



Yellowstone National Park Bird Program Annual Report

2016



A male ruffed grouse drumming to attract a mate. NPS Photo–N. Herbert

Cover photo: Trumpeter swans. Photo © B. McDonald

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Yellowstone National Park Bird Program Annual Report 2016

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Executive Summary

During 2016, Yellowstone National Park (YNP) continued its long-term core bird monitoring program for the 33rd year. In addition, we hosted several public outreach events and classes highlighting bird ecology.

Raptors: YNP supports at least 36 peregrine falcon territories, many of which are occupied annually (16 confirmed in 2016). Although nesting success has remained at or below the 27-year average in seven of the last ten years, the peregrine population in YNP remains stable. In contrast, nesting success of bald eagles and ospreys has been at or above the long-term averages for both species during the last several years. There are 50 historic bald eagle territories in YNP, one-half of which are occupied by a mated pair each year. Nine of 14 (64%) bald eagle nests were successful in 2016. We monitored 29 osprey nests, which represents a sample of the total population; 20 (69%) were successful. Three pairs nested on Yellowstone Lake; none of which were successful.

Golden eagles were monitored for the sixth consecutive year since 2011. In 2016, 26 of the 28 known territories were visited at least one time from April and August, and all were found to be occupied by golden eagles. Breeding attempts and nesting success has varied greatly across the six years of monitoring. The breeding season outcome was determined for 22 territories in 2016. Nesting success and productivity remained low, though slightly above the six-year average (in 2011-2016, nest success was 30% and productivity 0.37).

During winter/spring owl surveys, observers detected individuals of five owl species: great horned owl (5), boreal owl (12), northern saw-whet owl (9), northern pygmy-owl (3), and long-eared owl (1).

Trumpeter Swans: Two pairs nested in 2016. The Grebe Lake pair successfully fledged two cygnets, while the Riddle Lake pair fledged one cygnet. In partnership with Wyoming Wetlands Society, three cygnets raised in captivity were released on the Madison River to augment the population and establish more breeding pairs. Twenty-nine swans (23 white birds, 6 cygnets) were observed during the autumn survey in late September.



Pine grosbeak. Photo © B. McDonald

Molly Islands Colonial Nesting Birds: American white pelicans fledged 308 young, while double-crested cormorants fledged 34 young. None of the 12 California gull nest attempts were successful. No Caspian terns nested on the islands. The number of pelicans, cormorants, and gulls fledged from the Molly Islands has declined since the early 1990s; Caspian terns have not nested there since 2005.

Common Loons: Thirteen pairs fledged nine young, and another five unpaired loons were observed in YNP. The Biodiversity Research Institute (BRI) is working with park biologists to learn more about the Wyoming population, since it is isolated by more than 200 miles from the nearest breeding population in northwestern Montana. The park supports the majority of loons in Wyoming and, as a result, is extremely important for the persistence of this isolated population.

Songbirds: Three methods were used to monitor songbirds: point counts in willow stands, point counts in recently burned forests, and the international breeding bird survey. Twenty-six songbird species were recorded among three willow growth types. Species diversity of songbirds increased along a gradient from height-suppressed willows to tall, dense willows, where species richness was highest as well. Taller willows support willow specialists, such as the Wilson’s warbler and willow flycatcher. The forest burn surveys assess the responses of woodpeckers and songbirds to fires in recently burned plots. Observers recorded 20 bird species in this forest type. The most abundant species in these burns were the tree swallow, American robin, dark-eyed junco, and yellow-rumped warbler. The breeding bird survey indexes population trends through time. More than 2,400 individuals across 62 species were observed along three routes in YNP during 2016.



Killdeer. NPS Photo–B. Cassidy



Great gray owl. Photo © D. & L. Dzurisin

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Introduction

Yellowstone National Park (YNP) is surprisingly rich in bird diversity, given the challenging environmental conditions that characterize the landscape. Variations in elevation and the broad array of habitat types found within YNP contribute to the region's relatively high diversity. The YNP bird program monitors a small portion of its breeding bird species, with the broad goals of gathering information (e.g., reproduction, abundance, habitat use) on multiple species from a wide variety of avian taxonomic groups, as well as to maintain long-term datasets (more than 30 years) for several species. Maintaining long-term monitoring efforts will inform biologists of potential shifts in ecosystem function (e.g., climate change effects) and may guide future management decisions with the aim of conserving avian resources in the park. Over 4 million visitors are welcomed by YNP annually; many of them are avid bird watchers. This report summarizes data gathered for these programs during 2016. Details regarding field protocols and program history were provided in the 2011 annual report, which is available at <http://www.nps.gov/yell/naturescience/birdreports.htm>.

