements are limited vegetation and exposed rocks, which may occur as small patches. In the western Great Basin, they occur in canyons with cliffs and other steep slopes.
- Rock Wrens were common in the eastern Sierra Nevada and Wassuk Range.

Identification

- Rock Wrens are medium-sized, short-tailed wrens. The back, head, and wings are gray-brown with very small white spots. The belly and breast are whitish with fine gray streaks and the tail is brown with black bars. The face has a whitish supercilium, and a cinnamon rump is visible in flight. Immature birds are similar to adults but have duller plumage above, sometimes with buffy spots on the wing coverts, and do not have streaks on the breast.
- Rock Wrens bob while vocalizing and foraging, bending their legs to rapidly lower the entire body and quickly fanning their tail.
- Wrens are distinguished from most other small passerines by their long, downward-curved bills. Bewick's, Canyon, and House Wrens also breed in the western Great Basin. Bewick's Wrens have a longer tail, and House Wrens do not have a strong supercilium. Both are smaller than Rock Wrens and have different habitats. Canyon Wrens' habitat also is rocky, but they have a deeper red body and longer tail. They also have a white throat and crawl more than Rock Wrens.
- The songs of individual Rock Wrens are short and repetitive, although each male strings together different songs that may last for a minute or more, and can have a repertoire of more than 100 songs (Lowther et al. 2000). Each song, a single note or phrase that may be harsh and non-musical, is repeated about four times per second for one to two seconds: *chee chee chee chee chee chee* or *turr turr turr turr*.
- The most commonly heard call note can be characterized as *tick-ear* (Bent 1948). This call often is made by birds agitated at the approach of humans.

Response to human activity or natural disturbances

- Human-facilitated expansion of Brown-headed Cowbirds may be affecting the breeding success of Rock Wrens, but the effects have not been quantified (Lowther et al. 2000).
- PVC pipes installed to mark mining claims have trapped Rock Wrens and other birds that nest in cavities. The birds enter the vertical pipes, but the smooth-walled sides prevent them from exiting (Brattstrom 1995).

Data gaps

- Although the manner in which Rock Wrens build nests has been well-described, there are many gaps in data on their breeding biology and behavior, including their acquisition and use of a large number of songs (Lowther et al. 2000).

Canyon Wren (*Catherpes mexicanus*)

Natural history

Matt Grube

- Canyon Wrens spends most of their life cycle on vertical rock surfaces. Their charismatic, spiraling song is often heard echoing off the walls of the canyons they inhabit.
- Canyon Wrens are resident from southern British Columbia to southern Mexico, east to central Texas, and west through most of California. Disjunct populations occur in southwest South Dakota, southeast Montana, and northeast Wyoming. Some populations move to lower elevations for winter (Jones and Dieni 1995).
- In the western Great Basin, the species is locally common in expanses of open, bare rock such as cliffs and vertical canyon walls.
- Canyon Wrens are insectivorous. They glean invertebrates from rocky surfaces or from within crevices.

Nesting

- Canyon Wrens are monogamous and maintain pair bonds throughout the year. Some pairs remain together for multiple breeding season. The species also maintains territories throughout the year, although the boundaries of individual territories may shift between summer and winter in response to changes in the abundance of invertebrates. The reported size of foraging territories ranges from 0.4 to 20 hectares (Jones and Dieni 1995).
- Little is known about the nesting biology of the species, in part because the nests of Canyon Wrens are difficult for humans to access. Each clutch consists of five to six white eggs (Ehrlich et al. 1988). The number of broods per season and the timing of egg production are unknown (Bent 1948, Jones and Dieni 1995).
- Nests are constructed in caverns or cracks in extensive, bare rock, often below a ledge that shields the nest from sun and rain. Both males and females participate in nest construction. The nest is a cup made of twigs and bark, lined with softer plant material (Jones and Dieni 1995).
- Parasitism of Canyon Wren broods by Brown-headed Cowbirds has not been documented (Jones and Dieni 1995).

Status and trend

- Trends in abundance of Canyon Wrens are not well understood. The species is poorly detected by the Breeding Bird Survey, which has few routes through its habitat (Jones and Dieni 1995). Breeding Bird Survey data for the Great Basin suggest that the abundance of Canyon Wrens in the region increased by an average of 4% annually from 1966 to 2012 (Sauer et al. 2014).
- In the Wassuk Range, Canyon Wrens were common in canyons with bare rock. We have not detected the species in the eastern Sierra Nevada.

Habitat

- Occurrence of Canyon Wrens is not correlated with the presence of any vegetation community. Their occurrence depends entirely on the presence of extensive, bare rock, such as cliffs, canyon walls, boulder piles, or rock slides, in which they both forage and nest.

Identification

- A medium-sized, richly colored wren with an outsized bill. There are few differences in plumage between the sexes or among age classes. The body is a deep, red brown with white flecks across its upper body. The tail is brighter red with black crossbars. The chin, throat, and upper breast are bright white, contrasting sharply with the rest of the plumage.
- Canyon Wrens are likely to be confused only with Rock Wrens. Rock Wrens are much paler overall, have shorter tails, and cling to vertical surfaces to a lesser extent. House Wrens and Bewick's Wrens may be found in vegetation near Canyon Wrens but are less likely to be encountered on rocky surfaces. House Wrens and Bewick's Wrens are smaller than Canyon Wrens and are not deep red.
- The song of Canyon Wrens is distinctive, loud, and has three parts. The first part consists of high, repeated single-note whistles *twi twi twi*, followed by a series of dramatically descending, two-note whistles *towi towi towi*, and concluding with rapid, harsh, nasal phrases *jeev jeev*.

Response to human activity or natural disturbances

- One case of a Canyon Wren nest being destroyed by rock climbers has been documented. Because Canyon Wren habitat is difficult to access, it rarely is affected directly by humans. The species occasionally nests in man-made structures (Jones and Dieni 1995).

Data gaps

- Canyon Wrens have been studied little despite their relatively high abundance across their extensive range. Basic questions about the species' breeding phenology, migratory behavior, population dynamics, and relations with its environment remain unanswered (Jones and Dieni 1995).

Bewick's Wren (*Thryomanes bewickii*)

Natural history

David Pavlik

- A slender, active wren that is often found crawling through brush close to the ground.
- Bewick's Wrens are common on the Pacific slope in California, Oregon, and Washington, but occurrence decreases dramatically immediately east of the Sierra Nevada crest. Bewick's Wrens are scarce and local breeders across much of the Great Basin. Further east, they occur from Utah to southwestern Missouri and south to south-central Mexico.
- Bewick's Wrens are non-migratory throughout much of their range, although some short-distance migrations to lower elevations and latitudes occur in autumn and winter (Kennedy and White 2013).
- Bewick's Wrens are insectivorous. Birds glean and probe for prey in leaf litter, bark, and occasionally tree canopies.

Nesting

- Bewick's Wrens are primarily monogamous, but polyandry and polygyny have been documented (Kennedy and White 2013). Relative to its small body size, the species maintains large territories. Territories often are several hectares, even in productive riparian habitats in which other passerines occur at much higher densities.
- Bewick's Wrens are opportunistic secondary cavity nesters that will nest in natural cavities, cavities created by woodpeckers, and in leaf litter or brush piles that provide sufficient cover. Within the cavity, Bewick's Wrens construct a cup-shaped nest with plant fiber, animal hair, and feathers (Kennedy and White 2013).
- Bewick's Wrens lay five to seven (sometimes three to eight) eggs that are whitish with rings of dark spots around the larger end (Ehrlich et al. 1988). The species will lay a second brood if the first brood attempt is successful. Brood dates for central California range from early April through June (Kennedy and White 2013).
- Brood parasitism by cowbirds is rare (Kennedy and White 2013).

Status and trend

- Trends in abundance vary across the species' range. The species' abundance declined steeply over the past 100 years in the eastern United States, and the species was extirpated from most of its historic range east of the Mississippi River. This decline often is attributed to competition for nest cavities with House Wrens.
- Breeding Bird Survey data suggest that abundance of the species is increasing in Nevada, especially in southern and eastern Nevada (Sauer et al. 2014). This expansion may continue given projected increases in winter temperatures (Kennedy and White 2013).

Habitat

- Bewick's Wrens are associated with dry, open woodland and shrubland with an adequate number of cavities and primary cavity nesters. They are associated with riparian habitats at lower elevations in the Great Basin and may be excluded from higher elevations by competition with House Wrens.
- We rarely detected Bewick's Wrens in the eastern Sierra Nevada, and then mainly in wet meadows. The species is more common in riparian areas in the eastern Sierra Nevada to the south, particularly at lower elevations on the alluvial fan. It was abundant in diverse habitats in the Wassuk Range.

Identification

- A small, sleek wren, often heard before being seen. In the western Great Basin, most likely to be confused with House Wrens. Bewick's Wrens are more lustrous brown on their backs and have more white below, appearing much cleaner and with more color contrasts than House Wrens. Its bold white supercilium also distinguishes it from House Wrens. Bewick's Wrens are relatively long tailed for a wren, with crisp, brown-and-white bars on the outer tail feathers. The other two wrens that occur in the western Great Basin, Rock Wren and Canyon Wren, have distinctly different plumages and have different habitats than Bewick's Wrens.
- The song of Bewick's Wrens is long, complex, and loud. Their song is one of the more difficult for observers to learn given its similarity to those of other species, especially the common Song Sparrow. The song has a vigorous rhythm with numerous high whistles and buzzes, but is variable and often incomplete. The song of Bewick's Wrens, unlike that of Song Sparrows, incorporates at least one long buzz. The call note is an angry buzz, often delivered in quick succession.

Response to human activity or natural disturbances

- Bewick's Wrens are fairly resilient due to their capacity to nest in diverse locations. Decreases in abundance of populations in the eastern United States have been attributed to House Wrens. If true, urbanization and nest boxes may give House Wrens a competitive advantage over Bewick's Wrens (Kennedy and White 2013).

Data gaps

- Although common in parts of their distribution, Bewick's Wrens are not particularly well-studied. Data on drivers of abundance, population dynamics in Nevada, and recent increases in abundance in the Great Basin are limited (Kennedy and White 2013).

House Wren (*Troglodytes aedon*)

Natural History

Frank Fogarty

- House Wrens are small, drab birds with big personalities. They have an explosive song and incessantly scold intruders.
- House Wrens breed across southern Canada and south to northern Arizona and Tennessee. Resident populations occur in southern California. The species winters across the southern United States and most of Mexico.
- The species breeds in the central and northern portions of the Great Basin and is primarily a migrant in the southern Great Basin.
- House Wrens arrive in the Great Basin in late March or early April. Autumn migration typically takes place in September (Johnson 1998).
- House Wrens are insectivorous and feed primarily on the ground or by gleaning arthropods from low vegetation.

Nesting

- Male House Wrens are territorial, establishing small (0.2 to 0.5 hectare) territories around one or more potential nest cavities (Johnson 1998). Females evaluate nest cavities within a male's territory before choosing whether to form a pair bond (Johnson and Searcy 1993).
- House Wrens typically are monogamous. Both parents participate in rearing young, but some males with multiple nesting cavities within their territory may engage in polygyny (Johnson et al. 1993).
- At lower elevations and latitudes, nearly all House Wrens have two broods per year. In the Great Basin, only females that nest early in the season will attempt two broods. Most first clutches are begun in May. Females lay six to eight (sometimes as few as three) whitish eggs (Ehrlich et al. 1988, Johnson 1998).
- House Wrens nest in abandoned woodpecker holes, other natural cavities, nest boxes, and other man-made structures. The species usually builds nests in cavities within 30 meters of woody vegetation but not in dense foliage (Johnson 1998). Within the cavity, House Wrens build a platform of twigs that holds a cup of softer plant material.

- Brood parasitism by Brown-headed Cowbirds is rare, likely because House Wrens use cavities with small entrances (Pribil and Picman 1997).

Status and trend

- Trends in abundance of House Wrens are inconsistent across the species' large range. Breeding Bird Survey data suggest that the species' abundance in the Great Basin is relatively stable (Sauer et al. 2014).
- House Wrens were common in the Wassuk Range and eastern Sierra Nevada.

Habitat

- In the western United States, House Wrens occur in a variety of woodlands. The species rarely occurs in extensive, continuous tracts of forest away from edges or openings.

Identification

- House Wrens are small, brownish wrens that are distinctive in their lack of markings. The head, back, and wings are mottled brown, fading to brown-gray on the breast and belly. House Wrens have variable, dark bars on the flanks, wings, and sometimes on the back. The bill and tail are both relatively long.
- In the Great Basin, House Wrens are most likely to be confused with Bewick's Wrens. Bewick's Wrens have a stronger contrast between their dark backs and white breasts and have a bolder, whiter supercilium than House Wrens. The two other wren species in the western Great Basin, Canyon Wren and Rock Wren, have different habitats and are larger.
- The song of House Wrens is distinctive in the speed of its notes and its complexity. The song is chaotic and difficult to describe phonetically, but often rises in pitch at the beginning. No other wren that breeds in the Great Basin has a similar song.
- House Wrens may make a harsh, rattling alarm call when humans approach.

Response to human activity or natural disturbances

- House Wrens have mixed responses to human land use. Steep declines in abundance are associated with clear-cutting, but increases in abundance are related to other activities that thin trees or ground cover (Johnson 1998).
- In the Great Basin, House Wrens often occupy recently burned areas where they sometimes nest in piles of debris from fallen snags.
- House Wrens readily nest in nest boxes.

Data gaps

- The taxonomy of House Wrens, which may represent three species, is not well understood.
- House Wrens have destroyed eggs in the nests of conspecifics and other wren species, but the drivers of this behavior and its prevalence have not been studied in detail (Johnson 1998). This behavior may partly explain the decline of Bewick's Wrens in some parts of their historic range and their absence from some apparent habitat in the Great Basin.

Blue-gray Gnatcatcher (*Polioptila caerulea*)

Natural history

David Pavlik

- Blue-gray Gnatcatchers are among the smallest songbirds in the United States. These active, vocal passerines occur in colder climates than their congeners.
- Blue-gray Gnatcatchers breed across much of the conterminous United States. They are mostly absent from the Great Plains and the Northwest. Resident populations in Florida, southern Arizona, southern New Mexico, and Mexico are joined by migrants from the north during the winter.
- The species is a common breeder across much of the Great Basin, although it becomes markedly less abundant along the western edge of the region.
- Blue-gray Gnatcatchers are early spring migrants. Most Blue-gray Gnatcatchers reach their breeding grounds by mid April. In the Great Basin, the species generally begins its autumn migration by late August or early September (Kershner and Ellison 2012).
- Blue-gray Gnatcatchers are insectivorous.

Nesting

- Blue-gray Gnatcatchers are monogamous and highly territorial. Their territories are often several hectares, which is unusually large for a small bird.
- Blue-gray Gnatcatchers nest in many different species of trees. They typically construct nests in areas with relatively low tree density and trees of relatively small diameter (Ellison 1991). Nests are constructed on horizontal limbs, usually closer to the tip of the limb than to the tree trunk (Kershner and Ellison 2012).
- Blue-gray Gnatcatchers build open-cup nests of lichen and cobwebs. Both sexes actively build the nest and incubate and care for the young.
- Eggs are pale blue with brown spots. Blue-gray Gnatcatchers will lay two broods given sufficient time and success of a first brood. Most broods contain three or four eggs (Ehrlich et al. 1988). Double brooding likely is more common at the low latitudes of the species' range and less common in the Great Basin. First broods are laid between late May and late June (Kershner and Ellison 2012).
- Parasitism of Blue-gray Gnatcatcher nests by Brown-headed Cowbirds is common in locations close to riparian, urban, or agricultural areas. The local incidence of parasitism can be high, and extirpations due to parasitism have been documented in California (Woolley and Heath 2006).

Status and trend

- Although the species' abundance is decreasing in some parts of its range, particularly in the Appalachian and Ozark regions, Breeding Bird Survey data suggest that abundance of Blue-gray Gnatcatchers increased by an average of more than 1.5% per year in the Great Basin from 1966-2012 (Sauer et al. 2014).
- Annual abundance is relatively stable. The Breeding Bird Survey reported increases in abundance from west to east in the Great Basin (Sauer et al. 2014).
- Blue-gray Gnatcatchers were common in the Wassuk Range, but we rarely detected them in the eastern Sierra Nevada.

Habitat

- In the Great Basin, Blue-gray Gnatcatchers reach high densities in pinyon and juniper woodland and in the bottoms of riparian canyons with dense, large sagebrush in the understory.

Identification

- Blue-gray Gnatcatchers are slender and elongated. Their bodies are smaller than those of warblers. They often hold their long tails upward and flick them while foraging. The back and wings are bluish gray and the belly is white. The tail is black on top with white outer feathers; the underside of the tail is mostly white. Males are brighter than females and their backs and wings are more bluish. Males also have a thin, black supercilium that becomes more prominent during the breeding season. Both sexes have a bold, white eye ring.
- In the western Great Basin, Blue-gray Gnatcatchers are most likely to be confused with Bushtits. Blue-gray Gnatcatchers have more contrast between their white underside and brighter upperside and have a more striking tail pattern. Unlike Blue-gray Gnatcatchers, Bushtits usually occur in flocks.
- The most common Blue-gray Gnatcatcher vocalizations are call notes. Both sexes make reedy, mechanical *zeee* notes, which commonly function as contact calls while foraging in groups. The male's song is quieter and less frequent. The jumbled, rambing, disconnected song includes call notes and the mimicked vocalizations of other species.

Response to human activity or natural disturbances

- Blue-gray Gnatcatchers are not thought to be well-adapted to urban environments. Loss of pinyon and juniper woodlands likely would have negative short-term effects on populations. Increases in abundance of Brown-headed Cowbirds could decrease recruitment (Kershner and Ellison 2012).

Data gaps

- Several short-term studies indicated substantial decreases in recruitment of Blue-gray Gnatcatchers due to parasitism and predation, but long-term demographic studies have not been conducted. Little is known about the species' mobility and the capacity for populations in remote areas to serve as sources for locations with high levels of parasitism (Kershner and Ellison 2012).

Golden-crowned Kinglet (*Regulus satrapa*)

Natural history

Dan Irizarry

- Golden-crowned Kinglets are tiny, active songbirds that may be encountered in mixed flocks during winter when they have departed their boreal and subalpine breeding grounds.
- Golden-crowned Kinglets breed across most of Alaska, Canada, the Rocky Mountains, the Cascades, and the Sierra Nevada. The species is scarce in the Great Basin, occuring in mountains at the edges of the region. Golden-crowned Kinglets winter across the conterminous United States except in the arid Southwest and Florida.
- Migratory behavior in Golden-crowned Kinglets has not been well studied, and understanding is complicated by individuals that winter in portions of the breeding range. Some individuals are residents or elevational migrants (Swanson et al. 2012).
- Golden-crowned Kinglets are insectivorous during summer, gleaning small arthropods from foliage or capturing flying insects during short bouts of flight. During migration and winter, individuals consume a small amount of plant matter, mostly fruit (Swanson et al. 2012).

Nesting

- Golden-crowned Kinglets are serially monogamous, choosing a new mate each breeding season. The species defends small territories during breeding season and is non-territorial during winter, often joining mixed flocks (Swanson et al. 2012).
- Nests are built in the upper branches of dense conifers, on average 15 m above the ground. The nest is a compact, nearly spherical cup that often is suspended from a forked branch by its rim. The outer layer of the nest is constructed from moss and small twigs, and is held together with spider silk and insect cocoons. The inner cup is lined with soft plant material and feathers (Swanson et al. 2012).
- Golden-crowned Kinglets have two broods, laying their first clutches in late May or early June. Each clutch consists of eight or nine whitish eggs with small, brown spots (Swanson et al. 2012).
- Golden-crowned Kinglet nests rarely host Brown-headed Cowbird eggs (Swanson et al. 2012).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Golden-crowned Kinglets is stable rangewide and in the Sierra Nevada, but declined by an average of 2.4% per year in the Great Basin from 1966 to 2012 (Sauer et al. 2014).
- Golden-crowned Kinglets were uncommon in the eastern Sierra Nevada. We did not detect them in the Wassuk Range.
- Extremely low winter temperatures can cause high mortality that affects abundance during the following breeding season (Swanson et al. 2012).

Habitat

- Golden-crowned Kinglets occur in dense, mature coniferous forests and woodlands. In the western United States, the species occurs in spruce, fir, or lodgepole pine (Swanson et al. 2012).

Identification

- Golden-crowned Kinglets are among the smallest passerines in North America. Their short, narrow tails, small bills, and round, neckless bodies help to distinguish them from other species of small passerines. The body is gray-green, fading to whitish on the belly, and the wings are black with one pale wingbar and yellow edging on the flight feathers. The face is white with a bold black eye-line and a thinner black malar stripe. The crown is black with a golden yellow central patch. The legs are black and the toes are yellow. Males and females are similar in appearance. Juveniles are similar to adults but the yellow crown patch is replaced by gray-green.
- Most likely to be confused with its congener, Ruby-crowned Kinglet. Ruby-crowned Kinglets have a plainer head with a bold white eye-ring and a red crown patch that is concealed by surrounding feathers when birds are not displaying.
- The song of Golden-crowned Kinglets has two parts. The first part is a series of high, rising notes, *see see see si si*, followed by a lower, garbled chatter. The song of Ruby-crowned Kinglets is similar to but longer and more complex than the song of Golden-crowned Kinglets. The typical call of Golden-crowned Kinglets is a high, thin *zee zee zee*, similar to the call of Brown Creepers.

Response to human activity or natural disturbances

- Expansions of the breeding range of Golden-crowned Kinglets in the central and eastern United States are linked to planting of conifers. Timber harvest is negatively correlated with the species' abundance in the western United States (Swanson et al. 2012).
- Natural disturbances, including wind storms and fire, have been documented to lower the abundance of Golden-crowned Kinglets (Swanson et al. 2012).

Data gaps

- Neither the nesting biology nor the migratory behavior of Golden-crowned Kinglets have been well studied. Additionally, the mechanisms that allow these birds to survive cold nights are unknown; nocturnal hypothermia has not been documented in kinglets (Swanson et al. 2012).

Ruby-crowned Kinglet (*Regulus calendula*)

Natural history

Bonnie Ott

- Ruby-crowned Kinglets are tiny birds with loud songs. Because they forage in dense canopy during the breeding season, they are difficult to see.
- Ruby-crowned Kinglets breed from treeline in Alaska and Canada south to the Great Lakes, New England, the Rocky Mountains, Intermountain West, Sierra Nevada, and Cascade Range. In winter, the species occurs on the Pacific coast from Washington to California, in the Intermountain West, from New Mexico to Florida, and on the Atlantic Coast north to southern New England. The species also occurs in Baja California and most of Mexico during winter.
- The species is a common breeder in the Sierra Nevada but is a scarce and local breeder further east in the Great Basin.
- Northern populations of Ruby-crowned Kinglets are short- or medium-distance migrants, whereas most birds that breed in the western United States and Canada are elevational migrants. Most birds that breed in California arrive in mid May, and their peak autumn migration occurs in October (Swanson et al. 2008).
- Ruby-crowned Kinglets are insectivorous in the breeding season. Arachnids and their eggs are the most common prey items. During winter, the species also consumes small amounts of plant material (Swanson et al. 2008).

Nesting

- Relative to their body size, Ruby-crowned Kinglets defend large territories, typically one to six hectares (Martin 1960). Ruby-crowned Kinglets are monogamous but join mixed-species flocks in autumn and winter.
- Ruby-crowned Kinglets nest in large, dense conifers at least six meters above the ground (Swanson et al. 2008).
- The nests of Ruby-crowned Kinglets are globular with an opening near the top, often with some elasticity to expand as more eggs are added. Nests are placed on or suspended beneath forks of branches.
- The outer wall of the nest is constructed with plant material and moss, held together with large amounts of spider silk. The softer lining is often made from fine grass and feathers (Bent 1949).
- Ruby-crowned Kinglets begin laying eggs in late May or June. The species has one clutch per year of seven to nine (sometimes as few as four) eggs that are whitish with small reddish spots (Bent 1949, Ehrlich et al. 1988).
- Parasitism by Brown-headed Cowbirds is rare (Friedmann 1971).

Status and trend

- Trends in abundance of Ruby-crowned Kinglets vary among ecoregions but appear to be relatively stable rangewide. Breeding Bird Survey data suggest that in the Great Basin and Sierra Nevada, the species' abundance declined by an average of 2% and 8% per year, respectively, from 1966 to 2012 (Sauer et al. 2014).
- We detected Ruby-crowned Kinglets in all land-cover types except shrubsteppe in the eastern Sierra Nevada. We did not detect them in the Wassuk Range.

Habitat

- Ruby-crowned Kinglets breed in coniferous and mixed forests, typically occurring in higher densities where spruce or fir species are present (Swanson et al. 2008). During migration and winter, the species occurs in almost any area with trees.

Identification

- Ruby-crowned Kinglets are among the smallest passerines in North America. The back and head are olive-green, gradually fading to a paler olive on the breast and belly. The wings are dark, with two white bars and bright yellow edges on the flight feathers. The face is unmarked except for a bold white eye ring. The males have reddish crown feathers that are well-concealed except when the birds are displaying. The legs are black and the toes are yellow-orange.
- Ruby-crowned Kinglets are similar to Golden-crowned Kinglets but lack the strong facial pattern and broad yellow crown stripe. Compared to other small passerines, kinglets have round bodies that appear neckless and short, narrow tails.
- The song of Ruby-crowned Kinglets has three parts. The first is a set of two to three high, thin notes (*tee tee*), the second is a lower series of five or more notes (*tu tu tu tu tu*), and the third is complex and chaotic, often beginning with a dry chatter or trill and finishing with a rapid, repeated *rik-kee rik-kee*. The song is similar to that of Golden-crowned Kinglets but has a distinctive, more complex ending.
- Throughout the year, the most common call is a dry chatter of repeated *chet* notes.

Response to human activity or natural disturbances

- Ruby-crowned Kinglets nest in dense forests with large trees and their abundance declines as timber is harvested or after fire (Swanson et al. 2008).

Data gaps

- Little is known about the breeding ecology of Ruby-crowned Kinglets, likely because they breed at high latitudes and elevations and the nests are cryptic.
- The systematics of *Regulus* are unclear, and the genetic structure of taxa within the genus has not been studied (Swanson et al. 2008).
- The drivers behind substantial declines in abundance of the species in the Great Basin and Sierra Nevada are unclear.

Mountain Bluebird (*Sialia currucoides*)

Natural history

David Pavlik

- Mountain Bluebirds are colorful and conspicuous in woodlands, where they often sally from prominent perches to capture prey.
- Mountain Bluebirds breed in the Rocky Mountains of the United States and Canada, the Great Basin, and the mountains of California and Oregon. The species winters at lower elevations from Oregon east to Nebraska and south through central Mexico. In severe winters, the species may be absent from the northern half of its winter range (Power and Lombardo 1996).
- The species is present year round in the western Great Basin, but at lower elevations during winter. There are no data on whether the local breeding population is migratory and replaced by northern migrants in winter or whether individual birds are resident in the region.
- Mountain Bluebirds typically arrive on their breeding grounds in April. The timing of autumn migration varies, but generally is between September and December (Small 1994).
- Mountain Bluebirds are primarily insectivorous. Over 90% of their diet throughout the year consists of arthropods (Beal 1915). Fruit and seeds are consumed more frequently in winter, when insect abundance is lower. Mountain Bluebirds usually hunt from an exposed perch, flying out to capture arthropods in vegetation, on the ground, or in the air.

Nesting

- Mountain Bluebirds maintain unusually large territories for a songbird, sometimes larger than 5 hectares. Territory size may reflect scarcity of nest cavities and hunting perches in their habitat (Power 1980). Where the species' range overlaps with that of Western Bluebirds, the two species compete for nesting sites and exclude each other from their respective territories (Herlugson 1982).
- Mountain Bluebirds are monogamous. Males arrive on breeding grounds first and establish territories around potential nest sites (Power and Lombardo 1996).
- Mountain Bluebirds nest in abandoned woodpecker holes, natural tree cavities, rock crevices, and nest boxes. Little is known about nest site selection in Mountain Bluebirds, although the birds generally nest in cavities in open, dry areas within two meters of the ground. Males give elaborate displays at potential nest sites to attract a mate, flying back and forth between the cavity and a prominent song perch (Power and Lombardo 1996).

- The nest is a cup that fills the bottom of the cavity. It is constructed mostly from dry grass stems (Power and Lombardo 1996).
- Approximately 50% of Mountain Bluebird pairs attempt a second brood each year (Power 1966). Egg-laying begins in early May and can extend through July for second broods. On average, each clutch includes four to five pale bluish eggs (Power and Lombardo 1996).
- Parasitism of Mountain Bluebird nests by Brown-headed Cowbirds is rare. There are four reports of parasitism and no reports of fledgling Brown-headed Cowbirds reared by Mountain Bluebirds (Power and Lombardo 1996).

Status and trend

- Trends in abundance of Mountain Bluebirds differ locally, but Breeding Bird Survey data suggest that the rangewide abundance is relatively stable (Sauer et al. 2014).
- The density of Mountain Bluebirds is low across their breeding range, including the eastern Sierra Nevada and Wassuk Range.

Habitat

- The habitat of Mountain Bluebirds typically is open, with extensive grass or bare ground, scattered trees, and minimal shrub cover. The species also occurs in recently burned and other areas with open ground for foraging. Its summer and winter habitats are similar.

Identification

- Mountain Bluebirds are long-winged, medium-sized thrushes. Adult breeding males are washed in cerulean blue, which fades to bluish white on the belly. Non-breeding males and adult females are brownish-blue with bright blue rumps. Blue Grosbeaks and Lazuli Buntings are the only two other predominantly blue songbirds in the Great Basin. Mountain Bluebirds are larger, paler blue, and have a thinner bill.
- The song of Mountain Bluebirds is a simple, low, muffled series of whistles *jurrf jurrf jewr jippo jurf*, similar in quality to the songs of other bluebirds. Their call notes include a high, descending whistle and a muffled, descending phrase similar to elements of the song. The species also makes a hard *chek* note, sometimes repeated in a loose chatter, when agitated.

Response to human activity or natural disturbances

- Widespread clearing of forests in the western United States and Canada during the 19th and 20th centuries likely led to increases in the extent of Mountain Bluebird habitat and in its abundance. Reforestation efforts in the mid to late 20th century probably reduced the extent of this new habitat. The net change in forest cover, and with it changes in the area of Mountain Bluebird habitat, has stabilized in recent decades (Power and Lombardo 1996).

Data gaps

- The breeding biology, annual survival, and migratory patterns of Mountain Bluebirds have not been well studied (Power and Lombardo 1996).

Townsend's Solitaire (*Myadestes townsendi*)

Natural history

David Pavlik

- Townsend's Solitaires are drab, slow-moving, and difficult to detect when they are not vocalizing. Their calls are among the loudest of any passerine in the Great Basin and can carry more than half a kilometer.
- Townsend's Solitaires breed throughout the mountains of the western United States and Canada with an apparently disjunct breeding population in eastern Alaska and Yukon Territory. The species does not occur in Alaska or Canada during winter but occurs throughout its breeding range in the conterminous United States and in the western Great Plains and northern Mexico.
- Populations in Alaska and Canada are fully migratory. In the conterminous United States, most populations are elevational migrants, although some populations that breed at lower elevations may be resident (Bowen 1997).
- During the breeding season, Townsend's Solitaires primarily eat arthropods. During winter, they feed on fruit, especially juniper berries (Bowen 1997).

Nesting

- Territoriality of Townsend's Solitaires during the breeding season has not been studied extensively. Males defend a territory beginning in late spring. Both sexes defend winter territories, which are centered on juniper trees. Territories are defended from conspecifics and many other species of frugivores (Bowen 1997).
- Townsend's Solitaires have a single brood and begin laying eggs in late May. Each clutch contains four (sometimes three or five) eggs with dark marks. Egg color varies among individuals (Bent 1949, Ehrlich et al. 1988, Bowen 1997).
- Townsend's Solitaires nest on the ground, often along cutbanks where hollows or other depressions provide cover. Nest sites usually are in forests with open understory (Bowen 1997).
- The nest is a cup placed within a natural depression or a shallow scrape made by the female. Plant material from within 30 m of the nest site is used to weave the loose cup (Bent 1949, Bowen 1997).
- Nests of Townsend's Solitaires rarely are parasitized by Brown-headed Cowbirds.

There is a single record of a Brown-headed Cowbird nestling being raised to fledging by a Townsend's Solitaire (Friedmann 1977, Bowen 1997).

Status and trend

- Because Townsend's Solitaires are territorial and occupy relatively low elevations during the winter, they are one of the few passerines for which abundance is more easily estimated during winter than during summer (Bowen 1997). The species' abundance is not well-documented by the Breeding Bird Survey because it breeds in remote, montane areas, but the data suggest that its abundance is relatively stable (Sauer et al. 2014).
- We detected Townsend's Solitaires infrequently in the Wassuk Range and eastern Sierra Nevada.

Habitat

- Townsend's Solitaires breed in coniferous forests that are relatively open and have little ground cover. In winter, the species occurs almost exclusively in areas with juniper trees or other sources of fruit (Bowen 1997).

Identification

- Townsend's Solitaires are slender, medium-sized thrushes with long tails. The body and head are light gray, with a bold, white eye ring. The bill is small and dark. The wings are dark gray with a broad, buff band at the base of the primaries and white edges on the flight feathers. The tail is gray with white outer feathers. Juveniles are darker gray with white or buff scaling across the back and breast.
- Townsend's Solitaires are distinctive in the Great Basin. Drab female Mountain Bluebirds always have a blue tail and flight feathers. Northern Mockingbirds have bolder wing markings, a longer bill, and rarely co-occur with Townsend's Solitaires.
- The song of Townsend's Solitaires is a long, rambling, finch-like warble. It is highly variable but includes mostly whistles and low notes. The song does not have as many changes in pitch as do the songs of Cassin's Finches, Purple Finches, or other Cardueline finches. The song is often recognizable by its monotonous delivery and sheer length; many individual bouts of song last more than a minute.
- The most prevalent call note is an impressively loud, ringing *heeeh*, reminiscent of the sound made by running a finger around the rim of a wine glass. This call is common during the breeding season and in some cases appears to be used for territorial advertisement in lieu of song (Bowen 1997).

Response to human activity or natural disturbances

- No studies have examined the effects on human activity on Townsend's Solitaires, but the species' long-term viability may be affected negatively by loss of forest across its range.

Data gaps

- Aspects of migration of Townsend's Solitaires, including where the northern populations winter, remain unknown.
- The species has not been recorded from large areas of apparent habitat in British Columbia (Bowen 1997).

Hermit Thrush (*Catharus guttatus*)

Natural history

Bonnie Ott

- Hermit Thrushes are songbirds with cryptic plumage that often stay hidden in the understory, their presence revealed by their beautiful, flute-like song.
- Hermit Thrushes breed throughout most of Alaska and Canada, the mountains of the western United States, New England, and the Appalachians. The species winters across the mid Atlantic, southern United States, portions of the Pacific Coast, and most of Mexico.
- Hermit Thrushes winter further north than other *Catharus*. They are short-distance migrants that do not cross the Gulf of Mexico. They migrate relatively early in spring and late in autumn, arriving in the Great Basin in April and departing in October (Dellinger et al. 2012).
- Hermit Thrushes feeds primarily on arthropods during the breeding season, typically on the ground or low in vegetation. Their ability to transition to fruit and other vegetation during the winter allows them to winter in cooler regions than their congeners.

Nesting

- Hermit Thrushes are monogamous and territorial. Unpaired males chase conspecific males and females that intrude in their territory. The defensive behavior of the male is apparently part of courtship given that males cease chasing females after several days and form pair bonds. Territory size averages less than a hectare (Dellinger et al. 2012).
- There are few records of second broods of Hermit Thrushes. Second broods may be more likely in years in which the snow melts early. Egg laying in the Great Basin begins between late May and early July (Dellinger et al. 2012). Most clutches contains four eggs (Ehrlich et al. 1988).
- Hermit Thrush nests in the Great Basin are well-concealed on a low tree branch, typically less than three meters above the ground. The eastern subspecies often nests on the ground in dense vegetation. The nest is bulky and constructed from a variety of plant materials (Dellinger et al. 2012).

- Brood parasitism by Brown-headed Cowbirds regularly occurs in Hermit Thrush nests (Dellinger et al. 2012).

Status and trend

- Breeding Bird Survey data suggest that abundance of Hermit Thrushes is increasing rangewide but declined in the Great Basin and Sierra Nevada by an average of 1-2% per year between 1966 and 2012 (Sauer et al. 2014).
- The species was common in the Wassuk Range and the eastern Sierra Nevada.

Habitat associations

- Hermit Thrushes occur in diverse forests and woodlands. In the Great Basin, the species occurs in riparian woodlands, mountain mahogany, limber pine, and edges between riparian woodlands and pinyon-juniper woodlands.

Identification

- Hermit Thrushes are medium-sized thrushes. They are warm brown on the back and head. The breast and belly are whitish with blurry, brownish spots. The face has a thin, pale eye ring and loral line. The tail, rump, and flight feathers are rusty brown, contrasting with the brown back. Males and females have similar plumage.
- In the Great Basin, Hermit Thrushes are most likely to be confused with Swainson's Thrushes. Swainson's Thrushes do not have contrasting rusty flight feathers or tails and have bolder, buffier eyerings and loral lines than Hermit Thrushes. Swainson's Thrushes also are more closely associated with dense riparian vegetation than Hermit Thrushes.
- The song of Hermit Thrushes is typical of *Catharus* in its ethereal, flute-like quality. The song has two parts. The first is a clear, high whistle. The second part is complex and echoing, typically at a steady pitch. The long, clear opening note of Hermit Thrushes' song distinguishes it from Swainson's Thrushes' song.

Response to human activity or natural disturbances

- The response of Hermit Thrushes to fire and logging varies across their range (Dellinger et al. 2012).

Data gaps

- Little is known about some elements of breeding biology, survival, daily activities, dispersal, migration, and subspecific variation in Hermit Thrushes (Dellinger et al. 2012).

American Robin (*Turdus migratorius*)

Natural history

David Pavlik

- American Robins are widespread and quite common. Their cheery song is an iconic sign of spring across much of the United States and Canada.
- American Robins breed in nearly all of the United States and Canada except for the highest latitudes and the most arid parts of the Southwest. Breeding populations also occur in the highlands of central Mexico and Baja California.
- Northern populations are migratory, joining resident birds in the southern United States and Mexico during winter. The winter range also includes areas where the species does not breed, including Florida and the arid lowlands of the southwestern United States and Mexico (Sallabanks and James 1999).
- American Robins are omnivorous, foraging on arthropods and earthworms in warmer months and fruit in winter.

Nesting

- American Robins are monogamous and territorial during the breeding season, although territories may overlap to allow for higher densities. Territory size varies, and density of territories may be as high as 0.84 per hectare in Tennessee (Sallabanks and James 1999). American Robins may form flocks of several hundred individuals during winter, but also may be highly territorial, with one individual consistently defending one food source or tree against all other species.
- The clutches of American Robins have three to four bluish eggs. They regularly double-brood if the first nest is successful (Sallabanks and James 1999).
- American Robins nest in diverse habitats. They build a bulky nest of mud and grass, thus require substrates with branches of reasonable diameter that can hold the heavy nest.
- American Robins have a long nesting season, with active nests observed into October at multiple locations. The breeding season is believed to be shorter in the western Great Basin, particularly at higher elevations.
- American Robins recognize and reject Brown-headed Cowbird eggs; there is one reported case of adults rearing a cowbird to fledging (Sallabanks and James 1999).

Status and trend

- Breeding Bird Survey data suggest that the abundance of American Robins has increased over the past 50 years across the species' range with a few exceptions, including a decrease in the Sierra Nevada. Abundances are stable further east in the Great Basin (Sauer et al. 2014).
- The annual abundance of American Robins is relatively stable, but overwintering density can vary considerably between years depending on local food availability.

Habitat

- American Robins are generalists and well-represented in many land-cover types in the Wassuk Range and eastern Sierra Nevada. They are associated with woodland edges and adjust well to forest fragmentation and to woodland regeneration after agricultural activity.

Identification

- American Robins are large thrushes with a slaty, dark-gray head and back; white, split eye-ring; yellow bill; and rusty orange breast. Males generally have a brighter breast and darker head than females. In summer, juveniles have black spots on a pale orange breast. Often seen foraging on the ground for worms and other arthropods. Not likely to be confused with any other species in the Great Basin.
- The song of American Robins is complex, wobbly, and liquid. It is somewhat flutelike but not as musical as that of Hermit Thrushes. The song is described as a series of repetitive, well-spaced, rising and falling notes: *cheerily, cheer up, cheer up, cheerily, up* (Sallabanks and James 1999). The song is similar to that of Western Tanagers, but generally longer and neither as repetitive nor as harsh. It is similar to that of Black-headed Grosbeaks but neither as wobbly nor as sweet.
- American Robins are known for a wide array of vocalizations. The most common are startling, one-note *chuck* or *yeep* calls. American Robins occasionally make a high-pitched, drawn out *tseeet*, especially in the late afternoon, that is reminiscent of the calls of Cedar Waxwings or Hermit Thrushes. American Robins are also known to issue barely audible whisper songs.

Response to human activity or natural disturbances

- American Robins coexist with urban development given adequate food and nesting substrate.
- American Robins require woody substrates of considerable diameter to support bulky nests, and loss of habitat to fire can cause short-term decreases in abundance. The species' sensitivity to pesticides and other chemicals, in part due to its diet of earthworms and earthworms' ability to sequester chemicals, has been well-studied (Sallabanks and James 1999).

Data gaps

- American Robins are among the most common songbirds, and fairly well-studied.

Sage Thrasher (*Oreoscoptes montanus*)

Natural history

David Pavlik

- Sage Thrashers are large songbirds that occupy shrubsteppe. Their mumbling song seems unending.
- Sage Thrashers breed in eastern Washington and Oregon, western Montana, and Wyoming and south through the Great Basin. They winter from southern Nevada south through southern Arizona and New Mexico, western Texas, Baja California, and northern Mexico.
- Sage Thrashers are early migrants. Some birds begin spring migration in mid January, and movements peak in mid March. Autumn migration usually peaks in August (Reynolds et al. 1999).
- During the breeding season, Sage Thrashers feed primarily on insects. Their winter diet has not been studied (Reynolds et al. 1999). Within their territories they usually walk, run, or crawl rather than fly, but will flush with quick, direct flight when disturbed.

Nesting

- Sage Thrashers defend breeding territories of 0.5 to 2 hectares. Mating systems of the species have not been studied. Individuals often are solitary, although large flocks occasionally form during migration and winter (Reynolds et al. 1999).
- In the Great Basin, Sage Thrashers construct nests in dense stands of sagebrush. Nests are placed within the shrubs or on the ground, usually with extensive cover (Reynolds et al. 1999).
- The nest is a bulky cup made of large twigs and lined with grasses, hair, and feathers. The species sometimes constructs a platform above the nest, presumably to help conceal the nest from aerial predators (Rich 1985, Reynolds et al. 1999).
- In the western Great Basin, Sage Thrashers begin laying eggs in late April. Second broods have been documented but the proportion of individuals that have two broods has not been studied. Most clutches contain three to five eggs that are bluish or blue-green with large, dark spots (Bent 1948, Reynolds and Rich 1978).
- Parasitism of Sage Thrasher nests by Brown-headed Cowbirds is rare (Friedmann 1983). The low reported rate of parasitism may be the result of Sage Thrashers' ability to quickly recognize and remove Brown-headed Cowbird eggs from their nests (Rich and Rothstein 1985).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Sage Thrashers decreased by over 1% per year in the Great Basin and rangewide from 1966 to 2012 (Sauer et al. 2014), perhaps reflecting loss of sagebrush shrubsteppe.
- We frequently detected Sage Thrashers in shrubsteppe in the eastern Sierra Nevada, but rarely detected them in other land-cover types and in the Wassuk Range.

Habitat

- Abundance of Sage Thrashers typically is highest where individual sagebrush are large and provide extensive cover. The species sometimes occurs in areas dominated by other shrub species, especially near the edges of its breeding distribution (Reynolds et al. 1999).
- In the western Great Basin, the species is common in most areas with extensive sagebrush understory and few trees.

Identification

- Sage Thrashers are lean, medium-large passerines with long, slender bills and long tails. The back and head are grayish brown with indistinct brown streaks and the wings are darker brown with thin, whitish wing bars. The head has a faint, whitish supercilium and malar, the latter separated from the throat by a black border. The belly and breast are whitish with dense, bold brown spots. Juveniles are similar to adults but have less-distinct spots below.
- Sage Thrashers are the only mimids in their habitat in the Great Basin. Northern Mockingbirds sometimes occur near human development but are more boldly marked, with gray and white above and a clean white breast. Sage Thrashers are larger than other shrubsteppe passerines.
- The song of Sage Thrashers is complex and variable, and some of its elements mimic those of many other species. The song often sounds indistinct and muffled but is surprisingly loud and carries well across open shrubsteppe. The steady delivery and much longer length of the songs (average >160 seconds to 22 minutes) compared to those of other passerines is distinctive (Reynolds et al. 1999). Compared to other Mimids, Sage Thrashers' songs are less structured and contain fewer harsh notes or dramatic shifts between phrases.
- The most common calls are a hard *chuck* and a rising *wheeer*.

Response to human activity or natural disturbances

- The quality of Sage Thrasher habitat is decreased by reductions in the height and percent cover of sagebrush.

Data gaps

- There are many gaps in knowledge of Sage Thrashers' biology and ecology, including their winter range and ecology, breeding behavior, physiology, and longevity (Reynolds et al. 1999).

European Starling (*Sturnus vulgaris*)

Natural history

Karen Kearney

- European Starling is an incredibly successful invasive species in North America. The estimated population of 200 million is believed to be descended from about 100 individuals that were released in New York City's Central Park at the end of the 19th century.
- European Starlings are resident throughout the United States and Canada except for high latitudes. In the western United States, the species is most common in areas with human development.
- The species' native range extends from western Europe to central Russia and south into north Africa (Cabe 1993).
- European Starlings are omnivorous, consuming arthropods, fruit, seeds, vegetation, and garbage.

Nesting

- Most European Starlings are monogamous, but polygyny has been documented in many populations. Territory size is small, extending less than a meter from the nest cavity, but males fiercely defend these sites and sometimes kill conspecific intruders (Kessel 1957).
- European Starlings aggressively exclude many native species from cavities, sometimes destroying eggs or killing nestlings in active nests to take over a cavity. Declines in abundance of some species, including Eastern Bluebirds and Tree Swallows, have been attributed in part to expansion of European Starlings.
- The species will nest in almost any natural or man-made cavity. Most nests are at least 3 m above the ground. The male selects the nest site prior to pair formation and begins filling the cavity with nesting material (Kessel 1957).
- Egg laying typically is synchronized among individuals of a local population and occurs at the onset of spring. Many populations will lay two clutches per year if the first clutch is laid relatively early (Kessel 1957). Most clutches contains four to six eggs (Ehrlich et al. 1988).
- Conspecific brood parasitism is common in European Starlings, with as many as 33% of nests parasitized in some areas. Parasitism by Brown-headed Cowbirds is rare, likely due to vigorous defense of nest sites (Cabe 1993).

Status and trend

- European Starling is one of the most abundant bird species in North America.
- Breeding Bird Survey data suggest that the abundance of European Starlings across the United States declined by an average of about 1% per year from 1966 to 2012, with smaller decreases in abundance in the Great Basin (Sauer et al. 2014). The species is detected infrequently in the Sierra Nevada.