The core bird program for YNP is divided into three groups meant to represent YNP's diversity: Raptor Monitoring Program, Wetland Bird Monitoring Program, and Passerine and Near Passerine Monitoring Program. Bald eagles, peregrine falcons, and ospreys are monitored under the Raptor Monitoring Program. With the removal of the peregrine falcon and bald eagle from the Federal List of Endangered and Threat-

ened Wildlife and Plants in 1999 and 2007, respectively, there are no federally listed bird species in YNP. However, these species are monitored because they are of historical concern and to meet obligations outlined in post-delisting plans developed by the U.S. Fish and Wildlife Service (2003).

Trumpeter swans, common loons, and colony nesting species are included in the Wetland Bird Monitoring Program. Trumpeter swans, common loons, and colonial nesting birds on the Molly Islands are of particular concern in YNP due to small and locally declining numbers. The breeding bird survey, willow-bird survey, and forest burn survey are part of the Passerine and Near Passerine Monitoring Program. This program is particularly valuable since species in this group represent the majority of all bird species found within YNP and, in general, are declining across North America.

Golden eagle monitoring began in 2011 with the Yellowstone Raptor Initiative (YRI), a five-year project focused on diurnal and nocturnal raptors. Golden eagles were selected since no formal survey had been conducted in YNP; they were also chosen due to conservation concerns for the western population. With the completion of the YRI in 2015, golden eagle reproductive metrics averaged low and warranted concerns for the stability of the local population. Monitoring has continued through 2016 with hopes of establishing long-term efforts to understand the demographics of this top avian predator in YNP.



Sandhill crane. NPS Photo–N. Herbert

Climate Change

Within YNP, climate change effects on ecosystem processes are largely unknown, especially with respect to birds. Detecting changes in ecosystem processes (e.g., timing of migration or onset of breeding) will inform management decisions and add to our understanding of the significance of such changes for bird communities in and near YNP. Birds are touted as bio-indicators of climate change because of their sensitivity and relatively rapid response to shifts in seasonal weather patterns. For example, climate change has influenced migration patterns, population size and distribution, and the timing of reproduction and nesting success for several bird species (Crick 2004).

Since 2005, D.W. Smith has recorded spring arrival dates (migrants) in the Mammoth/Gardiner area for many common species. In 2012, we expanded the scope of this project by encouraging park staff to submit their first arrival sightings. Observations included red-winged blackbird on February 28, mountain bluebird on March 7, osprey on April 11, and meadowlark on March 20 (table 1). Eventually, this dataset may be used to determine if mean arrival date for certain species has shifted or if there is greater variability in mean arrival date. In addition to first arrivals, we monitor timing of nest initiation, incubation, and fledging for several species of raptors, to monitor the effects of climate change on breeding behavior.



Mountain bluebird. Photo © L. Dzurisin

Table 1. Spring arrival dates for common bird species in the Mammoth-Gardiner area, 2005-2016. Asterisk (*) indicates estimated arrival from Paradise Valley (24-March) and Phantom Lake, YNP (17-March). Note that 2011-2015 observations were collected by multiple observers.

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Osprey		6-Apr		8-Apr	19-Apr	12-Apr	7-Apr	5-Apr	4-Apr	6-Apr		11-Apr
Red-tailed Hawk		4-Apr	23-Mar	3-Apr		20-Mar*	18-Mar	19-Mar	9-Mar	21-Mar		12-Mar
American Kestrel		4-Apr	12-Apr	14-Apr	30-Apr	17-Apr	18-Apr	16-Apr	6-Apr	5-Apr		12-Apr
Tree Swallow		28-Apr	8-Apr	13-Apr	2-May	24-Apr	11-May	22-Apr	25-Apr	27-Apr		12-Apr
Ruby-crowned Kinglet		28-Apr	29-Apr	21-Apr	3-May	17-Apr	10-May	9-Apr	17-Apr	11-Apr	21-Apr	13-Apr
Mountain Bluebird	8-Mar	4-Mar	18-Mar	29-Mar	12-Mar	25-Mar	17-Mar	7-Mar	9-Mar	28-Feb	10-Mar	7-Mar
American Robin	20-Mar	14-Apr	17-Mar	28-Mar	21-Mar	18-Mar	25-Mar	18-Feb	6-Mar	1-Mar	10-Mar	8-Feb
Yellow Warbler	18-May	12-May	13-May	19-May	17-May	18-May	21-May	8-May		4-Jun		13-May
Yellow-rumped Warbler		28-Apr	29-Apr	20-Apr	9-May	17-Apr		7-May	6-May	16-May		13-Apr
Vesper Sparrow		3-May	13-May	4-May	6-May	7-May			9-May	-		
White-crowned Sparrow				1-May	1-May	7-May		26-May		-		21-Mar
Western Meadowlark		3-Apr	5-Apr	14-Apr	8-Apr	1-Apr		31-Mar	8-Apr	16-Mar	12-Mar	20-Mar
Red-winged Blackbird	10-Mar	16-Mar	18-Mar	8-Apr	17-Mar	29-Mar	21-Mar	5-Mar	10-Mar	3-Mar	11-Mar	28-Feb