Habitat

- European Starlings occur in almost every land-cover type in North America, especially those used extensively by humans, that provides open ground for foraging. The species rarely occurs in extensive, unfragmented forests or in arid areas in the western United States.
- We rarely detected European Starlings in the Wassuk Range and eastern Sierra Nevada.

Identification

- European Starlings are medium-sized, chunky, and short-tailed passerines that frequently are observed feeding on the ground. The entire body is covered in glossy, iridescent plumage. Breeding adults have bright yellow bills. Non-breeding adults have dark bills and are covered with small, white spots. Juveniles of both sexes are drab gray-brown and are not iridescent.
- In the western Great Basin, European Starlings may be confused with Brown-headed Cowbirds and Brewer's Blackbirds. European Starlings have shorter tails and longer, thinner bills than either of these species. In summer, the bright yellow bills of European Starlings also distinguish them from species with similar appearance.
- The song of European Starlings is quiet, harsh, and variable. It typically contains gurgling notes, high whistles reminiscent of a howling wolf, and mimicked phrases of other bird species. The most common call is a harsh chatter, *ch-ch-ch-ch-ch*.

Response to human activity or natural disturbances

- Human activity has facilitated the expansion of European Starlings throughout North America. Most trapping and hunting intended to reduce the species' abundance have been ineffective.

Data gaps

- Due to their abundance and detrimental effects on native avifauna, European Starlings have been widely studied in their native and expanded range.

Orange-crowned Warbler (*Oreothlypis celata*)

Natural history

Alan Vernon

- Orange-crowned Warblers occur in dense vegetation at high elevations in the Great Basin.
- Orange-crowned Warblers nest throughout most of Alaska and Canada south through the Sierra Nevada, coastal California, the Great Basin, and the Rocky Mountains. The species winters in the Central Valley of California, Arizona, the southern United States from west Texas to coastal Virginia and Florida, and most of Mexico.
- Orange-crowned Warblers that breed in the Great Basin arrive in the region in late April or early May. The timing of autumn departure for migration varies locally and is believed to coincide with rapid decreases in abundance of arthropods or the onset of cold weather (Gilbert et al. 2010).
- Orange-crowned Warblers mainly consume arthropods, which they capture by gleaning and probing in dense vegetation. The species also consumes berries, especially during winter.

Nesting

- Orange-crowned Warblers primarily are monogamous, and defend territories that include nesting and foraging habitat (Gilbert et al. 2010). Although these territories do not overlap with those of conspecifics, they frequently overlap with those of other insectivorous birds.
- Orange-crowned Warblers that nest in coastal California have two broods (Gilbert et al. 2010). It is unclear whether individuals in the Great Basin, which are members of a different subspecies, also have multiple broods per season.
- Most clutches contain four to five eggs, which are whitish with small reddish flecks (Gilbert et al. 2010).
- Nests are placed on the ground in a crevice or depression and are well-concealed. The nest is a small cup constructed from fine plant material and lined with soft grasses, feathers, or animal hair (Gilbert et al. 2010).
- Parasitism of Orange-crowned Warbler nests by Brown-headed Cowbirds is poorly understood. Parasitism has not been documented in some portions of the species' range, despite overlap with Brown-headed Cowbirds, whereas parasitism is common in other areas (Gilbert et al. 2010).

Status and trend

- Breeding Bird Survey data suggest that although trends in abundance of Orange-crowned Warblers varied across their range, the species' abundance rangewide and in the Great Basin and Sierra Nevada decreased from 1966 to 2012 (Sauer et al. 2012).

Habitat

- Orange-crowned Warblers breed in diverse land-cover types across their range. In the western Great Basin, they usually occur in or near riparian areas with aspen at elevations below 2500 m (Gilbert et al. 2010), and sometimes occur in other mixed woodlands.
- We frequently detected Orange-crowned Warblers in mixed woodlands and riparian areas in the Wassuk Range and eastern Sierra Nevada.

Identification

- A medium-sized warbler with a thin, sharp bill. Orange-crowned Warblers are among the plainest of the Parulines. Their entire body is yellowish green, and darker on the wings and back. The only noteworthy markings are a thin, dark eyeline and pale, broken eye ring, both of which can be difficult to see in the field. Males and females are similar in appearance.
- In the western Great Basin, Orange-crowned Warblers may be confused with female Yellow Warblers and female Wilson's Warblers. The latter two species lack dark eyelines and are brighter and more uniformly yellow than Orange-crowned Warblers. Yellow Warblers are slightly larger and have relatively larger, blunter bills.
- The song of Orange-crowned Warblers is a high, level trill. It can be distinguished from many similar songs by its weak ending, which is both low in pitch and slow. The call note, a sharp *chip*, is relatively distinct from the call notes of other Parulines.

Response to human activity or natural disturbances

- Orange-crowned Warblers' ability to use early successional and fragmented vegetation makes them less susceptible to human activity than many other species. Disturbances that reduce understory cover, including cattle grazing and activity of feral pigs, are associated with reductions in the species' abundance (Gilbert et al. 2010).

Data gaps

- Orange-crowned Warblers are well-studied, but identification of the sexes and estimation of individuals' ages in the field remains difficult.

Virginia's Warbler (*Oreothlypis virginiae*)

Natural history

Erik Enbody

- Virginia's Warblers are shy birds that breed in steep terrain. The species is probably the least understood Parulid in the United States.
- Virginia's Warblers breed locally within the montane western United States from southern Idaho to southern California and Arizona. A disjunct breeding population occurs in the Black Hills of South Dakota, and there is speculation that the species breeds in Oregon (Olson and Martin 1999, Swanson et al. 2000).
- The species winters from Jalisco to Oaxaca in southern Mexico. Virginia's Warblers are rare but regular winter residents in southern Texas and California, suggesting that other wintering areas may exist (Olson and Martin 1999).
- Virginia's Warblers are locally common in some mountain ranges in the western Great Basin but have not been recorded from other ranges with apparent habitat. Little is known about the drivers of the species' distribution.
- Migration of Virginia's Warblers has not been well studied, but the species is believed to arrive on its breeding grounds later than most Parulids, usually in late April or May. Autumn migration is also believed to be early, beginning in mid to late August and continuing into early October (Olson and Martin 1999).
- Virginia's Warblers feed on arthropods that are removed from vegetation or captured on the wing with short, direct attack flights (Olson and Martin 1999).

Nesting

- Male Virginia's Warblers are highly territorial, chasing conspecifics and other Parulids from their territories. Many territories are scattered and irregularly shaped. The majority of territorial boundaries are formed by natural features such as dense forest or cliffs rather than by the territories of conspecifics (Fischer 1978, Olson and Martin 1999). The species is believed to be monogamous.
- Virginia's Warblers are single-brooded, and egg laying usually begins in late May. Each clutch contains four (sometimes three or five) off-white eggs with small red or purple spots (Ehrlich et al. 1988, Olson and Martin 1999).
- Virginia's Warblers nest in open woodlands or areas with scattered trees and other vegetation, often on steep, rocky slopes. In the western Great Basin, they often are associated with mountain mahogany on canyon slopes.
- The nest is an open cup of woven grass. It is placed in a depression at the base of bunchgrasses or a shrub, sometimes within the stems (Olson and Martin 1999).
- The proportion of Virginia's Warbler nests that are parasitized by Brown-headed Cowbirds varies across the species' range and has not been estimated in many regions, including the western Great Basin (Olson and Martin 1999).

Status and trend

- Given their patchy distribution and remote breeding habitat, Virginia's Warblers are not effectively sampled by the Breeding Bird Survey. The survey does not report on the species in California or Nevada. Data from further east suggest an average annual decline in abundance of over 1% (Sauer et al. 2014).
- We detected Virginia's Warblers often in riparian and mixed woodlands in the Wassuk Range. We did not detect them in the eastern Sierra Nevada.

Habitat

- The habitat requirements of Virginia's Warblers are unclear, especially in the western Great Basin. The species typically is associated with oaks, pinyon pine, and mountain mahogany. In the Great Basin, they often occur in riparian canyons.

Identification

- Virginia's Warblers are medium-sized Parulids with thin, sharp bills and, for a warbler, relatively drab plumage. The body is light gray with darker gray wings and a yellow vent and rump. The face has a thin, white eye ring. Adult males have a yellow upper breast, white chin, and dense red spots on the center of the crown. Adult females do not have red on the crown and have less yellow on the breast than males. Immature females may lack yellow on the breast but always have yellow undertail coverts.
- In the western Great Basin, no other Parulid is so uniformly gray. Orange-crowned Warblers have a similar shape and minimal markings but are always much yellower. Blue-gray Gnatcatchers are smaller, longer-tailed, and have more contrast between their slate-blue back and white breast.
- The song of Virginia's Warblers has two or three parts. Each part is a sweet, repeated whistle, *seedi seedi seedi slip slip suwee suwee*. The song can be quite similar to that of MacGillivray's Warblers and Yellow Warblers but always sweeter is than that of MacGillivray's Warblers and generally is slower, and with fewer repetitions of the opening phrase, than that of Yellow Warblers. Some abbreviated songs may be difficult to distinguish. The call note is a metallic *tink*.

Response to human activity or natural disturbances

- Fire may reduce the extent of habitat for this species, but the species' response to human activity is not well understood (Olson and Martin 1999).

Data gaps

- There is little information on virtually all aspects of the biology and ecology of Virginia's Warblers, including their current distribution and habitat attributes.

MacGillivray's Warbler (*Geothlypis tolmiei*)

Natural history

Frank Fogarty

- MacGillivray's Warblers are colorful, secretive birds that occur in riparian thickets along the elevational gradient in the Great Basin.
- MacGillivray's Warblers breed from British Columbia south to central California and northern New Mexico. The species' distribution is irregular in the southern half of their range, reflecting the patchy distribution of its habitat. MacGillivray's Warblers winter from central Mexico south through the highlands of Central America.
- The species arrives in the Great Basin in May and leaves for autumn migration in late August or September (Hall et al. 1994, Pitocchelli 2013).
- The species is a common but local breeder in the western Great Basin.
- MacGillivray's Warblers are insectivorous, feeding mainly on flying insects and caterpillars.

Nesting

- MacGillivray's Warblers are highly territorial during breeding season, and males frequently attack conspecific intruders to their territories. Territory size is variable and has not been studied extensively (Pitocchelli 2013). The species is presumed to be monogamous, as are its congeners, but its mating system has not been well-studied.
- MacGillivray's Warblers lay a single clutch of four (sometimes three or five) whitish eggs in June (Ehrlich et al. 1988, Pitocchelli 2013).
- MacGillivray's Warblers nest on or near the ground in dense vegetation that helps to hide the nest (Pitocchelli 2013). The nest is a loose cup constructed mostly from plant stems and leaves.
- A high proportion of MacGillivray's Warbler nests are parasitized by Brown-headed Cowbirds, especially in parts of the eastern Sierra Nevada near human activity (Borgman and Morrison 2010).

Status and trend

- Breeding Bird Survey data suggest that the abundance of MacGillivray's Warblers declined rangewide by an average of 1-2% per year from 1966 to 2012. That trend was driven by declines in populations in the Pacific Northwest. The species' abundance in the Great Basin remained stable over the same time period (Sauer et al. 2014).

Habitat

- MacGillivray's Warblers' breeding habitat varies geographically and includes forest understory, riparian corridors, and early successional vegetation (Pitocchelli 2013). In the Great Basin, the species typically occurs in dense, wet thickets in canyons.
- We detected the species often in the eastern Sierra Nevada and Wassuk Range.

Identification

- MacGillivray's Warbler is a small, skulking warbler that rarely can be seen easily. The wings and back are brownish-yellow, the belly and breast are brighter yellow, and the entire head is covered by a sooty hood. There are bold white arcs above and below the eyes. Adult males have darker, blacker hoods than adult females and immature birds.
- MacGillivray's Warblers are quite similar to several of their congeners, but the only other *Geothlypis* in the Great Basin, Common Yellowthroat, does not have a complete hood.
- The song of MacGillivray's Warblers has two or three distinctive parts, with more consistent structure than the songs of most other warblers. Each part consists of a single, repeated phrase: *churry churry churry cheery cheery* or *churry churry churry cheery cheery turri turri*. Each note has a complex, rolling quality that can help one identify the species on the basis of partial songs. The call note is a flat, harsh *chik*.

Response to human activity or natural disturbances

- MacGillivray's Warblers benefit from logging and other activities that reduce forest cover and lead to secondary succession, especially in the Pacific Northwest and Canada (Pitocchelli 2013).

Data gaps

- Little is known about the breeding biology of MacGillivray's Warblers and the effect of loss of riparian vegetation in the Great Basin on their abundance. A zone of hybridization between MacGillivray's Warblers and Mourning Warblers recently was discovered in British Columbia, but has not yet been well studied (Pitocchelli 2013).

Yellow Warbler (*Setophaga petechia*)

Natural history

David Pavlik

- The energetic song of Yellow Warblers is common in spring in wetter areas.
- Yellow Warblers breed in most of Alaska and Canada throughout the conterminous United States except for the arid Southwest and Texas to North Carolina. Populations that are mostly non-migratory breed throughout the Caribbean, Central America, and northern South America. The species winters in coastal Mexico, throughout Central America, and south to Bolivia (Lowther et al. 1999).
- Yellow Warblers are locally common during the breeding season in some mountain ranges in the Great Basin but are absent from most of the ecosystem.
- Migration of Yellow Warblers is longer than that of most other Parulids. The species arrives on its breeding grounds in April or May and departs between July and September. Some western birds linger as late as October (Lowther et al. 1999).
- Yellow Warblers feed on arthropods that usually are captured by gleaning from vegetation. The species occasionally feeds on fruit. Their winter diet has not been studied (Lowther et al. 1999).

Nesting

- Male Yellow Warblers defend territories that include breeding and foraging areas. Most territories are smaller than one hectare. Aggression and defensive behavior also have been observed in winter. Yellow Warblers are primarily monogamous, with a low incidence of polygyny (Lowther et al. 1999).
- Yellow Warblers construct their nests in an upright fork in a shrub or tree (Lowther et al. 1999). The nest is a deep, woven cup of grasses and bark. Both the outside and inside are covered in finer plant material and animal hair (Mico 1998).
- Yellow Warblers begin to lay eggs in late May or early June (Lowther et al. 1999) and have one brood per season. Each clutch consists of four or five eggs. Egg color varies, but all have a ring of dark spots around the large end (Bent 1953).
- Many Yellow Warbler nests are parasitized by Brown-headed Cowbirds (Friedmann 1963) or Shiny Cowbirds (Wiley 1985). Yellow Warblers often bury or eject the foreign egg, although this response sometimes leads to ejection of one or more of their own eggs (Folkers and Lowther 1985).

Status and trend

- Breeding Bird Survey data suggest that the rangewide abundance of Yellow Warblers decreased by an average of <1% per year from 1966 to 2012. Abundance appeared to be relatively stable in the Great Basin but declined by an average of >1% per year in the Sierra Nevada (Sauer et al. 2014).
- Yellow Warblers were fairly common in the eastern Sierra Nevada, but we did not detect them in the Wassuk Range.

Habitat

- Yellow Warblers breed in wet areas with dense, low deciduous vegetation and few large trees. In the Great Basin, they often occur in thickets of riparian willow.

Identification

- Yellow Warblers are medium-sized Parulids with a relatively short tail and a heavy bill. The yellow that covers its body is brightest on the face, throat, and belly. The face has a narrow, low contrast, yellowish eye ring. Yellow Warbler is the only yellowish Parulid with bright yellow spots on its tail. Adult males have reddish streaks along their breast and belly that stop abruptly below the throat. Adult females do not have streaks on their underside. Most immature birds are duller than adults, although some immature females are grayish with almost no yellow.
- Four other yellowish warblers occur in the western Great Basin. Common Yellowthroats are not as uniformly or bright yellow, and have a longer tail. Orange-crowned Warblers have a dark eye line and a thinner, pointier bill. MacGillivray's Warblers have a gray hood and white eye arcs. Female and immature Wilson's Warblers are smaller, have shorter primaries, and have a thinner, lighter bill.
- Yellow Warblers have two main song types. The type I song is a rapid and distinctive *sweet sweet sweet si si si so SWEE* that ends on an emphatic upslur. The type II song, *seedl seedl seedl seet seet seet*, is slower, similar to the songs of many other Parulids, and higher and faster than most songs of MacGillivray's Warblers and Virginia's Warblers. It generally sounds sweeter and is less hurried or slurred than the song of the Yellow-rumped Warblers.
- The call note, a loud, clear *chip*, is quite variable. Most call notes are low and sound hollow but some are high and sweet, resembling the phrases of the song.

Response to human activity or natural disturbances

- Yellow Warblers are negatively affected by cattle grazing that reduces willow cover in riparian areas (Taylor and Littlefield 1986).

Data gaps

- Many studies have focused on Yellow Warblers in their breeding range but few have been conducted in their wintering range.
- Yellow Warblers have unusually complex non-song vocalizations for a parulid. The use and variation of these sounds are not well understood (Lowther et al. 1999).

Yellow-rumped Warbler (*Setophaga coronata*)

Natural history

Joe Turner

- Yellow-rumped Warblers once were considered to be two species, Audubon's and Myrtle. Both are now regarded as subspecies. The western subspecies, Audubon's, occurs in the Great Basin. Except where noted, this account refers to Audubon's Yellow-rumped Warblers.
- Yellow-rumped Warblers breed from southeast Alaska south through central British Columbia, western Alberta, and the western United States except for the Central Valley of California and the arid Southwest. Disjunct and physically distinct breeding populations occur in the highlands of Mexico and Guatemala. Yellow-rumped Warblers winter along the Pacific coast of the United States and in the southwestern United States east to western Texas, Mexico, Honduras, and Guatemala (Hunt and Flaspohler 1998).
- Yellow-rumped Warblers arrive on their breeding grounds in April and depart for autumn migration in late September or early October (Hunt and Flaspohler 1998).
- During the breeding season, the species primarily feeds on arthropods. They forage in shrubs and trees where they glean prey and catch flying insects. Unlike most parulids, they almost exclusively eat fruit during winter, which allows them to winter further north than most of their congeners (Bent 1953).

Nesting

- Yellow-rumped Warblers are territorial during the breeding season. Territories usually are smaller than one hectare, and interspecific antagonism with other parulids is uncommon (Morse 1976). During migration and winter, the species joins mixed flocks of Parulids and other passerines.
- The species is believed to be monogamous (Hunt and Flaspohler 1998).
- Yellow-rumped Warblers place their nests on horizontal tree branches. In the Great Basin, they often occur in extensive, mature stands of aspen.
- The nest is a cup of twigs, pine needles, and grass stems. Animal hair and mosses are often woven into the nest. The interior of the nest is lined with softer plant material and hair. Feathers often are embedded so that they cover the eggs when adults are not present (Hunt and Flaspohler 1998).

- Yellow-rumped Warblers are believed to have one brood per year, but there are anecdotal reports of second broods. Egg laying begins in late May or early June. Each clutch contains four or five (sometimes three) eggs, which are whitish with brownish spots (Bent 1953, Ehrlich et al. 1988, Hunt and Flaspohler 1998).
- Parasitism of Yellow-rumped Warbler nests by Brown-headed Cowbirds is common (Hunt and Flaspohler 1998).

Status and trend

- Breeding Bird Survey data for Yellow-rumped Warblers are not differentiated by subspecies. The species' abundance appears to be stable rangewide and in the Sierra Nevada and Great Basin, but declined by an average of <1% per year from 1966 to 2012 in the Western Breeding Bird Survey Region, where the breeding population primarily is Audubon's (Sauer et al. 2014).
- We detected Yellow-rumped Warblers often in the eastern Sierra Nevada and Wassuk Range.

Habitat

- Yellow-rumped Warblers occur in coniferous and mixed forests, often at high elevations. In the Great Basin, they tend to occur in relatively wet areas, especially those with aspen, with moderate to high canopy cover.

Identification

- A large, long-tailed Parulid. Adult males have a gray back with blackish stripes, gray wings with extensive white on the coverts, a gray tail with large white spots, a blackish breast, a yellow rump patch, and a white belly with yellow patches on the flanks and blackish streaks. The head is gray with blackish-gray auriculars and lores, a small yellow patch on the crown, white eye arcs, and a round yellow throat patch. The upperparts of adult females usually are more brownish-gray, the belly and breast are less cleanly marked, the wing coverts have less white, and the crown is solidly gray. Immature birds are similar to adult females, but some females are much browner, with muted markings on the breast. The gray-and-white body and white wingbars are unique among Great Basin Parulids.
- The song begins with a hurried, trill-like warble, *tuwee tuwee tuwee tuwee tuwee*. The song ends with a complex phrase that occasionally is repeated. The songs of MacGillivray's Warblers and Virginia's Warblers are slower, with more-distinct changes in pitch between parts and fewer repetitions of the opening phrase. Wilson's Warblers' song is harsher, with shorter individual phrases.
- The call note is a dry, rising *chit*.

Response to human activity or natural disturbances

- Because Yellow-rumped Warblers are generalists, human activities and natural disturbances have had relatively little effect on the species' status.

Data gaps

- There have been few studies of the breeding biology of Yellow-rumped Warblers, especially Audubon's.
- The taxonomic and genetic relations among the subspecies are unresolved.

Black-throated Gray Warbler (*Setophaga nigrescens*)

Natural history

Dan Irizarry

- Black-throated Gray Warblers are unique among warblers that occupy the Great Basin in their association with relatively dry woodlands.
- During the breeding season, Black-throated Gray Warblers are common in the Intermountain West and on the Pacific slope, where they nest in oak and pinyon and juniper woodlands at intermediate elevations.
- The species winters in similar woodlands, and in lower-elevation riparian areas, in Baja California and central Mexico, and occurs rarely but consistently during winter in southern New Mexico, Arizona, and coastal California.
- The species arrives on its breeding grounds in the Great Basin from mid April to mid May. Autumn departures are more protracted, generally from mid August through late October (Guzy and Lowther 2012).
- Feeds almost exclusively on insects gleaned from leaves, especially butterfly and moth larvae (Guzy and Lowther 2012).

Nesting

- Territoriality and mating systems of Black-throated Gray Warblers have not been studied. The species is likely monogamous and territorial during the breeding season, as are other members of its genus.
- The clutch consists of four (sometimes three or five) eggs that have reddish-brown speckling (Ehrlich et al. 1988). The species generally has one brood per year, but double brooding has been reported. In the Great Basin, eggs are laid from late May to June (Guzy and Lowther 2012).
- Black-throated Gray Warblers construct a cup-shaped nest from dry plant material and line the nest with animal hair. Most nests are at least one meter above the ground on a horizontal tree limb (Guzy and Lowther 2012).
- The species' nests frequently are parasitized by Brown-headed Cowbirds, although abundance of Brown-headed Cowbirds is often relatively low in the habitat of Black-throated Gray Warblers. Purcell and Verner (1999) reported that 29% of nests were parasitized in ponderosa pine in the Sierra Nevada, and noted that parasitism was most common at lower elevations. Guzy and Lowther (2012) reported that less than 20% of nests generally were parasitized.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Black-throated Gray Warblers over the past 50 years has varied across the species' range, but has decreased overall. Abundance apparently has decreased in the eastern (Colorado, Arizona, and New Mexico) and northern (British Columbia and Washington) sections of the species' range. Abundance appears to be increasing in central California, Nevada, and Utah (Sauer et al. 2014).
- The causes of the decline in abundance of Black-throated Gray Warblers are unclear. Their habitats have relatively little human use (Guzy and Lowther 2012).
- Black-throated Gray Warblers were common in the Wassuk Range, but scarce in the eastern Sierra Nevada.

Habitat

- Black-throated Gray Warbler habitat includes pinyon and juniper woodlands and riparian vegetation from 2000 to 3000 m, mountain mahogany above 3000 m, and occasionally limber pine and bristlecone pine (Guzy and Lowther 2012).