Yellowstone Core Bird Program

Raptor Monitoring Program

Peregrine Falcon

Peregrine falcons were once an imperiled species in North America because of widespread use of the pesticide DDT, but owing to nationwide recovery efforts, including those in and around YNP and bans placed on DDT, peregrines now thrive in Yellowstone. In 2016, we monitored 19 breeding territories from late April through July. Sixteen territories were occupied by at least one adult. Six of the 16 pairs, for which we could determine the final outcome, successfully fledged at least 15 young for a nesting success per occupied territory of 42.9% (figure 1). On average, peregrines produced 0.79 young per occupied territory (productivity per occupied territory), with an average brood size of 1.83 young fledged per successful pair (figure 2). In a recent publication on peregrine reintroduction, long-term reproduction, and nestling diet (Baril et al. 2015), YNP's peregrine population was deemed stable. The major threat that caused their endangerment (thin eggshells as a result of chemical contamination) is no longer a threat.

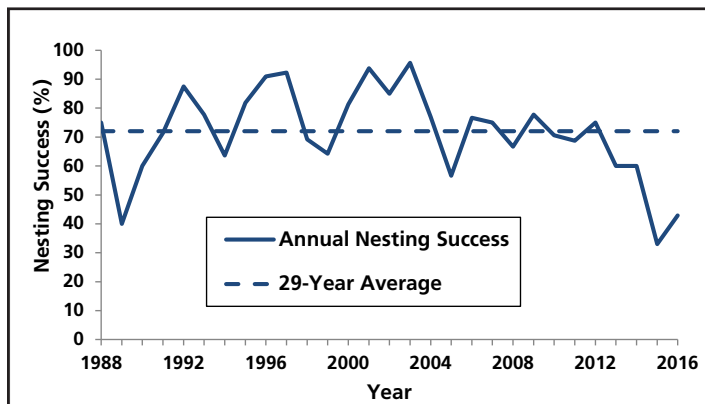


Figure 1. Peregrine falcon nesting success during 1988–2016 and comparison with the 29-year average.

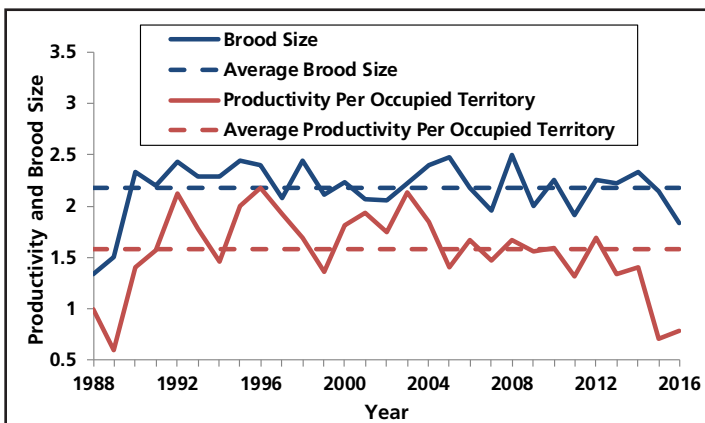


Figure 2. Peregrine falcon productivity and brood size during 1988–2016 and comparison with the 29-year average.



Bald eagle, ravens, and a coyote feed on a bison carcass. NPS Photo—J. Peaco

While our data indicate eggshell thinning is no longer an issue for YNP's peregrines, both productivity and nesting success have declined slightly over the last four years; and both measures have remained at or below the 29-year average in 7 of the last 10 years. The lower nesting success and productivity warrants closer monitoring and perhaps further study to determine the cause(s).

Bald Eagle

We monitored 31 of the 50 known extant and historical bald eagle territories for nesting activity. Similar to peregrines, not all territories are occupied every year and some have been inactive for years. Eighteen of the 31 territories were confirmed occupied. Seven of the territories were confirmed unoccupied and occupancy was undetermined at the remaining six. Long-lived birds like eagles forgo breeding in some years, depending on the availability of spring food sources and the condition of adults as they enter the breeding season.

We were able to determine the breeding season outcome for all of the confirmed occupied territories. Fourteen territories were confirmed active and nine successfully fledged young for a nest success of 64.2% (number of successful nests/active territory) and 50.0% (number of successful nests/occupied territory with known outcome). Nesting success per active territory in 2016 was greater than the 33-year average of 50% (figure 3). The nine nests fledged 13 young for a productivity of 0.93 per active territory and 0.32 per occupied territory with known outcome. The average brood size was 1.4 (figure 4). Overall, bald eagle numbers in YNP are stable, including those nesting on Yellowstone Lake where nesting success declined from 1987 to 2007, probably as a result of the catastrophic decrease in cutthroat trout (Baril et al. 2013). Parkwide, nesting success and productivity were above

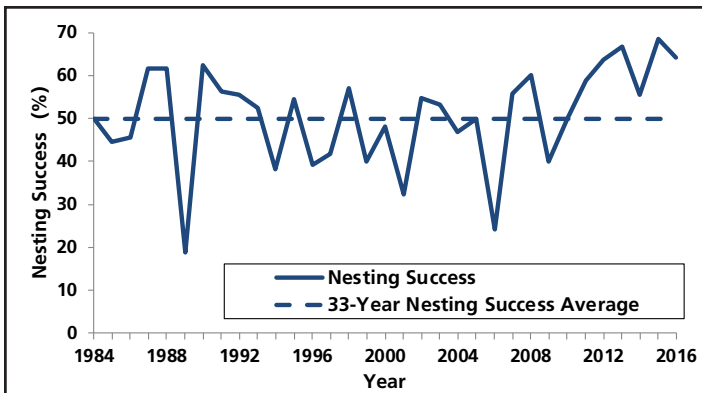


Figure 3. Bald Eagle nesting success during 1984–2016 and comparison with the 33-year average.

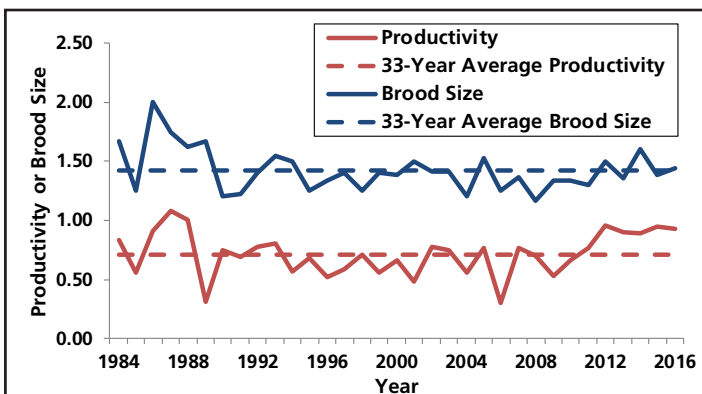


Figure 4. Bald eagle productivity and brood size during 1984–2016 and comparison with the 33-year average.



Adult osprey landing on cliff-side nest. NPS Photo–J. Peaco

average during the last few years and is likely attributed to the greater nesting success of eagles on Yellowstone Lake. During the last five years (2012–2016), nesting success at Yellowstone Lake is well above average for the park, probably because eagles have switched to other prey, such as birds nesting on the Molly Islands and waterfowl.

Osprey

We monitored 38 of the 51 known osprey territories from mid-May to mid-August; of these territories, 31 were occupied, 3 were unoccupied, and the occupancy for the remaining 4 could not be determined. Of the 31 occupied territories, we determined the breeding season outcome for all of them, confirming 29 active nests. Twenty territories successfully fledged a total of 33 young for a nest success of 69.0% (number of successful nests/active territory) and 64.5% (number of successful nests/occupied territory with known outcome), and a productivity per active nest of 1.14 and a productivity per occupied territory with known outcome of 1.06 (figure 5). The average brood size was 1.65 young fledged per active nest (figure 6). None of the three active nests on Yellowstone Lake produced young.