Identification

- Black-throated Gray Warblers often are heard before they are seen. The birds are somewhat large and slow-moving for a warbler. They have white underparts and gray upperparts, a dark crown, and a bold black or dark gray eyeline. Older males have black throats, whereas females and immature birds have white throats. The flanks are streaked with black and the dark wings have two white wing bars. There is a distinctive yellow spot on the lores (between the eye and beak).
- Black-throated Gray Warblers are superficially similar to Mountain Chickadees, although Mountain Chickadees are smaller and do not have wing bars or a yellow loral spot. Black-throated Gray Warblers are not likely to be confused with any other warblers in the Great Basin.
- The song is slow, repetitive, and buzzier than the songs of other warblers in the Great Basin. It consists of four to six two-note bars with a final note that is higher- pitched and descending (Guzy and Lowther 2012). The song is most similar to that of MacGillivray's Warblers and Yellow-rumped Warblers, but the phrases of Black-throated Gray Warbler songs are less sweet and generally slower.
- The call note is a heavy *chip* that is higher in pitch than that of MacGillivray's Warblers. Birds often make the call while in trees. By contrast, MacGillivray's Warblers tend to call from low, dense vegetation.

Response to human activity or natural disturbances

- Information on responses to human activity and natural disturbance is limited.

Data gaps

- Although Black-throated Gray Warblers are widespread and fairly common, there are few data on the species' demography, abundance trends, responses to human activity, or general biology (Guzy and Lowther 2012).

Wilson's Warbler (*Cardellina pusilla*)

Natural history

Bonnie Ott

- Wilson's Warblers breed in Alaska, Canada south of the treeline except for the southern Prairie Provinces, along the Pacific coast south to Santa Barbara County, the Sierra Nevada, the Rocky Mountains, and northern New England. Wilson's Warblers have disjunct breeding populations in mountain ranges of the Great Basin. The species winters along the Gulf Coast from Louisiana south and inland from central Mexico south through Panama.
- Movement to the Great Basin peaks relatively late, in late May. Autumn migration usually peaks in September (Ammon and Gilbert 1999).
- Wilson's Warblers feed on arthropods gleaned from vegetation or caught in flight. During the winter, the species also consumes some fruit and honeydew produced by insects in the Margarodidae (Greenburg et al. 1993, Ammon and Gilbert 1999).

Nesting

- Males defend territories of 0.3–2.0 hectares that include their breeding and foraging areas (Ammon and Gilbert 1999). The species primarily is monogamous, although some males in the Sierra Nevada are polygynous (Stewart et al. 1977). Some members of both sexes are territorial in winter (Ammon and Gilbert 1999).
- Wilson's Warblers nest on the ground at the base of trees or shrubs or within dense patches of grass or forbs (Bent 1953). Most nest sites in the Sierra Nevada are in wet areas or near bodies of water (Ammon and Gilbert 1999).
- The nest has a foundation of whole blades of grass, a cup of woven grass blades and bark, and an inner lining of finer vegetation and animal hair (Ammon and Gilbert 1999).
- In the Sierra Nevada, Wilson's Warblers have one brood, and egg laying begins in late June (Stewart et al. 1977). Each clutch contains four to six (sometimes two to seven) whitish, speckled eggs (Bent 1953, Ehrlich et al. 1988).
- Parasitism by Brown-headed Cowbirds in the Sierra Nevada was reported as rare by Stewart et al. (1977), but may have increased as the range of Brown-headed Cowbirds expanded during the second half of the 20th century.

Status and trend

- Breeding Bird Survey data suggest that across most of its range, including the Sierra Nevada, the abundance of Wilson's Warblers decreased from 1966 to 2012 by an average of 1.9% per year (Sauer et al. 2014).
- We detected Wilson's Warblers infrequently in the eastern Sierra Nevada and rarely in the Wassuk Range.

Habitat

- In the Sierra Nevada, Wilson's Warblers breed in patches of mesic shrubs in riparian zones or near the edges of lakes and beaver ponds, usually not in areas with extensive canopy cover.
- Because Wilson's Warblers migrate late, some early season detections may represent migrating birds rather than breeding birds on territory.

Identification

- Wilson's Warblers are small, with delicate features. The nape, back, wings, and tail are olive green. The breast, belly, and undertail coverts are a brighter lemon-yellow. The face is lemon-yellow with olive-yellow auriculars, a conspicuous black eye, and a small bill. Adult breeding males have a solid black cap. The caps of adult females and immature birds range from solid olive-yellow to solid black. The age and sex of most individuals cannot be determined in the field.
- Four other warblers in the western Great Basin have similar plumage. Most Common Yellowthroats are darker above and have paler breasts and bellies, but some bright immature females are difficult to distinguish. Female MacGillivray's Warblers have similar body colors but grayish heads and white eye arcs. Most Orange-crowned Warblers are duller in color than Wilson's Warblers, but bright individuals can be similar. Female Yellow Warblers have bright yellow on their tail feathers, a blank facial expression, a large and heavy bill, and are stockier.
- The song is a rapid series of ten to fifteen repeated, harsh whistles, *cheecheecheechee* or *chchchchch*, that become faster and lower at the end. The song is slower than most trills, including those of Orange-crowned Warblers.
- The call note, a husky *chimp*, is similar to that of Song Sparrows or Winter Wrens and more complex than that of most other parulids.

Response to human activity or natural disturbances

- The abundance of Wilson's Warblers declined substantially after use of a phenoxy herbicide in forests inhabited by the species (Morrison and Meslow 1984).
- Abundance of Wilson's Warblers peaks 11-20 years after a clear-cut. Abundance generally is lower in uncut forests and lowest during the first 10 years after a clear-cut. Decreases in abundance of the species also were associated with cattle grazing in its habitat (Ammon and Gilbert 1999).

Data gaps

- Wilson's Warbler's breeding biology, abundance, distribution, and habitat requirements in the Great Basin are not well understood.
- The drivers of decreases in the species' abundance are not fully understood.

Green-tailed Towhee (*Pipilo chlorurus*)

Natural history

Frank Fogarty

- Green-tailed Towhees are familiar, colorful birds that occur in almost any area with sagebrush. Males often sing from perches on the top of shrubs or small trees.
- Green-tailed Towhees breed throughout the Great Basin, Rocky Mountains, and scattered mountain ranges elsewhere in California, Oregon, and Washington, typically above 1500 m. They winter at lower elevations in the southwestern United States and most of Mexico.
- Green-tailed Towhees are the only truly migratory towhees. Their relatively short migration was described as "leisurely" (Dobbs et al. 2012) because most individuals leave their wintering grounds in mid March but do not arrive in the Great Basin until early May.
- Some individuals disperse after breeding, often moving up canyons to higher elevations in July or August (Morton 1991). Autumn migration begins between mid August and mid September (Dobbs et al. 2012).
- Green-tailed Towhees are omnivorous, consuming small insects, seeds and fruit. They primarily forage in low brush or on the ground in grasses.

Nesting

- Green-tailed Towhees are monogamous and maintain breeding territories. Territory sizes vary as a function of resource availability (Dobbs et al. 2012).
- Green-tailed Towhees are believed to have two broods per year, but their nesting has not been studied directly. Egg-laying dates range from late May to early July (Dobbs et al. 2012). Most clutches contain three or four eggs (Ehrlich et al. 1988).
- Nests usually are located in areas with dense, mature shrubs. Nests are well-concealed and located less than a meter above the ground in a shrub or tree (Dobbs et al. 2012).
- The nest is a bulky cup with a base constructed of twigs and bark. The softer lining usually is typically from woven grass, small roots, animal hair, and feathers (Dobbs et al. 2012).
- Parasitism of Green-tailed Towhee nests by Brown-headed Cowbirds is rare (Dobbs et al. 2012).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Green-tailed Towhees is stable rangewide, with some local declines (Sauer et al. 2014).
- Green-tailed Towhees are common and widespread in a variety of land-cover types in the Great Basin. We detected them frequently in the eastern Sierra Nevada and Wassuk Range.

Habitat

- Green-tailed Towhees occur in shrubsteppe ecosystems or in areas with shrub growth after disturbance. In the Great Basin, the species occurs in open pinyon and juniper woodlands with an extensive sagebrush understory (Fleishman and Dobkin 2009).

Identification

- A large, long-tailed Emberizid. The back, tail, and wings are olive-green. The breast, belly, and head are medium gray. The throat and malar are bright white, divided by a dark gray malar, and the crown is deep red. Males and females are similar in appearance. Juveniles are heavily streaked, as are most emberizids, but can be identified by their yellow-green wings and tail.
- Green-tailed Towhees are the only green Emberizids in the United States. Their blunt, seed-crushing bills and reddish crowns separate them from all other green-colored passerines in the Great Basin.
- The song of Green-tailed Towhees is complex and follows the pattern typical of many Emberizids. A series of introductory notes, usually repeated no more than twice each, is followed by a series of buzzes and trills. The song is difficult to distinguish from those of Song Sparrows and Fox Sparrows, but Green-tailed Towhees usually have at least one trill or buzz that is much harsher than those of the other two species. Additionally, Song Sparrows and Fox Sparrows rarely occur away from wet areas in the Great Basin. The call note of Green-tailed Towhees is a drawn out, questioning, whiney *meeewee?*

Response to human activity or natural disturbances

- Fire likely has a substantial effect on abundance of Green-tailed Towhees, but relations between fire and abundance are not fully understood and are complicated by the presence of non-native invasive plants, especially cheatgrass, and by cattle grazing.
- Ten percent of the historical habitat of Green-tailed Towhees may have been lost to conversion of shrubsteppe to grasslands for cattle grazing (Dobbs et al. 2012).

Data gaps

- Despite their high abundance across the Intermountain West, Green-tailed Towhees have been the focus of relatively few direct studies. Little is known about their diet, energetics, breeding behavior, and survival (Dobbs et al. 2012).

Spotted Towhee (*Pipilo maculatus*)

Natural history

David Pavlik

- Spotted Towhees occupy sagebrush shrubsteppe in montane areas. The species' plumage is striking. Males often sing from the tops of trees or large shrubs. Despite their relatively high abundance and extensive range, few studies have focused on the species' biology and ecology.
- Spotted Towhees' breeding range extends from southern British Columbia east through central North Dakota and south throughout the western United States with the exception of the arid Southwest. In winter, they occupy most of their breeding range in the United States and also occur in the lower Great Plains and northern Mexico.
- Different populations of Spotted Towhees are residents, elevational migrants, and full migrants. Most Spotted Towhees in the western Great Basin are residents or elevational migrants (Greenlaw 1996).
- Spotted Towhees are omnivorous and forage primarily on the ground. During the breeding season, the species mainly consumes insects and terrestrial arthropods. During winter, their diet shifts to seeds and fruit (Davis 1957).

Nesting

- Territoriality and mating in Spotted Towhees has not been extensively studied. The species is thought to be territorial across its range, but the type of territories they defend are unclear (Baumann 1959, Greenlaw 1996). The species is believed to be monogamous, but the extent of extra-pair copulations has not been evaluated.
- Most information on Spotted Towhee nesting comes from a few studies in California (Baumann 1959, Davis 1960). The nest typically is placed on the ground or in a shrub, and many nests are more exposed than the nests of other Emberizids. The outer cup of the nest is made of coarse vegetation and the inside is lined with finer plant material.
- Egg laying begins from late April to early May (Austin 1968). Spotted Towhees sometimes lay two clutches per season, although the proportion of pairs that lay multiple clutches and the associated drivers are unknown (Baumann 1959). Most clutches contain three or four eggs (sometimes two or as many as six), which are pale with fine spots (Baumann 1959, Ehrlich et al. 1988, Greenlaw 1996).

- Brown-headed Cowbirds reportedly parasitize Spotted Towhee nests (Friedmann 1963), but there is little information on the proportion of nests parasitized or the population-level effects of parasitism.

Status and trend

- According to Breeding Bird Survey data, local trends in abundance of Spotted Towhees from 1966 to 2012 varied across the species' range. Although the abundance of the species appeared stable rangewide, its abundance increased by an average of almost 2% per year in the Great Basin (Sauer et al. 2014).
- Spotted Towhees were among the most common species in the Wassuk Range and eastern Sierra Nevada.

Habitat

- Spotted Towhees breed in areas with dense shrubs that provide cover for birds foraging on the ground. During the breeding season in the Great Basin, the species generally occurs at intermediate elevations in sagebrush shrubsteppe with scattered pinyon and juniper trees. They rarely occur at low elevations with relatively few conifers or in dense woodlands. The species occurs at lower elevations and in relatively dry areas during winter.

Identification

- Spotted Towhees are medium-large, long-tailed Emberizids. Adult males have a blackish head, back, wings, and tail. The wings and back have white spots and streaks, the flanks are orange, the belly and breast are pure white, and the lower border of the throat is blackish. The deep red iris often is conspicuous. The broad white corners of the long tail are visible in flight. The plumage of adult females is similar to that of males but typically paler. Adult females have a brownish head. Juveniles have a mottled brownish back and wings, a brown head, and a buffy breast with blurry brownish streaks. The plumage of juveniles is more similar to that of other Emberizids than to that of adult Spotted Towhees.
- Spotted Towhees can be distinguished easily from other Emberizids in the Great Basin. Eastern Towhees are quite similar, but the two species do not co-occur. Adult male Black-headed Grosbeaks are somewhat similar, but have more-extensive bright orange plumage and different habitat and feeding behavior.
- The song of Spotted Towhees is simple and harsh. Most songs include an introductory note, which may be repeated from one to six times. All songs include a harsh buzz or trill. The song is simpler in structure and less variable than the songs of most other Emberizids.
- The call note is a harsh, rising *zhreee*, similar to that of Green-tailed Towhees but hoarser and less nasal.

Response to human activity or natural disturbances

- The response of Spotted Towhees to human activities depends on how land use affects tree and shrub cover in a given area (Greenlaw 1996).

Data gaps

- Few studies have examined the basic life history of Spotted Towhees.

Chipping Sparrow (*Spizella passerina*)

Natural history

David Pavlik

- One of the most abundant sparrows in North America, Chipping Sparrows often are seen foraging on lawns and other open, park-like areas.
- Chipping Sparrows breed in nearly all of the United States and Canada except for portions of the lower Great Plains, Florida, and the arid Southwest. Breeding populations also occur throughout central Mexico and parts of Central America. The species winters across the southern United States and in most of Mexico.
- Migration patterns vary among populations. Migratory northern subspecies join non-migratory subspecies in the southern United States and Mexico during winter. Chipping Sparrows typically arrive in the Great Basin by April and depart in late July or early August (Middleton 1998).
- Chipping Sparrows feed primarily on seeds, although invertebrates are consumed during summer and make up the majority of nestlings' diet (Middleton 1998). Chipping Sparrows forage primarily on the ground or in low vegetation.

Nesting

- Chipping Sparrows are territorial during the breeding season. Males defend their territories primarily through song. The species is monogamous, and females participate in defending their territory from conspecifics. Territory sizes range from 0.2 to 1.0 hectares (Middleton 1998). The species is non-territorial during winter, when it forms large flocks.
- Chipping Sparrows have a relatively long breeding season, and generally produce two or three broods in a given year. Egg-laying dates range from April to July, with each brood including four (sometimes two to seven) pale blue eggs (Ehrlich et al. 1988, Middleton 1998).
- Chipping Sparrows nest in a variety of vegetation types, most commonly one to three meters above the ground in conifers (Middleton 1998). The nest is a thin, loosely woven cup, mostly constructed from grass fiber, that is flimsy enough to let light through (Peck and James 1987).

- Broods of Chipping Sparrows often are parasitized by Brown-headed Cowbirds (Middleton 1998).

Status and trend

- Chipping Sparrows are common and abundant over their large range. Trends in abundance vary among regions. Data from the Breeding Bird Survey suggest that the abundance of the species declined by an average of 1.3% per year in the Great Basin and 2.9% per year in the Sierra Nevada from 1966 to 2012 (Sauer et al. 2014).
- Chipping Sparrow abundance likely increased as human settlement and agriculture expanded in North America (Rising 1996). Declining abundance in the late 20th century has been linked to reforestation, the intensification of agriculture, and the expansion of House Finches and Brown-headed Cowbirds (Middleton 1998).

Habitat

- Chipping Sparrows are common in many types of woodlands but usually breed in open, coniferous woodlands near shrubby or grassy open areas. The species readily adapts to areas with human activity. We detected Chipping Sparrows in nearly all land-cover types in the eastern Sierra Nevada and Wassuk Range.

Identification

- A small, long-tailed, and small-billed sparrow. Males and females have similar appearance. The back and wings are streaked with brown and black with two faint, whitish wingbars. The breast and belly are an unmarked, pale gray. The head is gray with a black eye line extending from the lores to behind the eye, and has a rufous cap. The supercilium is whitish and contrasts with the rest of the face. Immature birds and non-breeding adults are similar but have a brownish cap tinged with dark flecks, and their facial markings are less bright.
- In the western Great Basin, most likely to be confused with Brewer's Sparrows. Brewer's Sparrows tend to occur in areas with fewer trees, and lack the dark lores and reddish cap of Chipping Sparrows.
- Chipping Sparrows' song is a long, simple, mechanical trill. The song is difficult to distinguish from that of Dark-eyed Juncos, but the song of Chipping Sparrows is harsher and less musical. The song of Brewer's Sparrow is similar in quality but has multiple distinct parts.
- The call note is a high *tsip*, nearly identical to that of Brewer's Sparrows.

Response to human activity or natural disturbances

- Chipping Sparrows have benefitted from human activity across their range, although the human-facilitated expansion of other bird species may increase resource competition (Middleton 1998).

Data gaps

- The phylogeny of Chipping Sparrow subspecies is not well understood. Nearly all studies of the breeding biology of Chipping Sparrows have been conducted in the eastern portion of the species' range (Middleton 1998).

Brewer's Sparrow (*Spizella breweri*)

Natural history

David Pavlik

- Brewer's Sparrows often are detected on the basis of their loud, buzzy trills.
- Brewer's Sparrows breed across the entire Great Basin. Isolated populations occur in Alberta and British Columbia, Canada. They winter across the southwestern United States and portions of northern Mexico, especially the Sonoran and Chihuahuan Deserts (Rotenberry et al 1999).
- Brewer's Sparrows are common and widespread in the eastern Sierra Nevada and Wassuk Range, especially in shrublands and mixed woodlands.
- Most birds arrive on their Great Basin breeding grounds in April and depart for their wintering grounds from mid August through October. Weather can greatly affect migration timing and alter arrivals on the breeding or wintering grounds by several weeks (Best & Petersen 1985).
- During the breeding season, Brewer's Sparrows primarily feed on small insects gleaned from vegetation and seeds picked from the ground. The winter diet is poorly studied, but likely shifts mainly to seeds (Rotenberry et al 1999).

Nesting

- Brewer's Sparrows are believed to be primarily monogamous, although polygyny has been documented in congeners (Rotenberry et al 1999).
- Brewer's Sparrows are highly territorial. The sizes of breeding territories range from at least 0.1 to 2.36 hectares (Rotenberry et al 1999).
- Brewer's Sparrows lay two or three (sometimes four) blue-green eggs per clutch (Ehrlich et al. 1988). Many pairs produce double broods and replacement broods, with the second clutch laid about 10 days after the first brood has fledged (Rotenberry et al 1999).
- Brewer's Sparrows use dry grasses and forbs to build a cup-shaped nest near the ground in large, live shrubs, especially big sagebrush. Nest sites often are near the tallest, densest shrubs in a given area (Best and Petersen 1985).
- Nests from mid April to early August, with the majority of breeding activity between mid May and July (Paine 1968).

- Brewer's Sparrows are documented hosts of Brown-headed Cowbirds, although the incidence of parasitism is low in many areas given the low abundance of Brown-headed Cowbirds (Rotenberry et al 1999).

Status and trend

- Brewer's Sparrows are common and abundant, but Breeding Bird Survey data suggest that abundance decreased rangewide from 1966 to 2012 (~1% per year). Abundance was estimated to be decreasing by 2.6% per year in the Sierra Nevada and 1% in the Great Basin over the same time period (Sauer et al. 2014).
- Abundances of local populations vary dramatically among years. This variation is poorly understood but may be more strongly correlated with regional than with local changes in land cover and land use, although abundance tends to increase as shrub cover increases (Knick & Rotenberry 1995).

Habitat

- Breeds primarily in shrublands at diverse elevations. Also occurs in forest openings, mixed woodlands, and relatively open areas where shrubs are present. Migratory, wintering, and breeding habitats are similar (Rotenberry et al 1999).
- Brewer's Sparrow was among the species we detected regularly in the eastern Sierra Nevada and Wassuk Range.

Identification

- A small, long-tailed, and small-billed sparrow. The subtle facial pattern includes a pale gray supercilium, brownish cheeks framed in darker brown, pale lores, and a bold white eye-ring. The breast and belly are unmarked light gray and the back has the streaking typical of Emberizids.
- In the Sierra Nevada and Wassuk Ranges, most likely to be confused with Chipping Sparrows. Best distinguished by the lack of dark lores or a reddish cap in the breeding season, and by their distinctive song.
- Brewer's Sparrow song is a loud, distinctive series of varied, descending buzzy trills (1-10 separate trills, each held at a relatively constant pitch for 1-3 seconds). Males typically sing from exposed perches at the top of shrubs for extended periods of time throughout the day, with singing most frequent in the morning and evening.
- The soft, weak chip notes are difficult to detect at a distance. Females often remain hidden in shrubs and can be detected only by these notes.

Response to human activity or natural disturbances

- Brewer's Sparrows are not especially sensitive to human disturbance while nesting, and tolerate daily visits by humans to nest sites.
- Widespread population declines are attributed to extensive fragmentation of habitat by human development, the spread of cheatgrass, and increased fire frequency (Rotenberry et al 1999).

Data gaps

- Largely because the species is secretive during the migration and wintering seasons, little is known about Brewer's Sparrows' winter habitats and survival.
- Post-fledgling survival has not been studied (Rotenberry et al 1999).

Vesper Sparrow (*Pooecetes gramineus*)

Natural history

Simon Wray

- Vesper Sparrows breed across the interior western United States and Canada from northeast British Columbia and northern Alberta south through the Great Basin and east through the Rocky Mountains, upper Great Plains, midwestern United States, Great Lakes, and New England. The species winters across the southern United States from California to South Carolina and throughout Mexico.
- Vesper Sparrows typically arrive in the Great Basin in April and depart for autumn migration in late September or early October.
- During the breeding season, Vesper Sparrows feed on arthropods and plant matter. During winter, they feed on seeds (Jones and Cornely 2002).

Nesting

- During the breeding season, Vesper Sparrows defend territories of 0.3 to over 8 hectares. They usually are monogamous, although polygyny has been recorded (Jones and Cornely 2002). During the winter, most Vesper Sparrows are solitary. Some individuals join loose flocks of other species, especially Savannah Sparrows.
- Vesper Sparrows begin laying eggs in April or May and may continue as late as August. The species has one to three broods per season, although the proportion of pairs in the Great Basin that have multiple broods is unknown (Jones and Cornely 2002). Each clutch contains three or four (sometimes five) whitish eggs with colored spots (Ehrlich et al. 1988, Baicich and Harrison 1997).
- Vesper Sparrows nest on the ground at the base of vegetation, especially bunchgrasses, forbs, or agricultural crops that provide cover. The nest is a woven cup of grass that is placed in a shallow depression (Jones and Cornely 2002).
- Nests regularly are parasitized by Brown-headed Cowbirds. The proportion that are parasitized in the western Great Basin is not known (Friedmann 1963).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Vesper Sparrows declined rangewide and in the Great Basin by <1% per year from 1966 to 2012. Declines likely reflect loss of grasslands (Sauer et al. 2014).
- Vesper Sparrows were common in most land-cover types in the eastern Sierra Nevada and less common in the Wassuk Range.

Habitat

- Vesper Sparrows breed in areas with patchy or low herbaceous cover, some bare ground, and minimal to moderate shrub cover. In parts of their range, maintenance of their habitat may depend on fire, agriculture, and livestock grazing.
- In the Great Basin, Vesper Sparrows usually breed in shrubsteppe at relatively high elevations (Ryser 1985). They also are common after fire at lower elevations.

Identification

- The crown, nape, and back are brownish-gray with dense, blackish-brown streaks. The wings are blackish-gray with pale tips on the coverts and edges of the flight feathers. Worn adults often have reddish lesser upperwing coverts. The belly and breast are whitish with crisp brown or blackish-brown streaks. The tail is blackish-gray with outer white feathers that are conspicuous in flight. The face is brownish-gray with a low contrast, cream-colored supercilium and bold white eye ring. The auriculars are framed with a dark border and surrounded by a whitish J shape formed by the submoustachial stripe and the area below and behind the auriculars.
- Four other Emberizids in the western Great Basin have breast streaks: Fox, Lincoln's, Savannah, and Song Sparrows. Fox Sparrows are larger, darker, and have different habitat. Lincoln's Sparrows are darker, have a distinctive buffy breast band, and have different habitat. Song Sparrows lack an eye ring and occur in wetter areas. Savannah Sparrows are smaller, have a shorter tail and an eye ring that blends with the supercilium, and often have yellow on their supralores. In flight, none of these other species have visible white outer tail feathers.
- The song is similar to that of other Emberizids. It begins with two or three distinctive, down-slurred *chew* notes, followed by four to eight buzzes, trills, or repeated notes. The songs can be similar to those of Green-tailed Towhees and Song Sparrows, but the opening notes are consistent and distinctive.
- The most common calls are a sharp *chip*, harder than those of Savannah Sparrows, and a sharp, rising *seep* in flight.

Response to human activity or natural disturbances

- The rangewide decline of Vesper Sparrows has been attributed to loss of their habitat to human development, intensification of agriculture and reforestation in the eastern United States and Canada, and intensive livestock grazing in the western United States and Canada (Jones and Cornely 2002).

Data gaps

- Causes of declines in abundance across the range of Vesper Sparrows are not well understood, and may vary among regions.
- Relatively little is known about the species' physiology and migration patterns, including its fidelity to breeding and wintering areas (Jones and Cornely 2002).

Black-throated Sparrow (*Amphispiza bilineata*)

Natural history

David Pavlik

- Black-throated Sparrows are the iconic sparrows of the Great Basin, Mojave, Sonoran, and Chihuahuan Deserts.
- Department of Defense installations in the eastern Sierra Nevada and Wassuk Range are on the western edge of the species' breeding distribution, which extends from eastern Washington and Oregon through the Great Basin, Mojave, and Colorado Plateau. Black-throated Sparrows are resident in the Sonoran and Chihuahuan Deserts, Baja California, and Sonora, Mexico.
- Black-throated Sparrows are short-distance migrants and form gregarious flocks in winter.
- Black-throated Sparrows are omnivorous during the breeding season and granivorous during winter (Johnson et al. 2002).

Nesting

- Black-throated Sparrows are monogamous and territorial, although territories may be irregularly spaced. Territory fidelity among years has been documented but is uncommon (Johnson et al. 2002).
- Black-throated Sparrows lay three to four white or bluish-white eggs per clutch (Rising 1996). Double broods are common given adequate precipitation and associated abundance of food. The onset of the first brood often coincides with the beginning of spring or summer rains, the timing of which varies across the species' range (Johnson et al. 2002).
- The species builds an open-cup nest in a variety of shrubs or small woodland trees.
- Brown-headed Cowbirds parasitize Black-throated Sparrow nests near the urban and agricultural centers in which the cowbirds can find food (Johnson et al. 2002).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Black-throated Sparrows decreased rangewide by an average of 1.6% per year from 1966 to 2012 (Sauer et al. 2014). Causes of decreases in abundance may include fire-driven conversion of native perennial vegetation to non-native annuals, reduction in productivity during recent droughts, and Brown-headed Cowbird parasitism (Johnson et al. 2002). During the same period of time, the species' abundance increased in the Great Basin by an average of 1% per year (Sauer et al. 2014).
- Black-throated Sparrows were uncommon in the Wassuk Range. We did not detect them in the eastern Sierra Nevada.
- Drought to the south and east may drive irruptions of Black-throated Sparrows to the Wassuk Range. Our detections in late June and early July may represent dispersing birds or individuals that were unable to breed at lower elevations.

Habitat

- Black-throated Sparrows inhabit arid shrublands. The species typically occurs in evenly spaced shrubs at heights between one and three meters (Johnson et al. 2002).

Identification

- A small, sleek, and attractive sparrow with a bold black throat and mask, bright white supercilium and malar stripes, and a partial white eye ring. The back and wings are dark brown, the undersides are pale, and the tail is black, contrasting with the rump and back in flight. Males and females have similar appearance. The facial pattern of juveniles is similar to that of adults, but juveniles have a white throat instead of a black throat and have faint streaking on the back.
- In the western Great Basin, juveniles may be confused with Sagebrush Sparrows, which have similar habitat. Sagebrush Sparrows have bluish hoods, streaked backs, white throats, and less prominent supercilia.
- The song is typical of sparrows: introductory notes followed by repetitive trills and buzzes. The song of Black-throated Sparrows varies in composition but is bell-like, and often shorter and more mechanical in quality than the songs of other sparrows. In the western Great Basin, the song is most likely to be confused with those of Spotted and Green-tailed Towhees, with which Black-throated Sparrows may co-occur. Spotted Towhees have a simple but noticeably harsher song, whereas the song of Green-tailed Towhees usually is longer and more complex than those of Black-throated Sparrows.
- Most calls are high, ringing and bell-like. Common call types are a series of tinkling, repeated notes or a harder, ringing *tip!*

Response to human activity or natural disturbances

- Black-throated Sparrows do not persist in urban areas. In recent decades, a relatively high proportion of their habitat has been converted by fire to non-native invasive grasslands (Johnson et al. 2012).

Data gaps

- Few studies have examined reproduction and population biology, movements, and effects of drought on productivity (Johnson et al. 2012).

Sagebrush Sparrow (*Artemisiospiza nevadensis*)

Natural history

Frank Fogarty

- Until recently, Sagebrush Sparrow and Bell's Sparrow were classified as subspecies of Sage Sparrow. Although the distributions of the two species are not fully understood, Bell's Sparrows are not believed to breed in the Great Basin.
- Sagebrush Sparrows breed from central Washington south through eastern Oregon, throughout the Great Basin, and east through most of Wyoming and northern New Mexico. The species winters from the central Great Basin south through northern Baja California and western Texas.
- Sagebrush Sparrows arrive on their breeding grounds in the Great Basin in mid March and depart for autumn migration in October (Gaines 1988, Martin and Carlson 1998).
- Sagebrush Sparrows are omnivorous and forage primarily on the ground. During the breeding season, the majority of their diet is arthropods. During migration and winter, they mainly eat grass and forb seeds (Martin and Carlson 1998).

Nesting

- Sagebrush Sparrows are territorial and monogamous. The size of a given territory depends in part on the local cover of grass and sagebrush (Martin and Carlson 1998). During winter, the species is non-territorial and sometimes forms loose flocks.
- Sagebrush Sparrows nest in large shrubs, especially big sagebrush and sometimes rabbitbrush or bitterbrush, and occasionally in bunchgrasses or on the ground beneath shrubs (Wiens and Rotenberry 1981).
- The nest is an open cup made from small twigs and grass stems and lined with finer plant material, animal hair, and feathers (Martin and Carlson 1998).
- Sagebrush Sparrows are believed to have one brood per year. They begin laying eggs in April (Martin and Carlson 1998). Each clutch has one to four eggs that are pale blue with dark spots (Rotenberry and Wiens 1989).
- Parasitism of Sagebrush Sparrow nests by Brown-headed Cowbirds has been documented, but usually is associated with human disturbance in the immediate area. Brown-headed Cowbirds rarely occur in the extensive sagebrush in which Sagebrush Sparrows breed (Gaines 1988, Martin and Carlson 1998).

Status and trend

- The Breeding Bird Survey does not yet differentiate Sagebrush Sparrows and Bell's Sparrows, so rangewide estimates of abundance are not readily available. In the Great Basin and in states in which Bell's Sparrows do not breed, trends in the abundance of Sagebrush Sparrows are inconsistent (Sauer et al. 2014).

Habitat

- Sagebrush Sparrows occur in open, treeless areas dominated by big sagebrush that are at least one to two meters tall. Sagebrush Sparrows occasionally occur in areas with scattered juniper trees. The species usually occurs at elevations below 1700 m (Wiens and Rotenberry 1981, Martin and Carlson 1998).
- We rarely detected Sagebrush Sparrows in the eastern Sierra Nevada and Wassuk Range given that their habitat is uncommon in canyons. However, they were common in the nearby valleys.

Identification

- Sagebrush Sparrows are medium-sized Emberizids. The back and wings are brownish-gray with faint whitish wingbars. The head is slaty-gray with a white eye ring, loral spot, and submoustachial strip and blackish malar stripes. The breast and belly are whitish with faint, grayish streaks along the flanks. The tail is black with white edges and is often conspicuous in flight. Juveniles are similar to adults but have streaks below.
- In the western Great Basin, Sagebrush Sparrows are most likely to be confused with Black-throated Sparrows and Brewer's Sparrows, which have similar habitat. Sagebrush Sparrows do not have the strong black throat and white supercilium of adult Black-throated Sparrows. Juvenile Black-throated Sparrows resemble adult Sagebrush Sparrows but have a prominent white supercilium. Brewer's Sparrows have a more lightly marked head that is not slate colored.
- Male Sagebrush Sparrows often sing from prominent perches. When not marking territory, the species often stays concealed in brush. Birds sometimes are seen running across small patches of bare ground.
- Sagebrush Sparrow song is a series of short, burry musical buzzes loosely strung together. The song does not have the complex structure characteristic of the songs of many other Emberizids. The most common call note is a sharp, metallic *tink*.

Response to human activity or natural disturbances

- Increasingly frequent fires in the Great Basin threaten the stands of tall sagebrush that Sagebrush Sparrows occupy, as do other human disturbances. The species does not occur in areas with abundant cheatgrass (Martin and Carlson 1998).

Data gaps

- Much of the literature on Sagebrush Sparrows is anecdotal. Little is known about their winter ecology and the extent to which the ranges of Sagebrush Sparrows and Bell's Sparrows overlap (Martin and Carlson 1998).

Savannah Sparrow (*Passerculus sandwichensis*)

Natural history

Bonnie Ott

- Savannah Sparrows breed in Canada except for the Arctic Archipelago, Alaska, the western United States except for the arid Southwest, the upper Great Plains, Great Lakes, New England, and Appalachian Mountains. They winter from southern California east to South Carolina, north to New Jersey, and throughout Mexico, Belize, and Guatemala (Wheelright and Rising 2008).
- Nearly all individuals in Canada and the United States appear to be migratory. The species typically arrives on its breeding grounds in the Great Basin in March and departs for autumn migration in October (Wheelright and Rising 2008).
- Savannah Sparrows consume arthropods, seeds, fruit, and other plant matter. During winter, they mainly eat seeds and fruit (Wheelright and Rising 2008).

Nesting

- Males defend territories with display flights and songs from perches around the perimeter. Territories usually are smaller than one hectare. Territories include foraging areas, but both sexes frequently forage outside of their resident territory (Wheelright and Rising 2008). The species forms small flocks and often mixes with other species during the winter.
- Polygyny is common in Savannah Sparrows, with over 50% of males in some areas caring for multiple nests (Wheelright and Rising 2008). Polygyny is rare in the species' more northern populations (Weatherhead 1979).
- Savannah Sparrows begin laying eggs in late April or May. Some individuals in the eastern United States have two broods (Wheelright and Rising 2008).
- Each clutch consists of three to five (rarely two or six) eggs of variable color and with brown streaks or spots (Ehrlich et al. 1988, Wheelright and Rising 2008).
- Nests are built on the ground near the base of thick clumps of grass. Many are constructed in small depressions (Wheelright and Rising 2008). The nest is a small, well-concealed cup with coarse-grass exterior and finer-grass lining (Potter 1974).
- Brood parasitism by Brown-headed Cowbirds is rare (Friedmann et al. 1977, Wheelright and Rising 2008).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Savannah Sparrows decreased throughout nearly all of their range from 1966 to 2012. The Great Basin was one of the few areas in which abundance was fairly stable (Sauer et al. 2014).

Habitat

- Savannah Sparrows occur in open areas across their range. In the Great Basin, they are uncommon and limited to agricultural areas and wet meadows.
- We frequently detected Savannah Sparrows in wet meadows in the Wassuk Range and eastern Sierra Nevada, but not in other land-cover types.

Identification

- The color of the body plumage varies among populations. The back and nape are grayish or brownish with pale streaks. The wings are brown or red-brown with minimal wingbars. The head has a pale median crown stripe and a thin whitish eye ring that blends with the whitish supercilium above. The anterior portion of the supercilium sometimes is washed in yellow. The malar stripe is dark and thin. The belly and breast are white with crisp, thin brown streaks. Juveniles are similar to adults but typically more buffy below and redder above.
- Compared to other Emberizids in the Great Basin, Savannah Sparrows are smaller-billed and shorter-tailed. Fox, Lincoln's, Song, and Vesper Sparrows also have streaked breasts. Fox Sparrows are much larger, occur in denser riparian areas dominated by shrubs, and have darker plumage with a plainer, grayer head. Lincoln's Sparrows are darker and have a distinctive, buffy breast band. Song Sparrows are larger, longer-tailed, and larger-billed and have heavier, blurrier streaking on the breast. Vesper Sparrows are most similar, but their habitat in the Great Basin is drier. Vesper Sparrows have a complete white eye-ring that contrasts with its off-white supercilium, often has reddish-brown on its wing coverts, and has white outer tail feathers that are distinctive in flight.
- The buzzy, insect-like quality of Savannah Sparrows' song distinguishes it from those of other Emberizids in the western Great Basin. The song has three or four distinct parts. It begins with three to eight high, repeated notes that often are followed by one or more whistles; continues with a long, buzzy phrase that is typically repeated; and concludes with a high, descending trill.
- The most common call, a thin *tsip,* is higher than that of most other Emberizids.

Response to human activity or natural disturbances

- The distribution and abundance of Savannah Sparrows likely increased rangewide in response to clearing of forests for agriculture in the eastern United States and crop irrigation in the western United States. Regional declines may be related to reforestation and agricultural intensification (Wheelright and Rising 2008).

Data gaps

- Savannah Sparrows are among the most extensively studied Emberizids in North America. Further genetic studies could strengthen understanding of its subspecies and relations among taxa in the Emberizidae (Wheelright and Rising 2008).

Fox Sparrow (*Passerella iliaca*)

Natural history

Eric Heisey

- Four distinct groups of subspecies of Fox Sparrow are recognized. The breeding ranges of the groups have minimal overlap, and the groups can be distinguished in the field. Two of the groups, Large-billed and Slate-colored, occur in the western Great Basin.
- Fox Sparrows breed in most of Canada, Alaska, the Rocky Mountains, the Sierra Nevada, and the mountains of the Great Basin. The subspecies that occur in the western Great Basin winter in interior California south to northern Mexico (Weckstein et al. 2002).
- Most Large-billed and Slate-colored Fox Sparrows are migratory, but some are short-distance elevational migrants. The species typically arrives on its breeding grounds in mid March and departs in August (Weckstein et al. 2002).
- During the breeding season, Fox Sparrows consume mostly arthropods. The species is more omnivorous in winter (Weckstein et al. 2002).

Nesting

- Little is known about the mating system and breeding biology of Fox Sparrows.
- Double broods have not been documented among Fox Sparrows. Few data exist on egg-laying dates and clutch size, but the species apparently begins laying its three to five eggs in May. Eggs are slightly glossy, pale bluish green, and heavily marked with dark spots (Weckstein et al. 2002).
- Fox Sparrows nest on the ground or in low bushes in areas of dense shrubs. The nest is cup-shaped and is constructed from twigs, bark, and moss with a lining of softer vegetation (Weckstein et al. 2002).
- Fox Sparrows rarely are reported as hosts of Brown-headed Cowbird eggs, even in areas where densities of Brown-headed Cowbirds are high (Friedmann 1963). However, few data have been collected on parasitism.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Fox Sparrows is relatively stable rangewide, although the species breeds in remote areas that have few Breeding Bird Survey routes (Sauer et al. 2014).
- The species was abundant in the eastern Sierra Nevada and Wassuk Range. It occurs in all land-cover types except extensive shrubsteppe.

Habitat

- In most of the Great Basin, Fox Sparrows occur in dense riparian thickets, especially willow and birch. In the Sierra Nevada, the species often nests in dense chaparral. Wintering birds in California usually occur in tall chaparral.

Identification

- Fox Sparrows are the largest Emberizids in the Great Basin. Large-billed and Slate-colored forms have similar plumage and are best distinguished by bill size. In the western Great Basin, some individuals are not identifiable to subspecies group and may be intergrades. The wings and tail are dull red, the back and head are grayish, and the white breast and belly are covered in heavy, blackish spots. Spots usually are heavier and more extensive on Slate-colored Fox Sparrows than on Large-billed Fox Sparrows. Most Large-billed Fox Sparrows have a more massive bill than other subspecies groups. The appearance of males and females is similar.
- Fox Sparrows can be confused with Song Sparrows and Lincoln's Sparrows, both of which have similar habitat. Song Sparrows and Lincoln's Sparrows are both smaller, smaller-billed, and have stronger facial patterns than Fox Sparrows.
- The song of Fox Sparrows is long, varied, and musical, as is typical of many sparrow songs. The song can be difficult to separate from those of Song Sparrows and Green-tailed Towhees. The song of Song Sparrows includes more repetitions of the initial notes, whereas the song of Green-tailed Towhees includes harsher, buzzier trills. Listening to multiple songs sometimes is necessary to distinguish these species. Fox Sparrows' call note is a sharp, high *seep*.

Response to human activity or natural disturbances

- Little information is available. Most Fox Sparrows do not nest in areas with high levels of human activity.

Data gaps

- Little is known about Fox Sparrows. Major data gaps include details of nesting biology and the genetic relations among subspecies (Weckstein et al. 2002).

Song Sparrow (*Melospiza melodia*)

Natural history

Bonnie Ott

- Song Sparrows breed from British Columbia south to northern Baja California and east through Arizona, Colorado, Wyoming, and Montana. They also breed in eastern North America across the Prairie Provinces to southern Quebec and the Maritime Provinces, and throughout the Midwest, New England, the mid Atlantic, and the Appalachian Mountains.
- Song Sparrows winter in southern British Columbia and the conterminous United States except the upper Great Plains and northern New England.
- Different populations of Song Sparrows are residents, elevational migrants, and short-distance migrants. The species is present in the Great Basin year-round, although it is unclear what percentage of individuals are migrants. Many Song Sparrows that breed in the Great Basin winter in Arizona (Arcese et al. 2002).
- Song Sparrows forage on the ground, in shrubs, and sometimes in shallow water. They consume arthropods, seeds, fruit, and other plant matter (Judd 1901).

Nesting

- Both male and females are territorial and chase more than 20 other species from their territories (Nice 1937). Resident birds usually are territorial during all seasons (Nice 1937).
- Song Sparrows primarily are monogamous, although a low proportion of birds in most populations are polygamous (Arcese et al. 2002).
- Song Sparrows have as many as four broods per season. Females may lay a second clutch before the first brood has fledged (Arcese et al. 2002). Each clutch contains three or four (rarely five) variably colored eggs (Nice 1937, Ehrlich et al. 1988).
- Song Sparrows nest in a variety of substrates, including man-made structures. The nest site generally is well concealed.
- The nest is a loosely constructed open cup of grasses and forb stems. Subsequent nests during the same season may be poorly constructed (Nice 1937).
- Parasitism by Brown-headed Cowbirds is common, although the extent of parasitism varies among populations (Friedmann 1963, Arcese et al. 2002).

Status and trend

- Rangewide abundance appeared to decrease by <1% annually from 1966 to 2012. Abundance in the Great Basin appears to be relatively stable (Sauer et al. 2014).
- We frequently detected Song Sparrows in the eastern Sierra Nevada. They were less common in the Wassuk Range.

Habitat

- Song Sparrows occur in diverse land-cover types across their range. In arid western North America, the species usually breeds in areas near water.
- Song Sparrows are common breeders in wet meadows and other riparian areas in the western Great Basin.

Identification

- The back and wings are reddish brown with pale and dark streaks. The head is grayish with a broad, reddish brown cap and postocular line. The face may have other markings but the auriculars have some dark borders, the moustachial stripe is dark, the submoustachial stripe is whitish to buffy, and the malar is thick and dark, ranging in color from red-brown to black. The breast and belly are whitish with grayish or buffy wash and heavy, dark brown streaks that form a messy spot in the center of the breast. Juveniles have more streaks on buffier breasts.
- Of the four other Emberizids with breast streaks that occur in the Great Basin, Fox Sparrows are larger and have a darker, less marked head. Lincoln's Sparrows are the most similar, but usually have smaller bills and always have a complete, buffy breast band that contrasts strongly with the whitish lower belly and fully contains the crisp, black breast streaks. Song Sparrows may have some buff color on the breast, but the buff is less cleanly demarcated and its broad, blurry brown streaks usually extend onto the whiter belly and flanks. Savannah Sparrows have smaller bodies and bills, shorter tails, paler plumage, and finer breast streaks. Vesper Sparrows, which usually do not occur in riparian areas, have colder, grayish plumage with a distinct white eye ring and white outer tail feathers.
- The song structure is similar to that of Fox and Vesper Sparrows and Green-tailed Towhees. The introductory notes, which are whistled and typically repeated two to seven times, are followed by a series of buzzes, trills, and whistles. The song is neither as sweet as the song of Fox Sparrows nor as harsh as the song of Green-tailed Towhees. The quality and repetition of the introductory notes are the best way of distinguishing the song from that of Vesper Sparrows.
- The most common call, a distinctive *jeemp*, is squeakier and more complex than the calls of other Emberizids. The species also makes a sharp *tik* when agitated.

Response to human activity or natural disturbances

- Song Sparrows respond well to human disturbance. Several subspecies with small ranges may be threatened by habitat loss (Arcese et al. 2002).

Data gaps

- Song Sparrows have been studied extensively, but the life history and relations among distinct populations in diverse habitat are not fully understood.

Lincoln's Sparrow (*Melospiza lincolnii*)

Natural history

David Pavlik

- Lincoln's Sparrows rarely leave the cover of dense shrubs, although males sometimes sing from perches.
- Lincoln's Sparrows breed throughout most of Canada and Alaska, in the Rocky Mountains, and in the Cascade Mountains south through the central Sierra Nevada. The species winters across the southern United States from California to Texas and throughout Mexico.
- The species is a common breeder in the Sierra Nevada but is scarce further east in the Great Basin.
- Lincoln's Sparrows arrive on their breeding grounds in May and depart for autumn migration in September or early October (Ammon 1995).
- Lincoln's Sparrows are omnivorous, feeding on terrestrial arthropods and seeds during summer and seeds during winter. They primarily forage on the ground, methodically searching litter for slow-moving arthropods (Ammon 1995).

Nesting

- During the breeding season, the species defends territories of 35-100 m diameter, primarily by singing from elevated perches (Ammon 1995). Lincoln's Sparrows rarely form large flocks in winter but may occur in small, mixed-species groups.
- Lincoln's Sparrows are monogamous, and the sex ratio is apparently skewed towards males (61-75% of captured birds) (Ammon 1995).
- Lincoln's Sparrows nest in specific microhabitats. Their nests are built on the ground within a large shrub, most often a willow or birch. Most nests are on slightly elevated ground, at least 30 cm from the edge of the shrub, and accessed by a tunnel through the vegetation (Ammon 1995).
- The nest is made of woven, coarse plant stems and is lined almost exclusively with fine sedge stems (Ammon 1995).
- Lincoln's Sparrows have one brood per season. In most cases, they lay four to five variably colored eggs in June (Ehrlich et al. 1988, Ammon 1995).
- No instances of Lincoln's Sparrows successfully rearing young Brown-headed Cowbirds have been documented (Ammon 1995).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Lincoln's Sparrows is stable range-wide and in the Great Basin (Sauer et al. 2014).
- Local abundance has been reported as variable among years (Ammon 1995).
- The species was abundant in the eastern Sierra Nevada, but we did not detect it in the Wassuk Range.