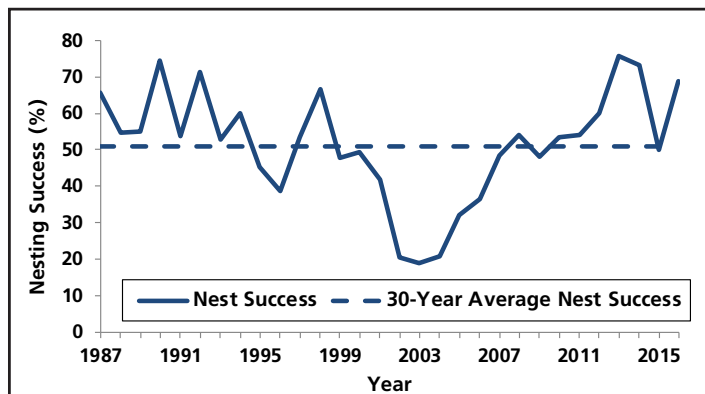


Figure 5. Osprey nest success during 1987–2016 and comparison with the 30-year average.

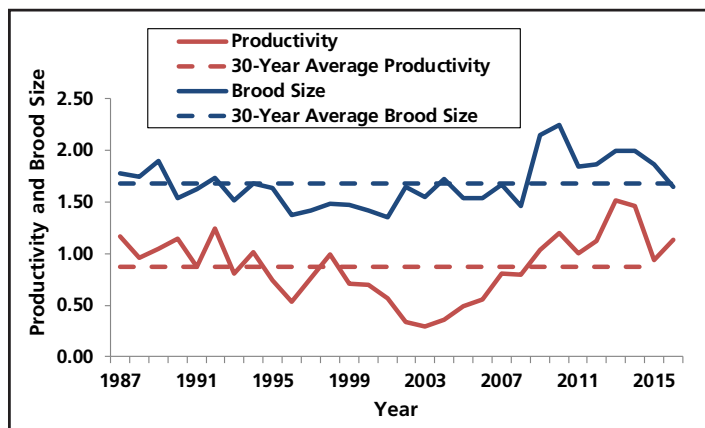


Figure 6. Osprey brood size and productivity during 1987–2016 and comparison with the 30-year average.

Wetland Bird Monitoring Program

Trumpeter Swan

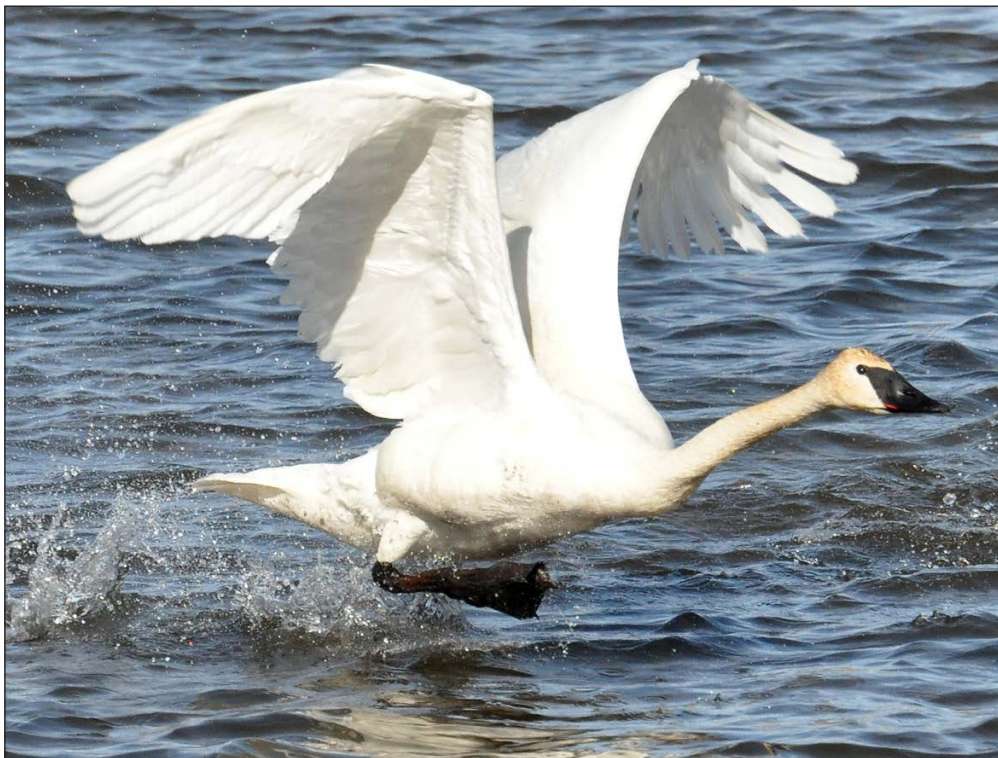
Trumpeter Swan Reproduction and Breeding Season Observations

Two pairs of trumpeter swans nested in YNP in 2016, one pair each at Grebe Lake and Riddle Lake. The pair at Grebe Lake returned in spring and nested on the platform installed in October 2011. The pair laid three eggs which were taken and replaced with wooden replica eggs; the female continued to incubate them as normal. All three eggs laid were inviable. The YNP Bird Program has partnered with the Wyoming Wetlands Society (WWS) to bolster YNP's swan population through releasing captive-raised cygnets and incubating eggs in captivity for later release. Two cygnets hatched at WWS were placed in the Grebe Lake nest just hours after hatching. The adults accepted the cygnets and raised them as their own. The western half of Grebe Lake was closed to protect this pair from human disturbance. The Riddle Lake pair successfully nested and raised one cygnet; no other cygnets were ever seen. Another swan (unknown if a yearling or older) was seen on Riddle Lake most of the summer and was tolerated by the territorial pair. This swan may have been a young bird returning to its home lake, but since young cygnets are not banded in YNP, we do not know its origin. To protect nesting swans from human disturbance, which possibly interacts with bald eagle predation, Riddle Lake was closed for the entire summer and reopened on September 15.

A pair of adult swans moved among Twin Lakes, Grizzly Lake, and Swan Lake for most of the early summer. The pair seemed to eventually settle on Swan Lake. A nest platform was installed on the lake in September in hopes that this territorial pair will nest there in the coming years. F33, released on West Tern Lake in 2013, seems to be part of this pair. F33 has lost the plastic field band, so seeing the metal band has proved difficult.

At least 10 additional non-breeding adult swans over-summered in YNP. Two moved between Cygnet Lakes and Wolf Lake, and are likely the two remaining cygnets produced by the Grebe Lake pair in 2012. A single swan was commonly seen on the Firehole River near Fountain Flats where a single bird had been seen since at least 2013. Banded female H52 spent weeks at Trout Lake alone. Three swans spent the summer in the southeast arm of Yellowstone Lake. Swans are consistently seen in this area, but there has not been evidence of any nesting behavior. Banded birds F32, H51, and H54 spent most of the summer in Hayden Valley near where females H51 and H54 were released in 2014. F32 was released in 2013 at West Tern Lake (11 miles east) and, as hoped, has found other swans.

A number of swans were seen occasionally throughout the breeding season at Duck Creek, Lilypad Lake, and on the Bechler River.



A trumpeter swan takes flight. Photo © L. Dzurisin

Trumpeter Swan Release

Three swans (one female, two males) were released on the Madison River on September 22. Trumpeter swan numbers in YNP have declined since the early 1960s. The number of nest attempts peaked during the 1990s, but has since declined substantially and is currently comprised of only two breeding pairs (figure 7). The current management goal is to increase the number of territorial pairs and, in turn, the probability of long-term persistence. In cooperation with WWS, the park has released 20 cygnets since 2013, including the three swans released this year.

Autumn Trumpeter Swan Count

On the September 28 aerial survey, we counted 23 adult trumpeter swans and 6 cygnets, including the 3 swans released in 2016. The autumn count provides an estimate of the resident population and total productivity for the tri-state area at the junction of Wyoming, Idaho, and Montana. In YNP, both adults and cygnets declined over the last several decades; however, numbers have increased since swan releases began in 2013 (figure 8).

Colony Nesting Birds

Through photographic interpretation from four overflights

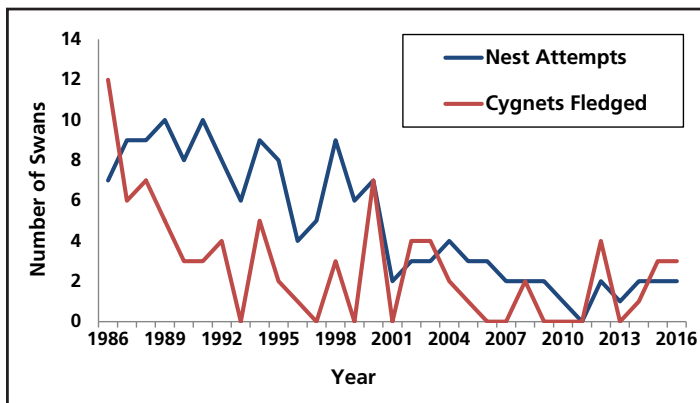


Figure 7. Trumpeter swan nest attempts and cygnets fledged in YNP, 1986–2016.