Habitat

- During summer, Lincoln's Sparrows occur in bogs with dense shrub cover, and are most abundant in areas dominated by willows. Winter and migration habitat is less specialized, but usually has dense shrub cover (Ammon 1995).

Identification

- Lincoln's Sparrows are medium-sized, slender-billed sparrows. The back is brownish-gray with crisp black streaks. The wings are dark with pale brown edges. The face is gray with a dark postocular stripe, rusty crown, and buffy malar, and the throat has fine white streaks. The belly is white and contrasts sharply with the buffy flanks and upper breast. Fine, black streaks on the flanks and upper breast typically do not extend onto the white belly. Males and females have similar plumage. Juveniles are quite similar to other juvenile *Melospiza* and may not be distinguishable.
- Lincoln's Sparrows may be confused with Fox, Savannah, Song, and Vesper Sparrows. Fox Sparrows are larger and bulkier with a relatively plain, gray head. Savannah and Vesper Sparrows both occur in grassy areas, often away from riparian areas, and have paler plumage. Some strongly marked Savannah Sparrows are similar in color to Lincoln's Sparrows, but often have prominent yellow patches above the lores and lack the strong contrast between their buffy flanks and white belly. Song and Lincoln's Sparrows have similar habitat and are the most difficult species to distinguish visually. Song Sparrows have a stouter bill and longer tail, and their breast streaking is heavier, blurrier, and dark brownish rather than black.
- Lincoln's Sparrows' song is distinctive. It is a jumbled warble, wren-like and less structured than that of most Emberizids, with some flute-like notes that resemble a thrush song. The call note is a soft *chip*.

Response to human activity or natural disturbances

- Substantial declines in abundance were documented in clearcuts where glyphosate herbicide was applied (Santillo et al. 1989) and in areas in the Great Basin that were grazed by livestock (Schulz and Leininger 1991). Nest desertion rates are also relatively high in areas used for human recreation (Ammon 1995).

Data gaps

- Few studies have been conducted on Lincoln's Sparrows' biology and ecology. There are anecdotal reports of antagonistic interactions with congeners, but it is unclear whether these interactions affect the distribution of Lincoln's Sparrows or the abundance of breeding birds in areas in which the species co-occur.

White-crowned Sparrow (*Zonotrichia leucophrys*)

Natural history

David Pavlik

- White-crowned Sparrows breed in Alaska, Yukon Territory, Northwest Territory, Nunavut except for the Arctic archipelago, British Columbia, northern Quebec, the Rocky Mountains, the Pacific coast south to Santa Barbara, and locally in the Great Lakes and Great Basin. They winter in the conterminous United States except in the upper Great Plains, Great Lakes, and New England, and in Mexico south to Tamaulipas (Chilton et al. 1995).
- Nearly all populations, including those that breed in the Great Basin, are believed to be fully migratory. Although the species occurs year-round in the western Great Basin, birds that breed in this area winter in the southwestern United States and Mexico and are replaced by migrants from northern areas in winter (Cortopassi and Mewaldt 1965). The species usually arrives on its Great Basin breeding grounds in May and departs in September (Morton and Pereyra 1994).
- White-crowned Sparrows feed on the ground and in low vegetation. They eat arthopods, seeds, and other plant matter (Chilton et al. 1995).

Nesting

- White-crowned Sparrows defend breeding territories that include nesting and foraging areas. Adults sometimes leave territories to forage. Many males return to the same territory in multiple breeding seasons (King and Mewaldt 1987).
- White-crowned Sparrows primarily are monogamous, with a low incidence of polygyny (Chilton et al. 1995). In winter, the species forms large flocks that have dominance hierarchies (Keys and Rothstein 1991).
- Breeding-habitat requirements include patches of grass, open ground, and shrubs. In the Great Basin, the species usually nests in subalpine meadows with willows and streams (King and Mewaldt 1987). Most nests are placed on the ground near the base of vegetation. When snow or flooding prevents ground nesting, some nests are placed low in trees or shrubs (Chilton et al. 1995).
- The nest is an open cup of twigs, bark, and coarse grass stems that is lined with finer vegetation (Chilton et al. 1995).
- In the Great Basin, egg laying begins in late May or early June, and second broods are rare (King and Mewaldt 1987). Each clutch contains three to five (rarely six or seven) greenish-blue eggs with red spots (Ehrlich et al. 1988, Chilton et al. 1995).
- Parasitism by Brown-headed Cowbirds is rare (<1% of nests in most studies), but can vary among regions. The highest percentage of parasitism (14%) has been recorded in populations in eastern Oregon (King and Mewaldt 1987).

Status and trend

- Breeding Bird Survey data suggest that the rangewide abundance of White-crowned Sparrows declined by an average of <1% per year from 1966 to 2012. Trends varied among regions. Sample sizes in the Sierra Nevada and Great Basin are too low to infer regional trends (Sauer et al. 2014).
- White-crowned Sparrows were common in the eastern Sierra Nevada. We rarely detected the species in the Wassuk Range and further east.

Habitat

- The species' abundance is higher in the relatively wet canyons of the eastern Sierra Nevada than further east. Many of the small, subalpine wet meadows in the Sierra Nevada and Great Basin support a small number of breeding pairs. Further north and west, breeding habitat often is present at lower elevations.

Identification

- White-crowned Sparrows have a distinct head pattern and a peaked crown. The back is light gray with dark brown streaks. The rump, tail, nape, and breast are gray. The wings are dark brown with dark gray edges and two crisp, white bars. The flanks and lower belly are buff-brown. Adults have a gray head with a thick black eye line, a white supercilium, and a black crown with a white central stripe; the stripes of immature birds are brown and buff. Juveniles have heavy streaks on their bodies and the pattern on their heads is faint. All White-crowned Sparrows have pale, pinkish-orange bills that are distinct among Great Basin Emberizids.
- Lark Sparrows also have strong head patterns and unstreaked breasts, but the pattern on their heads extends down the face to the throat and is a different color than that of White-crowned Sparrows. Black-throated Sparrows have a large black throat patch and do not co-occur with White-crowned Sparrows.
- White-throated Sparrows' song is similar to but less harsh than that of other Emberizids, and best identified by its opening notes—pure whistles, *seeee odi di*. Those notes are similar to those of other *Zonotrichia*, none of which occur in the Great Basin. The opening notes are followed by other whistles, buzzes, and trills.
- The common call is a sharp, dry *pink*, similar to the calls of other *Zonotrichia*.

Response to human activity or natural disturbances

- White-crowned Sparrows benefit from land uses that increase the proportion of grasses and open ground (Chilton et al. 1995). In Colorado, however, the species is negatively affected by cattle grazing within its habitat (Knopf et al. 1988)

Data gaps

- Migration and wintering ecology of White-crowned Sparrows is not fully understood (Chilton et al. 1995).

Dark-eyed Junco (*Junco hyemalis*)

Natural history

Frank Fogarty

- Dark-eyed Juncos are familiar backyard birds across most of North America. Until the 1970s, they were considered to be five separate species.
- Dark-eyed Juncos are resident across the montane western United States, northeastern United States, and Appalachian Mountains. A migratory population occurs across most of Canada and Alaska, and winters throughout the United States and northern Mexico.
- At least three subspecies of Dark-eyed Juncos are resident in the western Great Basin. Other subspecies also occur in the region during migration and winter.
- Dark-eyed Juncos feed primarily on the ground, and most of their diet consists of small seeds and other vegetation. The species also consumes small arthropods.

Nesting

- Dark-eyed Juncos are monogamous and males are highly territorial, with territories established as early as January. Territories are small, averaging about 0.3 hectares (Nolan et al. 2002).
- Egg-laying dates for Dark-eyed Juncos are as early as late March in California. Most pairs have two broods per season; individuals at lower latitudes and elevations have as many as four broods. Each clutch consists of three to five pale eggs with reddish-brown speckles (Nolan et al. 2002).
- Dark-eyed Juncos typically nest in small cavities on or near the ground. Nest sites include embankments, the bases of trees and shrubs, fallen logs, and man-made structures, and are occasionally constructed as high as 15 m in trees. Nest design varies, but most nest cavities are lined with soft plant material (Nolan et al. 2002).
- Dark-eyed Junco nests often are parasitized by Brown-headed Cowbirds. In the Sierra Nevada, 25% of nests were reported to contain Brown-headed Cowbird eggs (White 1973).

Status and trend

- Breeding Bird Survey data suggest that across its range, including the Great Basin and Sierra Nevada, abundance of Dark-eyed Juncos decreased by an average of about 1% per year from 1966 to 2012 (Sauer et al. 2014).
- Few data are available on trends in abundance for the 15 different subspecies of Dark-eyed Juncos.
- The species is abundant and widespread in the western Great Basin.

Habitat

- Dark-eyed Juncos breed in diverse land-cover types and elevations. In the western Great Basin, the species usually occurs at intermediate to high elevations near trees.

Identification

- Dark-eyed Juncos are dark, stocky sparrows. Unlike most other Emberizids, they do not have an intricate pattern of streaks. All subspecies have dark tails with bright white outer feathers and pale bills. Two groups of subspecies breed in the western Great Basin and can be distinguished in the field. So-called Oregon Dark-eyed Juncos have a complete, blackish hood that contrasts with their reddish back and wings. The breast and belly are white with a reddish wash across the flanks. Females are lighter than males. Gray-headed Dark-eyed Juncos have a gray head, wings, and body; a deep-red patch on the upper back; and a white belly. A black patch extends from the chin through the lores and surrounds the eyes. Male and female Gray-headed Dark-eyed Juncos have similar plumage. Juveniles have similar appearance regardless of subspecies. The back is dark brown with black streaks, the head is mottled gray, and the belly is whitish with variable, dark streaks.
- The unstreaked plumage of adult Dark-eyed Juncos distinguishes them from most other Emberizids. Adult Oregon Dark-eyed Juncos may be confused with Spotted Towhees. Spotted Towhees are larger, have a dark bill, and have bright white spots on the back and wing coverts. Juvenile Dark-eyed Juncos are similar to other juvenile Emberizids and best distinguished by habitat and by watching for attendant adults.
- The song of Dark-eyed Juncos is a short, monotonous trill. The song is difficult to distinguish from that of Chipping Sparrows, but Dark-eyed Juncos' song usually is slower and more musical. The common call note is a high and sharp *stip*. The species also gives a buzzy series of softer chips, *tsititit tsit*, when flushed.

Response to human activity or natural disturbances

- None reported, but climate change may affect the timing of reproduction, especially in northern latitudes (Nolan et al. 2002).

Data gaps

- No extensive genetic studies of Dark-eyed Junco subspecies have been conducted. Little is known about the stability of hybrid zones and the degree of introgression between subspecies (Nolan et al. 2002).

Western Tanager (*Piranga ludoviciana*)

Natural history

David Pavlik

- Western Tanagers feed slowly and methodically, and tend to stay hidden within the canopy. These behaviors make them difficult to detect visually despite the vivid plumage of males.
- Western Tanagers breed in southeast Alaska, British Columbia, Alberta, and the western United States with the exception of the Central Valley and southern California. The species winters from central Mexico south to Panama.
- All Western Tanager populations are migratory. The species typically arrives in the Great Basin in late April or May, with peak migration near the end of May. Birds depart for autumn migration in late July or August (Hudon 1999).
- Western Tanagers feed on arthropods and fruit. The birds capture arthropods by slowly crawling through vegetation and plucking the arthropods from leaves and twigs, or occasionally by flycatching from an exposed perch (Hudon 1999).

Nesting

- Male Western Tanagers are territorial during the breeding season. The species is believed to be monogamous. Pair bonds often form during winter or migration (Hudon 1999).
- Western Tanagers nest in a variety of woodlands, usually in areas with open canopies. In the western Great Basin, the species nests in both riparian areas and pinyon and juniper woodlands.
- The nest is a loosely constructed, flat bowl with a shallow cup holding the eggs. It is built from twigs and grasses and lined with finer plant material and animal hair (Bent 1958).
- Egg laying begins between mid May and mid June (Hudon 1999). The species has one brood per season. Western Tanagers lay three to five eggs, which are bluish with a few dark spots (Bent 1958).
- Many Western Tanager nests are parasitized by Brown-headed Cowbirds (Hudon 1999).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Western Tanagers increased rangewide and in almost every ecoregion, including the Great Basin, from 1966 to 2012 (Sauer et al. 2014). It is one of few passerines that appears to be increasing in abundance across its range. The drivers of this increase are unclear.
- Western Tanagers were common in the eastern Sierra Nevada and Wassuk Range.

Habitat

- Western Tanagers occur in open woodlands, usually at elevations above 500 m.

Identification

- Western Tanagers are medium-sized passerines with large bills. Adult males are striking, with a black back, wings, and tail; yellow body and rump; and a reddish head. The wings have two bars. The upper bar is yellow and the lower bar is whitish. Adult females have an olive head, rump, and body, a grayish back, and a dark gray tail and wings. The wings have two whitish bars. Immature males are similar to females but have brighter, yellower bodies. Immature females are duller than adult females.
- No other tanager species occurs in the Great Basin. Female Bullock's Orioles have similar colors but always have more orange on the tail and body and a thinner bill.
- Western Tanagers' song is a slow, husky warble, *cheeree cheeree cheeroo cheeree*, that resembles the song of American Robins but is hoarser, contains fewer different phrases, and usually is shorter. The call note is a distinctive, abrupt *priddit*, often made between bouts of song. The call note interspersed with songs is useful for distinguish singing Western Tanagers from American Robins.

Response to human activity or natural disturbances

- Tree thinning does not appear to have a negative effect on Western Tanagers given the species' association with open woodlands (Hudon 1999).

Data gaps

- Many aspects of the natural history of Western Tanagers remain unknown, including breeding behavior, migratory routes, and winter ecology. The source of the species' red pigmentation, which appears to be biochemically distinct from that of other red *Piranga*, also remains unclear (Hudon 1999).

Black-headed Grosbeak (*Pheucticus melanocephalus*)

Natural history

Joe Turner

- With their orange plumage, cheerful song, and ability to nest in suburban areas, Black-headed Grosbeaks are easily recognized.
- Black-headed Grosbeaks are Neotropical migrants. They breed throughout the western United States from Nebraska to the Pacific coast but are absent from the Mojave and Sonoran Deserts. A resident population in central Mexico is joined during the winter by individuals that breed in the United States and northern Mexico (Ortega and Hill 2010).
- The species arrives in the Great Basin between late April and May. Males depart in late July or early August, whereas females and immature birds linger for several weeks longer. After nesting, individuals may move to lower elevations in late summer prior to their southbound migration (Ortega and Hill 2010).
- Black-headed Grosbeaks are omnivorous and feed primarily on arthropods in summer. They likely consume a greater proportion of fruits and seeds in autumn and winter, but their diet during those seasons has not been well studied.

Nesting

- Both males and females are highly territorial and aggressive towards intruders, and defend relatively large territories (0.43 to 3.9 hectares) (Ortega and Hill 2010). Older males usually occupy the highest-quality territories. Territory quality often is a function of the abundance of avian nest predators; Western Scrub-Jays are their primary avian nest predators in the Great Basin (Hill 1988).
- The clutch consists of three or four (sometimes five) eggs that are bluish with red-brown spots clustered around the larger end (Ehrlich et al. 1988). The species has one brood but sometimes will renest after a failed first attempt. In the Great Basin, Black-headed Grosbeaks usually lay eggs in May, although renesting attempts may occur in June. It is unknown whether Mexican populations have two broods given their longer breeding season (Ortega and Hill 2010).
- Nests are often constructed near water in the dense outer branches of small trees or large shrubs, especially willows, around two to four meters above the ground (Ortega and Hill 2010).
- Black-headed Grosbeaks build a loosely constructed, open-cup nest. Males select nest sites and may begin construction, perhaps as a method of courtship, but females complete nest building. Both males and females incubate, and males frequently sing from the nest (Ortega and Hill 2010).
- Parasitism by Brown-headed Cowbirds is rare (Ortega and Hill 2010).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Black-headed Grosbeaks is increasing rangewide. The eastern Sierra Nevada and western Nevada are among the few areas in which abundance appears to be decreasing (Sauer et al. 2014).
- Black-headed Grosbeaks were among the most widespread bird species in the Wassuk Range. They were less common in the eastern Sierra Nevada.
- Local abundance is fairly stable. Individuals may move to wetter areas in dry years if food availability and vegetation cover decrease, and heavy snowpack can push birds to lower elevations early in the breeding season (Ortega and Hill 2010).

Habitat

- Fairly common in riparian vegetation, mature Jeffrey and ponderosa pine stands, and pinyon and juniper woodlands. In the eastern Sierra Nevada and Wassuk Range, they were most common in riparian corridors with willow.

Identification

- A medium-sized songbird with an outsized, heavy bill. Males are bright orange on the rump, belly, chest, and neck, with a black head, tail, back, and wings. Large white wing patches are visible even when the wings are folded. Lemon yellow in the belly and underwings is visible when the birds are observed closely. Females also have orange chests and underparts, but the orange is much paler. Areas that are black on males are brown on females, although females have a bold, pale supercilium. The white wing bars are smaller in extent than those on males.
- Young (second year) males will arrive on breeding grounds with some black and orange adult plumage molted in. However, this molt may be limited, rendering the birds indistinguishable from females.
- Females and young males are difficult to distinguish from Rose-breasted Grosbeaks, a rare vagrant to the eastern Sierra Nevada and Wassuk Range. Adult males are similar in color to male Bullock's Orioles, but have more-extensive black on their heads and much thicker, shorter bills.
- The song is flutelike, with ascending and descending notes. It is similar to the song of American Robins but sweeter, more wobbly, and less repetitive. The call note is a loud, clear, and high *pic*.

Response to human activity or natural disturbances

- Fairly resilient due to its capacity to nest in a wide variety of locations.

Data gaps

- Relatively few studies have been conducted on wintering and resident populations in Mexico (Ortega and Davis 2010).

Lazuli Bunting (*Passerina amoena*)

Natural history

Aaron Maizlish

- Lazuli Buntings are common and unmistakable in the Mountain West, adorned in flashy sky blue, cinnamon, and white.
- Lazuli Buntings breed across the western United States from northern New Mexico north to southern British Columbia. They primarily winter on the Pacific slope of Mexico.
- The species arrives in the Great Basin in May. Autumn migration begins in August, with birds stopping at locations in the Southwest to molt for a month before continuing to wintering grounds (Greene et al. 2014).
- Lazuli Buntings are omnivorous, feeding mainly on arthropods, seeds, and fruit.

Nesting

- Lazuli Buntings are highly territorial. They defend territories in which they breed and feed by singing frequently, chasing intruders, and occasionally physically attacking intruders. Territory size varies and has been reported to range from 0.6 to 5 hectares (Greene et al. 2014).
- Lazuli Buntings are socially monogamous, but extra-pair copulation is common in both males and females (Greene et al. 2014). There are no estimates of the percentage of extra-pair fertilizations, but it has been reported to be over 12% in closely related Indigo Buntings (Westneat 1987).
- Lazuli Buntings have two broods in parts of their central and southern breeding range (Greene et al. 2014). Whether they have two broods in the western Great Basin is unknown. Egg laying begins in May or early June. Each clutch consists of four (rarely three) pale blue eggs (Ehrlich et al. 1988, Greene et al. 2014).
- Nests are constructed in the outer branches of a shrub in dense vegetation and are less than one meter above the ground. The nest is an open cup built between several branches. A variety of plant materials are used in construction, and spider or cocoon silk often is wrapped around the outside (Greene et al. 2014).
- The percentage of Lazuli Bunting nests parasitised by Brown-headed Cowbirds varies regionally, from 0 to 100% (Greene et al. 2014). There has been no detailed study of brood parasitism in the western Great Basin.

Status and trend

- Breeding Bird Survey data suggest that the abundance of Lazuli Buntings is stable rangewide but increased by an average of 1-4% per year in the Great Basin and Sierra Nevada from 1966 to 2012 (Sauer et al. 2014).
- Lazuli Buntings are patchily distributed during the breeding season. Their wide geographic range may inhibit detection of local declines and extinctions by the Breeding Bird Survey (Greene et al. 2014).
- We found that Lazuli Buntings were common in the Wassuk Range and eastern Sierra Nevada.

Habitat

- Lazuli Buntings occupy diverse shrublands across their range. In the western Great Basin, they often occupy the bottoms of riparian canyons, especially those with cottonwoods.

Identification

- Lazuli Buntings are small Cardinalids. Adult males have bright blue heads, backs, and rumps. The belly is white and there is a cinnamon band across the breast. The wings are dark with two bold, white wingbars. Adult females are mostly buffy, fading to white on the lower belly, and have bluish tails. The plumage of immature birds and males in winter is between that of adult males and females.
- Blue Grosbeaks and Mountain Bluebirds are the only other primarily blue songbirds in most of the Lazuli Bunting's range. Male Blue Grosbeaks are larger and darker, with an entirely blue breast and belly and rusty wingbars, whereas Lazuli Buntings have white bellies and wingbars. Female Blue Grosbeaks are similar to female Lazuli Buntings but typically have some rust color on the wing coverts and are larger-billed than Lazuli Buntings. In the Great Basin, Blue Grosbeaks usually occur at lower elevations in valley bottoms than Lazuli Buntings. Mountain Bluebirds are entirely blue, have thin bills, and are larger than Lazuli Buntings.
- The song of Lazuli Bunting is a high series of repeated warbles, with each phrase repeated two to five times. Songs often end on buzzy notes. Unlike many other songbirds, adult Lazuli Buntings only sing a single version of their song, a fact that can be useful in identifying them by vocalizations (Greene et al. 2012).
- Lazuli Buntings' call note is a hard, dry *pik*.

Response to human activity or natural disturbances

- Lazuli Buntings are captured for the pet trade in Mexico, but whether this practice has population-level effects is unclear (Greene et al. 2012).

Data gaps

- Lazuli Buntings have been well-studied in their breeding range but questions remain about the potential effect of Brown-headed Cowbird parasitism on local abundance, the physiology of molt delay in the species, and the species' wintering ecology (Greene et al. 2012).

Red-winged Blackbird (*Agelaius phoeniceus*)

Natural history

David Pavlik

- Red-winged Blackbirds breed from the southern Northwest Territories and Yukon east to the Maritime Provinces and south through the conterminous United States and portions of Mexico. During the winter, the species occurs throughout the conterminous United States except in the northern Great Lakes, New England, and upper Great Plains.
- Red-winged Blackbirds are common but local residents of the Great Basin.
- Most Red-winged Blackbirds in the western United States are non-migratory. Spring migration of northern populations occurs from mid February to mid May, and autumn migration begins in October (Dolbeer 1978).
- Red-winged Blackbirds are omnivorous. They primarily eat arthropods during the breeding season and seeds during winter (Yasukawa and Searcy 1995). The species often feeds by gaping – that is, prying open substrate by inserting its bill and forcibly opening it against resistance (Orians 1985).

Nesting

- Males use song and display to defend territories. Variation in territory size is likely related to local habitat extent and quality (Yasukawa and Searcy 1995). Red-winged Blackbirds also display territorial aggression toward other marsh-nesting birds, although the aggression does not seem to be a deterrent (Orians and Collier 1963).
- Red-winged Blackbirds are polygynous. The average number of nesting females per male territory ranges from five to fifteen (Yasukawa and Searcy 1995). Female behavior within male territories resembles territorial defense, but it is unclear whether females have well-defined subterritories (Searcy 1986).
- Red-winged Blackbirds usually nest in emergent vegetation within marshes, although nests of the species increasingly have been documented in uplands and agricultural areas (Yasukawa and Searcy 1995).
- The open-cup nest usually is less than one meter above the water. It is woven from leaves and strips of bark and links many small, dense, live stems for support.
- One brood per year. Most clutches contain three to four eggs that are bluish-gray with dark markings (Beer 1965, Ehrlich et al. 1988, Yasukawa and Searcy 1995).
- The proportion of Red-winged Blackbird nests that are parasitized by Brown-headed Cowbirds is relatively high, but varies locally and declines as nest density increases (Blankespoor et al. 1982, Yasukawa and Searcy 1995). Conspecific brood parasitism is rare (Harms et al. 1991).