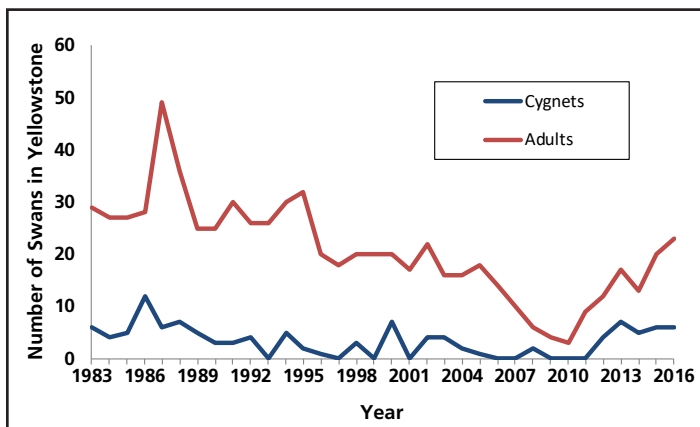


Figure 8. YNP autumn counts of trumpeter swans, 1983–2016.



American white pelicans. NPS Photo–N. Herbert

over the Molly Islands during June through August 2016, we observed approximately 414 American white pelican nests that fledged an estimated 308 young. We counted 57 nesting double-crested cormorants that fledged an estimated 34 young. Twelve California gull nests were observed, but they did not produce any young. No Caspian terns were observed on the islands.

The number of pelicans, cormorants, and gulls fledged from the Molly Islands has declined since the early 1990s, and Caspian terns have not nested there since 2005 (figure 9). The reasons are not well understood, but a previous study indicates high levels of water in Yellowstone Lake are associated with low reproduction for pelicans nesting there (Diem and Pugsek 1994). The decline in cutthroat trout, the primary food source for colonial nesting birds, is also a factor which likely influences nesting success. Bird program staff plan more intensive work here to try and understand why these declines are occurring. Like Riddle Lake with bald eagle predation on swan cygnets, the substantial decrease in cutthroat trout may be causing bald eagles to prey on pelican young in nests; eagles have been observed around nests on the islands, which may be contributing to reduced reproduction.

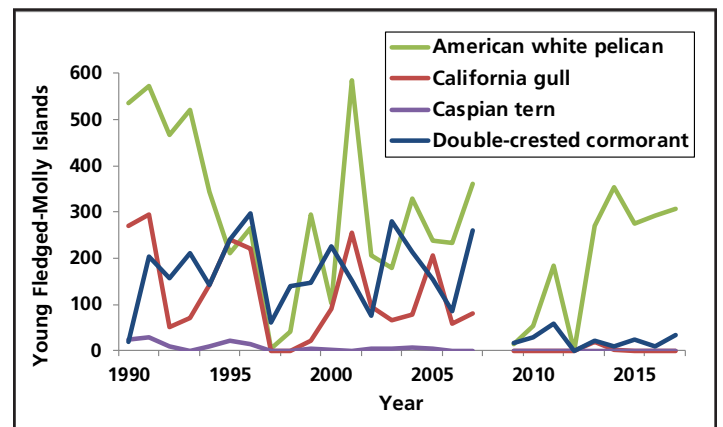


Figure 9. Number of young fledged from the Molly Islands during 1990–2016.

Common Loon

The park's common loon population is one of the most southerly breeding populations in North America. The majority of Wyoming's population of breeding common loons occurs in Yellowstone. The common loon is listed as a Species of Special Concern in Wyoming because of its limited range, small population, sensitivity to human disturbance, and loss of breeding habitat outside of YNP. Wyoming's breeding loon population is isolated from populations to the north by more than 200 miles, limiting immigration from other populations. Since the mid-2000s, Wyoming's population has declined by 38%. YNP's loon population has declined since surveys began in 1989, with the most dramatic decline being since 2006. However, detailed data from a study initiated in 2012 in collaboration with the Biodiversity Research Institute (BRI) based in Portland, Maine, indicate the number of loons present in the park can vary widely from year to year. Continuing research will analyze any trends in productivity, nesting success, and number of breeding pairs to try and determine why some years are more productive than others.