Status and trend

- Red-winged Blackbirds may be the most abundant birds in North America. However, Breeding Bird Survey data suggest that the species' abundance declined by an average of approximately 1% per year from 1966 to 2012. The Great Basin was one of the few regions of the United States where abundance was relatively stable (Sauer et al. 2014). Declines may be linked to drought and land-use change.
- Red-winged Blackbirds were common in wet areas in the eastern Sierra Nevada. We did not detect them in the Wassuk Range. The species is common in river valleys and marshes at lower elevations in the western Great Basin.

Habitat

- Red-winged Blackbirds breed in freshwater and saltwater marshes, wet meadows, agricultural areas, and, less commonly, along wooded riparian corridors and within moist woodlands with dense understory.
- In winter, large flocks roost in dense vegetation near agricultural areas, where they feed on many types of grains.

Identification

- Adult males are glossy black with striking red and cream-colored shoulder patches (epaulets) that may not be visible when the bird is not displaying. Adult females have mottled brown backs and wings; whitish underparts with dense, heavy dark-brown streaks; a strong white supercilium; and a buffy, yellow, or pinkish wash on the throat. The appearance of immature males is highly variable. Some individuals are similar to adult females and some are similar to adult males. Immature females are similar to adult females but typically have less color on their throats.
- In the Great Basin, most likely to be confused with Brewer's Blackbirds, Brown-headed Cowbirds, and European Starlings. Male Red-winged Blackbirds are best distinguished by their red epaulets and unpatterned, glossy black plumage. Females are more intricately patterned than other Icterids but superficially similar to streaked species of sparrow, especially Song Sparrows. Females can be distinguished from sparrows by their larger, triangular bills.
- The song is a distinctive *kon-ka-REEE*. The first notes are rich and liquid, whereas the end of the song is harsher and trilled. Red-winged Blackbirds make a variety of call notes that have been extensively studied (Orians and Christman 1986). The most common call, a hard *check*, generally is made by feeding or agitated birds.

Response to human activity or natural disturbances

- Red-winged Blackbirds are considered by some to be agricultural pests, although their overall effect on agricultural production likely is moderate (Weatherhead et al. 1982). An exception to the Migratory Bird Treaty Act allows farmers to kill Red-winged Blackbirds that endanger their crops, and considerable numbers of individuals are killed or trapped each year (Yasukawa and Searcy 1995).

Data gaps

- Questions remain about the species' systematics, social behavior during the breeding season, and net effect on agricultural crops (Yasukawa and Searcy 1995).

Western Meadowlark (*Sturnella neglecta*)

Natural history

David Pavlik

- Western Meadowlarks breed from southern British Columbia east through the Prairie Provinces to the Great Lakes, and south through the conterminous United States from the Pacific coast to the central Great Plains. They winter in Washington, Oregon, California, Arizona, the Great Basin, the southern Rocky Mountains and Great Plains, and as far east as Indiana, Arkansas, and Louisiana.
- Northern populations of Western Meadowlarks are migratory, whereas most southern breeding populations are resident (Davis and Lanyon 2008). The extent to which birds that breed in the western Great Basin migrate is unclear, although the species is present year-round in this area.
- Western Meadowlarks capture arthropods and forage for plant matter on open ground. They often use their large bills to probe the soil for buried seeds. They occasionally feed on eggs and nestlings of other species and on roadkill, especially when snow limits foraging (Davis and Lanyon 2008).

Nesting

- Males defend territories that include nesting and foraging areas. Territory size varies among individuals and during the breeding season, likely in response to female movements and changes in resource availability (Lanyon 1956).
- Western Meadowlarks are polygynous. Males usually pair concurrently with two or three females (Davis and Lanyon 2008). During autumn and winter, the species forms large flocks and is not territorial (Lanyon 1953).
- Many Western Meadowlarks have two broods per year. The species may renest as many as six times after nest failures in a given season, which runs from April to early August (Davis and Lanyon 2008). Each clutch contains five (rarely three to seven) whitish eggs with extensive, dark spots (Bent 1958, Ehrlich et al. 1988).
- Western Meadowlarks nest on the ground in small depressions in grasslands with dense cover. Nests are more common in areas with high grass cover than in areas with high forb cover (Davis and Lanyon 2008).
- The nest is a cup made of grass and forbs stems. It often is woven into the surrounding vegetation and may have an overhanging roof and an extension of the base several feet from the entrance (Davis and Lanyon 2008).
- Parasitism of Western Meadowlark nests by Brown-headed Cowbirds is common. A smaller proportion of nests in the midwestern United States and Canada and Great Plains is parasitized than in areas further west (Davis and Lanyon 2008).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Western Meadowlarks declined by an average of > 1% per year rangewide and in nearly every ecoregion, including the Great Basin, from 1966 to 2012 (Sauer et al. 2014). Much of this decline has been attributed to decreases in the area and condition of grasslands.
- We detected the species often in the Sierra Nevada but rarely in the Wassuk Range.

Habitat

- The abundance of Western Meadowlarks is positively correlated with grass height and vegetation cover and negatively correlated with shrub cover, shrub height, and proximity to human development. In the western Great Basin, the species occurs in patches of grass and forbs within shrubsteppe, woodlands, and riparian areas.

Identification

- Western Meadowlarks have a short tail, large bill, and long legs. They usually are observed standing on the ground or perched low within grasslands. The back, wings, and nape are light brown with buff scales and black bars. The crown is darker brown with a pale median stripe. The supercilium is white on the posterior and bright yellow from the eye to the lores. The face has a thick, dark brown postocular line, streaked brownish cheek, and yellow malar. The throat and breast are yellow with a broad, black v-shaped mark from the center of the chest to the neck. The belly is yellow in the center, fading to whitish on the flanks with blackish spots. The tail has white outer feathers and a pattern similar to that on the back.
- Adult females and juveniles are duller than adult males. Non-breeding adults have much duller yellow on the underparts and much smaller blackish chest shields.
- Western Meadowlarks' song is rich, musical, and complex. It begins with several pure whistles, *seep loo lidi*, and ends with a dense, rapid series of gurgling notes. The most common calls are a low, musical *chup* and a dry rattle.

Response to human activity or natural disturbances

- Western Meadowlarks are uncommon in cultivated areas. They are sensitive to expansion of woody shrubs and non-native invasive plants, and to intensive levels of livestock grazing (Davis and Lanyon 2008).

Data gaps

- The eastern boundary and boundaries of the winter distribution are not entirely understood given the difficulty of distinguishing Western and Eastern Meadowlarks. The extent of co-occurrence during the breeding season and of hybridization with Eastern Meadowlarks are unknown (Davis and Lanyon 2008).
- The extent to which Western Meadowlarks can use restored or created grasslands is unknown, and may be relevant to the species' conservation given its rangewide decline and continuing loss of native grasslands (Davis and Lanyon 2008).

Brewer's Blackbird (*Euphagus cyanocephalus*)

Natural history

Dan Irizarry

- Brewer's Blackbirds often occur in small, loud flocks in open areas near water.
- Brewer's Blackbirds are resident across most of the western United States and northward into British Columbia and Saskatchewan. A migratory breeding population occurs from the northern Great Plains east to the Great Lakes. Migratory birds winter across the southern United States and throughout much of Mexico. The species is common but local throughout the Great Basin.
- Brewer's Blackbirds are omnivorous. They primarily feed on arthropods during the breeding season and on grains, seeds, and fruit during winter (Martin 2002).

Nesting

- Brewer's Blackbirds are colonial breeders. Colony sizes vary from a few pairs to over 100 individuals. Colony size, mating system, and territoriality are correlated with food availability. Polygamy in Brewer's Blackbirds increases and territory size decreases as food availability increases (Martin 2002).
- Across their range, Brewer's Blackbirds usually have one brood per season, although double broods are common where nesting begins relatively early in the year. Double broods are less likely in the eastern Sierra Nevada and Wassuk Range given their relatively high elevation and latitude (Martin 2002).
- Individuals select nest sites after a colony site has been chosen (Martin 2002). The species constructs nests in shrubs, trees, and often on the ground.
- Brewer's Blackbird nests are bowl-shaped. The outer portion of the bowl is constructed from plant material held together with mud. The inner nest is lined by finer vegetation, feathers, and animal hair (Martin 2002).
- The coloration and pattern of eggs varies. On average, each clutch contains four to five eggs. The first clutch typically is laid between mid April and mid May (Martin 2002).
- Parasitism of Brewer's Blackbirds by Brown-headed Cowbirds may be relatively common, but the level of parasitism varies geographically and appears to be related to which subspecies, thus size, of cowbird is present. In the western Sierra Nevada, where the smallest Brown-headed Cowbird subspecies (*Molothrus ater obscurus*) occurs, parasitism levels are relatively low (0-28% of nests) (Martin 2002). In the Great Basin and Rocky Mountains, where the larger *M. a. artemisiae* occurs, 20-35% of nests are parasitized (Martin 2002). In the eastern United States, where *M. a. ater* occurs, <1% of nests are parasitized (Peck and James 1987). Conspecific brood parasitism also has been documented (Harms et al. 1991).

Status and trend

- The range of Brewer's Blackbirds rapidly expanded across the northern Great Lakes in the early 20th century (Martin 2002). Breeding Bird Survey data suggest that the abundance of the species declined in the Great Basin and Sierra Nevada from 1966 to 2012 (Sauer et al. 2012).
- Brewer's Blackbirds were common in the eastern Sierra Nevada. We rarely detected them in the Wassuk Range.

Habitat

- Brewer's Blackbirds occupy a variety of urban and natural environments. Attributes associated with the presence of colonies include numerous potential nesting sites, perches from which males can guard the colony, and nearby foraging areas (Martin 2002).

Identification

- Brewer's Blackbirds are dark and medium-sized. Males have an iridescent blue-green sheen and a pale yellow iris. Females have a duller brown sheen and a brown iris.
- Brewer's Blackbirds are most likely to be confused with Red-winged Blackbirds, Brown-headed Cowbirds, and European Starling, all of which are smaller.
- In comparison to Red-winged Blackbirds, male Brewer's Blackbirds do not have red patches on their wings and have a pale yellow iris, and female Brewer's Blackbirds do not have striped chests. In flight, Brewer's Blackbirds can be distinguished from Red-winged Blackbirds by their larger size and longer tail.
- Female Brown-headed Cowbirds are similar to female Brewer's Blackbirds, but Brewer's Blackbirds have thinner, slightly downward-curved bills. European Starlings have longer, straighter bills, shorter tails, and more intricately patterned iridescent plumage than Brewer's Blackbirds.
- Brewer's Blackbirds' song is an unmusical, reedy half-whistle with a long buzz. Call notes are a variety of one-note grunts (*chup* or *tsup*), often repeated. The species also makes a clear, whistled *tsee-eur* (Martin 2002).

Response to human activity or natural disturbances

- Brewer's Blackbirds adapt well to urban and agricultural areas. Their rapid range expansion in the upper Midwest is attributed to human activity (Martin 2002).

Data gaps

- Little is known about the species' breeding biology, wintering ecology, and social interactions, both intraspecific and with other Icterids (Martin 2002).

Brown-headed Cowbird (*Molothrus ater*)

Natural history

Eric Bégin

- A nondescript blackbird that lays its eggs in the nests of other birds and can coexist with humans.
- Native to the Great Plains, Brown-headed Cowbirds began expanding in the 19th century as forest was cleared. By the early 1980s, they were well established in the conterminous United States (Lowther 1993).
- Brown-headed Cowbirds were absent from the Sierra Nevada until the 1930s. They colonized most of the region by the mid 1970s (Rothstein et al. 1980).
- A short-distance migrant in the northern and central portions of its range, but resident in southern and coastal areas. The winter range extends to central Mexico.
- Brown-headed Cowbirds are migratory in Great Basin. Most birds arrive by mid May and depart by late September. Populations in suburban areas may be resident.
- Brown-headed Cowbirds feed almost exclusively in low grass or bare ground on seeds (75% of diet) and arthropods (25% of diet) (Ankney and Scott 1980). They often associate with domestic livestock, which help maintain the birds' foraging habitat and stir up insect prey.

Nesting

- Brown-headed Cowbirds do not construct their own nests or raise their own young. Instead, the female deposits her egg in the nest of another species. The presence of a Brown-headed Cowbird nestling can greatly reduce survival of the host's own offspring.
- The species is non-territorial, but males will defend females in the morning, when most mating occurs. Interspecific aggression declines in the afternoon, when feeding flocks form (Lowther 1993).
- Lays one white egg with gray-brown spots in each host nest; a female may parasitize four to five and as many as seven nests during the breeding season (mid April to mid July) (Ehrlich et al. 1988). The female often removes at least one of the host species' eggs when laying her egg (Lowther 1993).
- Documented to parasitize at least 220 species. Egg masses of many of the parasitized species are less than those of Brown-headed Cowbirds, which may give the cowbird nestling a competitive advantage when the host brings food to the nest. Parasitism of small, open nests or large, closed nests is most common. Very small or cryptic nests may deter parasitism (Lowther 1993).

Status and trend

- Brown-headed Cowbirds are widespread and abundant, especially where human activity has created open spaces. Abundance in North America is estimated to be 20 to 40 million individuals (Lowther 1993). Local trends in abundance are correlated with changes in land use. In the northeast, populations have declined over the last 50 years due to reforestation (Lowther 1993).
- Abundances increased in the Sierra Nevada from 1966 to 1985 but decreased significantly from 2000 to 2012 (Raphael et al. 1987, Sauer et al. 2014).

Habitat

- In the Great Plains, Brown-headed Cowbirds are associated with ecotones between woodlands and open or grassy areas with scattered trees. Brown-headed Cowbirds are closely associated with agriculture in most of their expanded range.
- Abundance of Brown-headed Cowbirds increases near livestock corrals and pack stations in the eastern Sierra Nevada (Robinson et al. 1993).
- The species was uncommon in the Wassuk Range but frequently detected in most land-cover types, except extensive shrubsteppe, in the eastern Sierra Nevada.

Identification

- A small, dark passerine commonly seen feeding on the ground, often with other blackbirds and starlings. Males are glossy black with brown hoods that cover the entire head, neck, and upper portion of breast. Females lack hoods and are brown above and paler brown below, often with indistinct paler streaking on the breast and a low contrast, cream-colored throat. Immature birds are similar to adult females but are more heavily streaked below. Brown-headed Cowbirds have heavy, finch-like bills that help distinguish them from other dark Icterids and starlings.
- In the Great Basin, most likely to be confused with the similarly sized Brewer's Blackbirds and European Starlings. Brewer's Blackbirds have a thinner bill and the males have bright, pale irises rather than dark irises. European Starlings have much shorter tails and have bright yellow, thin, thrush-like bills during summer.
- The species' odd, liquid song is characterized as *glug glug glee*. The first two parts are modulated from low to high, with the third part much higher and more difficult to detect at a distance. The male's song is usually accompanied by head bowing.
- Both sexes make high single or repeated whistles in flight. Females also make a dry, wren-like chatter, *ch-ch-ch-ch-ch*.

Response to human activity or natural disturbances

- The abundance and density of Brown-headed Cowbirds may continue to increase in regions that it has colonized relatively recently.

Data gaps

- Brown-headed Cowbird is one of the best studied bird species in North America due to its expansion and effects on the survival of other species.

Bullock's Oriole (*Icterus bullockii*)

Natural history

Jan Arendtsz

- Bullock's Orioles breed in the western United States from central Texas to California and north to the Canadian border. The species winters from northern Mexico to Costa Rica. A small population is resident in coastal southern California (Rising and Williams 1999).
- Bullock's Orioles arrive in the Great Basin in April. Autumn migration is prolonged, from late July to late September (Rising and Wiliams 1999).
- Bullock's Orioles feed mainly on arthropods, especially butterfly and moth larvae, which they glean from trees or bushes. The species also consumes fruit and nectar, especially during winter and migration (Rising and Williams 1999).

Nesting

- Male Bullock's Orioles defend their territories aggressively, pursuing extended chases and occasionally latching onto rival males, which can send both birds tumbling towards the ground (Rising and Williams 1999). The size and type of territory defended by males varies as a function of food density. In sites with low food density, nests often are clustered, and males defend the immediate vicinity of their own nest (multiple pairs may nest in the same tree), sharing a larger foraging area with multiple other pairs. Where food density is higher, Bullock's Orioles may defend territories that include both nests and foraging areas (Pleasants 1979).
- Eggs are pale blue or gray with fine, purple lines concentrated at the larger end. Pairs usually lay one clutch of four to five eggs per season, but pairs at the southern end of the range may double-brood (Ehrlich et al. 1988, Rosenberg et al. 1991, Rising and Williams 1999).
- Bullock's Orioles nest in isolated trees at habitat edges, especially along watercourses. The pendulum-shaped nests are woven from hair and other fibers, hung from small branches, and can take 15 days to construct (Williams 1998).
- The timing of nesting is associated with the timing of migration (Rising and Williams 1999). In the Great Basin, most eggs are laid in June (Alcorn 1988).
- The incidence of brood parasitism is unclear due to the species' ability to recognize cowbird eggs and puncture or eject them (Rising and Williams 1999).

Status and trend

- Bullock's Orioles are abundant in Texas, Washington, and central California. Breeding Bird Survey data suggest that the species' abundance across its range declined slightly from 1966 to 2012, with declines of over 2.5% in the Sierra Nevada (Sauer and Droege 1992, Sauer et al. 2014).
- The species is uncommon and local in the Great Basin, perhaps reflecting the relatively small number of riparian trees in which the birds can nest.

Habitat

- In the Great Basin, Bullock's Orioles usually occur in riparian areas with large, scattered trees.
- The species was scarce in the Wassuk Range and eastern Sierra Nevada.

Identification

- Bullock's Oriole is one of the only orange birds in the western Great Basin. It is lean and long-tailed, with a sharply pointed and slightly curved bill.
- Adult males are bright orange below and black above. The wings are blackish with white edging along the flight feathers and white coverts. The head is orange with a black throat, eye line, and crown. Females are drabber than males, with muted yellow-orange heads and no facial markings. The back and wings are grayish brown and the underside is pale gray, sometimes with a yellow wash. Wings have two whitish wingbars (one strong and one weak). Immature females are less bright than adults and have buffy wingbars.
- Immature males are similar to adult females but are brighter and usually have some dark mottling on the back. By mid autumn, young males develop a facial pattern similar to that of adult males. (Rising and Williams 1999).
- Male Bullock's Orioles may be confused with male Black-headed Grosbeaks, especially in flight, but grosbeaks have a heavy, short bill and a black-and-white tail. Females may be confused with male or female Western Tanagers, but have a thinner, more pointed bill and no green or red in the plumage.
- Bullock's Orioles sing squeaky, warbled songs that are fast, complex, and variable, often with a sharp rising note near the end. Best identified by the rich, squeaky quality of the phrases and the harsh, dry chatter that is often interspersed between songs. Unlike many species of songbirds, both males and females sing.

Response to human activity or natural disturbances

- Bullock's Orioles have benefitted from the planting of trees, including those planted as windbreaks, and the suppression of wildfire in the Great Plains. Depletion of ground water and reduced annual precipitation in arid regions may decrease the extent of the species' habitat (Rising and Williams 1999).

Data gaps

- Little is known about the migration and winter ecology of this species or its behavior, including intraspecific interactions and territoriality during the breeding season (Rising and Williams 1999).

Gray-crowned Rosy-Finch (*Leucosticte tephrocotis*)

Natural history

David Pavlik

- Gray-crowned Rosy-Finches are beautiful birds that inhabit harsh, craggy mountain tops. The birds do not fear humans, often allowing people to approach them closely.
- Gray-crowned Rosy-Finches breed throughout Alaska, including the Aleutian Islands, and south through the mountains of central British Columbia. The species is resident at elevations above 3000 m through most of the Cascade Mountains, Sierra Nevada, and the Montana portion of the Rocky Mountains. Their winter range includes the Intermountain West as far south as Nevada and Utah (Macdougall-Shackleton et al. 2000).
- Breeding birds in the Sierra Nevada are elevational migrants that move to lower elevations during winter, usually arriving on breeding grounds in March and departing in November. Some individuals may not migrate. During the winter, northern migrants join these local populations (Grinnell 1913, Macdougall-Shackleton et al. 2000).
- Gray-crowned Rosy-Finches forage on the ground and mostly eat seeds, although they also eat insects and vegetation (Macdougall-Shackleton et al. 2000).

Nesting

- Gray-crowned Rosy-Finches are believed to be monogamous. Territoriality is limited in this species, with only the immediate area around active nests defended. Males also will guard females once a pair pond has been established (Macdougall-Shackleton et al. 2000).
- Little is known about the breeding biology of Gray-crowned Rosy-Finches. Most populations are believed to have one brood, laying four or five (rarely three) whitish eggs in June or July (Ehrlich et al. 1988, Macdougall-Shackleton et al. 2000).
- Nests are built in a depression in a cliff face or other rock feature with an overhang, and occasionally in man-made structures (Johnson 1965).
- Nests are bulky and often fill the crevice within which they are constructed. The outer portion is made of moss and coarser vegetation, and the nest is lined with softer vegetation and feathers (Macdougall-Shackleton et al. 2000).
- There is a single record of Brown-headed Cowbird parasitism of a Gray-crowned Rosy-Finch nest in the Sierra Nevada. There likely is little overlap in the two species' breeding habitats (Macdougall-Shackleton et al. 2000).

Status and trend

- There is little information on the abundance of Gray-crowned Rosy-Finches given their remote breeding habitat. The Breeding Bird Survey does not report trends for the species.
- We rarely detected the species in the eastern Sierra Nevada and did not detect it in the Wassuk Range.

Habitat

- During their breeding season, Gray-crowned Rosy-Finches occur in mountains near or above the timberline, often near snowfields, glaciers, or exposed rock. During the winter, the species occurs at lower elevations in diverse land-cover types with open ground (Macdougall-Shackleton et al. 2000).

Identification

- A stocky, long-winged finch. The back and breast are rufous-brown. The wings are grayish with a pink wash. The belly and rump are pinkish. The head is rufous-brown with a broad, pale gray cap and a black forehead. Adult females are similar to adult males but are paler overall. Juveniles are more uniformly gray with limited pink on wings and faint head markings.
- Gray-crowned Rosy-Finches are distinctive in appearance, behavior, and habitat, and are not likely to be confused with any other species in the western Great Basin.
- The vocalizations of Gray-crowned Rosy-Finches are not well-studied, and the distinction between song and call is not clear. The most commonly heard vocalization is a harsh, descending series of whistles, *chew chew chew chew*.

Response to human activity or natural disturbances

- There are few human activities in the remote nesting habitat of Gray-crowned Rosy-Finches. There are no data on effects of weather on survival. During winter, bird feeders may increase local survival (Macdougall-Shackleton et al. 2000).

Data gaps

- Little is known about Gray-crowned Rosy-Finches. Elements of their physiology, including their tolerance of harsh environments, are unusual among North American passerines. The phylogenic relations among its subspecies have not been studied, although currently recognized subspecies differ in physical appearance, have disjunct breeding ranges, and have different migration patterns (Macdougall-Shackleton et al. 2000).

Purple Finch (*Haemorhous purpureus*)

Natural history

Andrew Reding

- Purple Finches breed from southern Yukon Territory across most of central and southern Canada and south through the mountains of California. They are absent in summer east of the Sierra Nevada crest, with the exception of the Great Lakes, New England, and the Appalachian Mountains south to Virginia.
- The species winters from the central Great Plains east through New England and the Maritime Provinces, south through central Georgia, and throughout its Pacific Coast breeding range. About every other year, the species irrupts in winter and can occur across most of the conterminous United States.
- Purple Finches have long migrations. Spring migration occurs from February through May, whereas autumn migration occurs from August through December. Populations in the western United States are elevational migrants (Wootton 1996).
- Purple Finches mostly eat seeds, fruit, and buds, and occasionally insects.

Nesting

- The species is believed to defend territories and to be monogamous, but the type and size of established territories are not well known (Bent 1968, Wootton 1996).
- Purple Finches can rear multiple broods per season, but the proportion of individuals that rear two or more broods is unknown. Clutch initiation dates range from early April through early July (Wootton 1996).
- Purple Finches nest in the branches of conifers. The nest is a cup made of twigs and roots and lined with soft grasses and animal hair (Bent 1968).
- Each clutch contains four or five (rarely two to seven) eggs (Ehrlich et al. 1988). The eggs are greenish-blue with dark spots (Wootton 1996).
- The percentage of Purple Finch broods that are parasitized by Brown-headed Cowbirds was estimated at 8% in the eastern portion of the species' range. Parasitism has not been reported in western populations (Wootton 1996).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Purple Finches decreased rangewide by an average of 1.3% per year and in the Sierra Nevada by an average of more than 2% per year from 1966 to 2012 (Sauer et al. 2014).
- Large declines in the abundance of Purple Finches in the mid 20th century were associated with the expansion of House Finches (Wootton 1987). Abundance of Purple Finches appears to have stabilized in recent decades, although current abundance may be 50% of historic (Wootton 1987, Sauer et al. 2014).

Habitat

- Purple Finches usually occur in moist, cool, coniferous forests but also breed in other land-cover types. During winter, the species occurs in any land-cover type with sufficient abundance of seeds and fruits.
- The species has been detected once in the eastern Sierra Nevada and Wassuk Range, which are outside of the species' known breeding range. They are rare visitors to the western Great Basin.

Identification

- Purple Finches are sexually dimorphic. The culmen is slightly curved, and western birds' primary projection is relatively short. Adult females and immatures are similar, with gray-brown backs, wings, and heads. The breast and belly are whitish, with thick, blurry gray-brown streaks. The head has a prominent, whitish supercilium and malar stripe that often connect behind the auriculars.
- Adult males do not have a strong facial pattern or streaks below. Their bodies have an extensive pink wash that usually extends through the upperwing coverts.
- Purple Finches are difficult to distinguish from Cassin's and House Finches. Adult male House Finches have a more-rounded culmen, no red on the upperwing coverts, and streaks on the flanks and belly. Adult male Cassin's Finches have contrasting reddish caps, no red on the upperwing coverts, longer primary projections, and a more reduced pinkish wash on the back and belly. Immature and adult female House Finches are best distinguished by bill shape and their relatively plain facial pattern. Immature and adult female Cassin's Finches are similar to adult female and immature Purple Finches and are best distinguished by their nearly straight culmen and longer primary projection.
- The song of Purple Finches, a variable, husky, rolling warble, is similar to the songs of its congeners but typically is much longer and has sweeter phrases.
- The most common call is a sweet whistled *tweeeyou*. In flight, Purple Finches make a dry *pik* that is different from the flight calls of its congeners.

Response to human activity or natural disturbances

- Although Purple Finches in Canada are protected by federal law, shooting and trapping still may be occurring and having population-level effects (Collister 1989).
- Purple Finches appear to respond positively to forest thinning but negatively to clear-cuts that result in habitat loss (Wootton 1996).

Data gaps

- Few studies have been conducted on the biology of Purple Finches. Breeding populations are small and do not occur near human development (Wootton 1996).

Cassin's Finch (*Haemorhous cassinii*)

Natural history

Frank Fogarty

- Cassin's Finches are resident in mountains from southern British Columbia south to central Nevada and central Colorado. They winter from eastern Arizona to western New Mexico, south into central Mexico, and in southern California and northern Baja California.
- Across most of the species' breeding range, some individuals migrate and others are resident. Residents often move to lower elevations during winter (Hanh 1996).
- Cassin's Finches feed primarily on vegetation, especially tree buds. Other foods include berries, seeds, and insects. They often forage on the ground (Hahn 1996).

Nesting

- Pair bonds are formed during the winter or early spring and may be maintained for multiple years (Samson 1976, Mewadlt and King 1985). Males do not defend territories prior to nest construction. Once the female has chosen a nest site, the male begins to defend a small area around the nest site (5 to 15 m in diameter) from other males (Samson 1976). No foraging territories are defended. During winter, Cassin's Finches form large flocks and do not defend territories, although there is evidence of dominance hierarchies within flocks (Samson 1977).
- Nesting biology, including phenology, has not been well-studied in Cassin's Finches. The species is believed to be single-brooded, laying four to five light-blue eggs per clutch (Orr 1968, Mewaldt and King 1985).
- Nests are built in conifers, at least 5 m above the ground and often near the crown or the tip of a branch (Samson 1976). Females construct a loose, bowl-shaped nest of twigs, rootlets, and grass stems lined with softer plant material (Hanh 1996).
- Brood parasitism has not been recorded but is possible, especially in areas where Cassin's Finches and Brown-headed Cowbirds co-occur (Hahn 1996).

Status and trend

- Breeding Bird Survey data suggest that from 1966 to 2012, average annual abundance decreased by 2.7% rangewide, increased in the Great Basin by 0.3%, and decreased in the Sierra Nevada by 1.6% (Sauer et al. 2014).
- We often detected Cassin's Finches in the Sierra Nevada and Wassuk Range.
- Local abundance of Cassin's Finches can vary dramatically from year to year during both the breeding season and winter (Samson 1976, 1977).

Habitat

- Cassin's Finches occur in open, coniferous woodlands and also breed in sagebrush steppe with scattered trees. Restricted to above 2500 m in some portions of their range, including much of Nevada (Hahn 1996). They often sing from treetops.

Identification

- Immature and adult female Cassin's Finches are nearly identical. They have brownish-gray wings, back, and head. The breast and belly are whitish with heavy, longitudinal, brownish-gray streaks. The cheek is framed by a thin white supercilium above and a broad white malar below. Adult males are distinctive. They do not have streaking below and have a pinkish wash over the entire body that is concentrated on the head and upper breast. The adult males' crown is a darker, reddish pink that contrasts with the paler face and nape.
- In the Great Basin, most likely to be confused with House and Purple Finches. Male House Finches have heavy streaking on the lower belly and flanks and no contrasting red cap. Immature and adult female House Finches have a more muted facial pattern and their bills have a strongly curved rather than a straight culmen.
- Purple and Cassin's Finches are difficult to distinguish. Male Purple Finches sometimes have a more-extensive pink wash that extends lower onto the breast and belly and always lacks a contrasting, dark cap. Immature and adult female Purple Finches have a slightly more pronounced facial pattern, with a broader white supercilium and more white behind the dark cheek patch, than Cassin's Finches. The back and wing feathers of some immature and adult female Purple Finches have a greenish rather than a colder gray cast.
- Cassin's Finches' high, complex, variable songs are shorter and slightly faster than those of their congeners. They do not have the drawn-out elements and pauses of some House and Purple Finches. Some Cassin's Finch songs and call notes may be indistinguishable from those of Purple Finches; the distinctive flight call of Cassin's Finches (*chidilip*) is often the best vocal cue to distinguish the two species. While perched, both sexes of Cassin's Finches also make a higher *teedeyo*.
- Cassin's Finches' songs often included mimicked notes or phrases of other species, generally as one of the last notes in the song and not repeated. The different songs of an individual bird often include mimicked notes of different species.

Response to human activity or natural disturbances

- Little evidence of responses to human activity. Cassin's Finches may benefit from thinning of dense woodlands and from bird feeders (Hahn 1996).

Data gaps

- Little is known about migratory patterns and behavior, wintering habitat and distribution in Mexico, and song learning and development (Hahn 1996).

House Finch (*Haemorhous mexicanus*)

Natural history

David Pavlik

- House Finches are colorful, gregarious songbirds that often are associated with human development and feeders, especially during winter.
- House Finches are native to the western United States and Mexico, but have colonized nearly all of the United States and southern Canada since the 1930s, when several individuals were released in New York (Badyaev et al. 2012).
- In the Mountain West, many House Finches move to lower elevations during winter. In the more northern portions of the species' range they are short-distance migrants, whereas most urban populations are resident (Badyaev et al. 2012).
- More than 97% of the diet of House Finches is plant matter, including seeds, buds, fruit, and leaves. Nestlings also eat insect larvae (Badyaev et al. 2012).

Nesting

- House Finches are gregarious throughout the year, with minimal conspecific antagonistic behavior. House Finches are monogamous, although extra-pair copulation is regularly recorded. Males will guard their mates and immediate nest site, although other nests often are placed within one meter (Badyaev et al. 2012).
- Despite the rapid expansion of House Finches, they do not appear to compete directly with native species for food or nest sites (Badyaev et al. 2012).
- House Finches nest in many types of trees, shrubs, and man-made structures. The species usually does not nest in deciduous trees or in cavities. The nest is a woven cup that is secured to a horizontal branch and well concealed. Nest construction apparently is a learned behavior; first-year females frequently watch older females and sometimes do not construct viable nests (Badyaev et al. 2012)
- House Finches have a long nesting season, with egg laying dates reported from late March through early August in the Mountain West. Nearly all females have at least two broods. Some individuals raise as many as three broods. Most clutches have four to five pale, bluish eggs (Ehrlich et al. 1988, Badyaev et al. 2012).
- High levels of parasitism by Brown-headed Cowbirds were documented in some regions, especially within the first few years after colonization by House Finches. Levels of parasitism in other populations are quite low despite high local abundances of Brown-headed Cowbirds. House Finches may recognize and remove Brown-headed Cowbird eggs and sometimes abandon nests in which Brown-headed Cowbirds have laid more than one egg (Badyaev et al. 2012).

Status and trend

- Mycoplasmal conjunctivitis, a poultry pathogen, first was detected in House Finches in 1994 in the District of Columbia, and quickly began spreading throughout the species' range. The disease is highly contagious and causes substantial mortality. It has been estimated that the abundance of House Finches in the eastern United States decreased by 60% within five years of the outbreak (Dhondt et al. 2005). The disease has reached the Pacific coast and may cause further declines if it becomes ubiquitous in western populations.
- Breeding Bird Survey data suggest that the abundance of House Finches is stable or decreasing across most of its range. The species' abundance in the Great Basin increased by an average of more than 2% per year from 1966 to 2012 but is now decreasing, possibly due to mycoplasmal conjuctivitis (Sauer et al. 2014).

Habitat

- In the western United States, House Finches occur in a variety of native land-cover types and urban areas. In the more arid portions of the Great Basin, they are typically restricted to areas of human development.
- House Finches were fairly common in the Wassuk Range and less common in the eastern Sierra Nevada.

Identification

- House Finches are medium-sized finches. The back and wings are a light brown-gray. The breast and belly are whitish with thick, blurry brown-gray streaks. Immature birds and adult females have similar plumage and relatively plain, brown-gray heads. Adult males have a pinkish-red wash on the head and breast.
- House Finches are similar to Cassin's and Purple Finches. Male House Finches are best distinguished by heavy, blurred streaks on the lower breast and belly, whereas Cassin's and Purple Finches have relatively unmarked bellies. Adult female and immature House Finches are best distinguished by their heavier streaking and unmarked faces, whereas congeners have a strong supercilium.
- House Finches' song is a complex, variable warble, similar to the songs of its congeners. The song is faster than that of Cassin's Finches and less musical than that of Purple Finches. A *veeerr* note near the end of some House Finches' songs is diagnostic, but the songs of many Great Basin birds do not include that note.

Response to human activity or natural disturbances

- House Finches benefit from associations with humans across their range.

Data gaps

- The mechanisms of the rapid range expansion of House Finches, especially the natural expansion of their range in the western United States, are not well-understood (Badyaev et al. 2012).

Red Crossbill (*Loxia curvirostra*)

Natural history

Matt Grube

- The eight recognized variants of Red Crossbills in North America are distinguished by subtle differences in vocalizations and bill sizes and shapes. These differences allow each variant to specialize on the cones of particular species of conifers. The variants cannot be distinguished in the field; they only can be identified on the basis of sonograms.
- Red Crossbills are resident from southeast Alaska east through central Canada to the Maritime Provinces, New England, and the Great Lakes. The species also occurs throughout the Rocky Mountains, Cascade Range, and Sierra Nevada.
- The species is a rare and local breeder at higher elevations in the Great Basin.
- Red Crossbills do not have a predictable migration, but flocks often wander outside their breeding range in search of cone crops, especially during autumn and winter. During years in which the cone crop is poor in the species' core range, they travel as far south as Florida and Texas in search of food.
- Red Crossbills feed on the seeds of conifers, especially spruce and hemlock. They also consume small amounts of other seeds, tree buds, and insects associated with conifers (Adkisson 1996).

Nesting

- Breeding behavior of Red Crossbills is not well understood. There is no direct evidence of territoriality, but males sometimes are observed on song perches away from their nests and engaging in aggressive interactions with other males (Adkisson 1996).
- Polygyny has not been recorded in Red Crossbills, although it has been documented in their congeners (Adkisson 1996). The species occurs in flocks year-round.
- Breeding phenology of Red Crossbills is complex and differs among variants and populations. A given population usually has a breeding window of about nine months, from roughly December through September, which is driven by photoperiod. Within the breeding window, the species begins laying eggs when food is abundant (Benkman 1990). Two or more broods per year are common when food is abundant (Adkisson 1996).
- Red Crossbills nest in the dense branches of conifers. The nest is a bulky cup of twigs that is lined with finer plant material, hair, or feathers (Snyder 1954). Nests constructed during winter are bulkier and likely provide more insulation than those constructed during summer (Adkisson 1996).
- Each clutch consists of three or four variably colored eggs (Ehrlich et al. 1988, Adkisson 1996).
- Parasitism of Red Crossbills' broods has not been documented.

Status and trend

- Abundance of Red Crossbills appears to be relatively stable in North America, but the species is not detected effectively by the Breeding Bird Survey given its low density and extensive movements (Sauer et al. 2014).

Habitat

- Red Crossbills rarely occur far from the conifers on which they feed. In the Great Basin, most individuals are associated with ponderosa, lodgepole, or limber pine.
- We did not detect the species in the Wassuk Range and rarely detected it in the eastern Sierra Nevada.

Identification

- Red Crossbills are stocky, medium-sized Cardueline finches. The species' name reflects its sharply curved upper and lower mandibles, which cross near the tips. Adult males have deep, brick-red heads and bodies and blackish brown wings and tails. Adult females are uniformly gray-olive with variable greenish washes on the upper breast and rump. The plumage of juveniles is similar to that of adult females but the juveniles have heavy, dark breast streaks.
- Red Crossbills' bill shape distinguishes them from all other species of birds in the Great Basin. If bill shape is not visible, the uniform red plumage of males and relatively short tail help distinguish Red Crossbills from the other reddish finches, House Finches and Cassin's Finches.
- Red Crossbills' song is a string of short, repeated phrases: *whit whit whit toree toree toree pip pip*. The individual notes vary among individuals, and most males have multiple songs.
- The flight call is a distinctive, dry *kip kip kip*. Flocks also make a variety of soft, chittering calls when foraging, especially before the flock moves to a new location.

Response to human activity or natural disturbances

- The extent and quality of Red Crossbills' habitat may be reduced by logging in old growth forests, the species' main source of conifer seeds (Adkisson 1996).

Data gaps

- It is unclear whether variants of Red Crossbill are subspecies or full species. Resolving the species' taxonomy likely will require studies of the variants' genetics and interbreeding (Adkisson 1996).

Pine Siskin (*Spinus pinus*)

Natural history

Frank Fogarty

- Pine Siskins usually are observed in excitable, loud flocks as they fly among tree tops in search of seeds.
- Pine Siskins breed from southern Alaska across central Canada and south through New England, the Great Lakes, and most of the western United States except for the Central Valley of California and the arid Southwest. They are resident in the highlands of central Mexico (Dawson 1997) and present year-round in southern Canada and in their breeding range in the United States. The winter range varies annually, and they occur nearly anywhere in the conterminous United States.
- Pine Siskins are common throughout the Sierra Nevada and are locally common further east in the Great Basin.
- The movements of Pine Siskins are erratic, both within a season and between years. The species has low site fidelity in its breeding and wintering range. Irruptive movements generally occur every other year, coincident with fluctuations in seed production in northern coniferous forests (Yunick 1983).
- Pine Siskins forage in flocks throughout the year, feeding on seeds and plant buds. The species readily visits feeders, and a small percentage of its diet is arthropods.

Nesting

- Pine Siskins are believed to be monogamous, although sequential polyandry is possible (Dawson 1997). The species feeds in social flocks throughout the year, even when nesting. An extremely small territory around the nest (<1 m radius) is defended (Weaver and West 1943). Pine Siskins commonly form flocks with American Goldfinches and other finches, especially in winter.
- The number of broods per season is unknown and likely variable, given that egg laying dates have been recorded from mid March through late July (Dawson 1997).
- Pine Siskins nest colonially in open coniferous woodlands. Nests are constructed on horizontal limbs with dense, concealing foliage (Dawson 1997).
- The nest is a shallow, flat saucer that is relatively large given Pine Siskins' body size (Palmer 1968). It is constructed from twigs, lichen, and bark with a dense insulating lining of finer vegetation, feathers, and fur. The size and insulation may allow the birds to nest earlier in spring than most small passerines (Dawson 1997).
- Each clutch contains three to four eggs. Eggs are pale greenish-blue with dark spots (Dawson 1997).
- Historically, the ranges of Pine Siskins and Brown-headed Cowbirds had little overlap (Friedmann 1963). However, tree plantings in the Great Plains expanded the area of overlap. Where the species co-occur, parasitism is common, although most parasitized nests are abandoned by adults before fledging (Dawson 1997).

Status and trend

- Breeding Bird Survey data suggest that the abundance of Pine Siskins declined by 1-3% between 1966 and 2012 across its range and in the Sierra Nevada and Great Basin (Sauer et al. 2014). However, the species' low site fidelity complicates estimation of abundance by the Breeding Bird Survey (Sauer et al. 2014).
- The species was common in all land-cover types in the eastern Sierra Nevada. We did not detect it in the Wassuk Range.

Habitat

- Pine Siskins are most common in open coniferous forests but occur in almost all woodlands. The species has colonized conifer plantings south of its historic breeding range, especially in windbreaks and ornamental woodlots.
- Because Pine Siskins wander widely in search of food, they can be encountered far from their core nesting areas in the western Great Basin.

Identification

- Pine Siskins are small, long-winged finches with sharply notched tails. The back and head have brownish feathers with blackish-brown streaks. The wings are blackish brown with two buffy wingbars. The base of the flight feathers and tail feathers are bright yellow and often concealed at rest. The belly and breast are whitish with dense, dark-brownish streaks. Very bright individuals are identifiable as adult males, but the sex of most birds cannot be determined in the field.
- In the western Great Basin, Pine Siskins are most likely to be confused with American and Lesser Goldfinches. The latter two species have unstreaked bellies and are more extensively yellow during the breeding season than Pine Siskins.
- The song of Pine Siskins is complex and variable. It includes husky, down-slurred notes and trills, sometimes with a diagnostic, loud *ZHREEE*, which also is made as a stand-alone call. The song is similar to that of American Goldfinches but lower and hoarser. In flight, the species makes a lively *bidew*, often repeated.

Response to human activity or natural disturbances

- Pine Siskins have diverse responses to timber harvest (Dawson 1997).

Data gaps

- Pine Siskins are readily kept in captivity, so many aspects of the species' biology and reproduction are well-understood. However, their erratic distribution has hindered field studies of their ecology. Studies have not focused on the drivers of local irruptions (Dawson 1997).

Lesser Goldfinch (*Spinus psaltria*)

Natural history

Erik Enbody

- Lesser Goldfinches are striking finches that have become increasingly abundant in the western Great Basin over the last several decades.
- Lesser Goldfinches are resident from southern Oregon and Idaho east through central Texas and south through Mexico and the highlands of Central America.
- Migration of Lesser Goldfinches is poorly understood. Assertions that northern populations are migratory have questioned by recent studies, although it is clear that many populations move seasonally. The disappearance of breeding birds during winter may be explained by nomadic wandering or elevational movement, but remains a mystery (Watt and Willoughby 2014).
- Lesser Goldfinches feed on seeds, fruit, buds, and other plant matter. They often feed in small flocks in brush, clinging to seed heads or foraging on the ground.

Nesting

- Breeding behavior of Lesser Goldfinches is not well studied. Nests are typically clustered in loose colonies and the degree of territoriality around individual nests and mating systems are not well understood. Adults typically leave nesting areas in small groups to feed (Coutlee 1968, Watt and Willoughby 2014). In winter, the species forms large flocks that travel long distances in search of food.
- Lesser Goldfinches are believed to be primarily single-brooded, but there are several records of pairs raising two broods in a season. Egg-laying dates for the species vary from May through October. Each clutch consists of four or five (rarely three or six) pale blue eggs (Ehrlich et al. 1988, Watt and Willoughby 2014).
- Nests are constructed in a variety of tree and shrub species, especially cottonwood and willow (Watt and Willoughby 2014), and typically are placed near the tip of a branch in dense foliage.
- The nest is a small, compact cup constructed of plant material and lined with feathers or animal hair (Coutlee 1968).
- Lesser Goldfinch nests rarely are parasitized by Brown-headed Cowbirds (Watt and Willoughby 2014).

Status and Trend

- Breeding Bird Survey data suggest that the abundance of Lesser Goldfinches increased by an average of 1% per year from 1966 to 2012. The species' abundance is low in the Great Basin and Sierra Nevada, but its regional abundance and distribution seem to be increasing (Floyd et al. 2007, Sauer et al. 2014). This expansion may be linked to urban development, increases in the number of bird feeders, and agriculture.
- Lesser Goldfinches were uncommon in the Wassuk Range. We did not detect the species in the eastern Sierra Nevada.

Habitat

- Lesser Goldfinches occur in a variety of woodlands and shrublands. In the Great Basin, they are uncommon and local in open riparian canyons and near human development.

Identification

- Lesser Goldfinches are small Cardueline finches. Plumage is similar throughout the year. Adult males have a bright yellow throat, breast, and belly. The back varies regionally from olive to nearly black; most individuals in the western Great Basin have paler backs. The cap is black and the wings also are black, with broad white wingbars and white edges on the flight feathers. Adult females are drabber; the head and body are olive-yellow and the wings are grayish with faint white wingbars and edges. Immature males are similar to adult females but brighter, with variable blackish features on the head.
- In the Great Basin, Lesser Goldfinches are most likely to be confused with Pine Siskins or American Goldfinches. Pine Siskins are slightly larger and have heavy streaking on the breast and belly. American Goldfinches do not breed in the western Great Basin, but the species' non-breeding plumages are quite similar to those of adult female Lesser Goldfinches. Adult female Lesser Goldfinches are best distinguished by their yellowish undertail coverts and distinctive call. The undertail covers of American Goldfinches are whitish.
- Lesser Goldfinch song is a rambling series of high, hoarse notes that seem to lack any discernable pattern. Many notes in the song are recognizable imitations of other species' call notes. The call is a high, even *tleeee* or *tleee-eeew*, lacking the descending quality of American Goldfinches' call note.

Response to human activity or natural disturbances

- Lesser Goldfinches may be sensitive to loss of riparian areas in parts of their range and may benefit from irrigation near human settlements and agriculture elsewhere. It has been hypothesized that abundance of the species in Central America may be reduced by capture for the pet trade (Watt and Willoughby 2014).

Data gaps

- Lesser Goldfinches' phenology and many aspects of their biology, including breeding, migration, and differences in dorsal plumage among males (Watt and Willoughby 2014), are not well understood.

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