In 2016, BRI biologists checked at least 17 lakes for loon activity. Some lakes, like Yellowstone Lake, had more than one loon territory. Fourteen of the lakes were occupied by at least one loon, with a total estimate of 31 adult loons. Only nine pairs attempted to nest, and two of those failed. The seven successful pairs produced nine loonlets during 2016 (figure 10). BRI biologists captured two adults in the park: the Beula Lake male was captured and banded, and the Flat Mountain Arm female, originally captured in 2015, was recaptured and the geolocator deployed during 2015 was recovered. Mercury levels were assessed in both blood and feathers for all birds captured in 2016. Although mercury levels have been below the thresholds for adverse effects in previous years, the Wolf Lake female (captured in 2014 and recaptured in 2015) had concentrations above what is found for other northwestern Wyoming loons. The geolocator recovered from the Wolf Lake female in 2015 revealed this bird spent the 2014/2015 winter season around the southern end of the Baja Peninsula. The fall migration path was southward over land across the Colorado Plateau. Location data over time suggest the bird wintered on the west side of the Baja Peninsula for most of October, then spent November and December on the east side of the peninsula. The location data lost accuracy in mid-December, so there is no data on late winter and spring locations or migration path. We will continue these efforts to discover the Wyoming loon populations wintering areas. These efforts are part of a large-scale Intermountain West effort to better understand loon population dynamics.

There are several threats to YNP's loon populations. Direct human disturbance to shoreline nests lowers survival rates,

as do the loss of breeding habitats due to water level fluctuations (e.g., erratic spring flooding). Predation by bald eagles and other predators may also be significant given the limited number of nesting pairs. Fish are the primary prey of loons. As part of a multi-park study on mercury concentration in fish, fish from various lakes where loons nest were screened for mercury. Fish were sampled from Beula, Grebe, Yellowstone, and Lewis lakes. Fish from Beula, Grebe, and Yellowstone lakes exceeded the threshold at which fish-eating birds may be affected by mercury toxicity. Fish from Lewis did not exceed that threshold, although they still contained mercury. Lastly, during lake trout suppression efforts on Yellowstone Lake, loons are occasionally caught in gill nets. Usually the birds caught are autumn migrants, but one resident bird has been caught.

Loons are long-lived, but have relatively low chick production and a poor ability to colonize new breeding areas. Given the very small size and isolation of Wyoming's breeding loon population, it is at a particularly high risk of local extinction.

In the western United States, common loons breed in Idaho, Montana, Washington, and Wyoming. The total western U.S. breeding population is estimated at 115 territorial pairs. Wyoming's breeding population is isolated and totals approximately 20 territorial pairs, including 13 in YNP. Western populations of breeding common loons are known to overwinter from Washington south to California. Spring and fall migrants in Wyoming represent breeding populations from Alberta and Saskatchewan, Canada, that overwinter around Mexico's Baja California Peninsula.

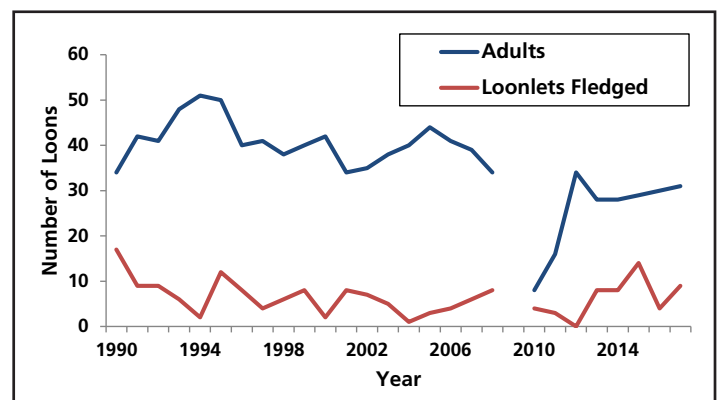


Figure 10. Common loon adults and fledglings in YNP during 1989–2016.



Passerine and Near Passerine Monitoring

Willow Songbird Surveys

This year was the 12th consecutive year of monitoring willow-songbird communities in YNP. Details of the sampling protocol are available in Baril et al. (2011). In most years, three types of willows were surveyed for breeding passerines, including previously tall (averaging more than 1.5 meters in height and experiencing little browsing), suppressed (generally less than 1 meter in height and experiencing heavy browsing), and released (formerly height suppressed, now similar in height to previously tall willows but with lower overall canopy cover; figure 11).

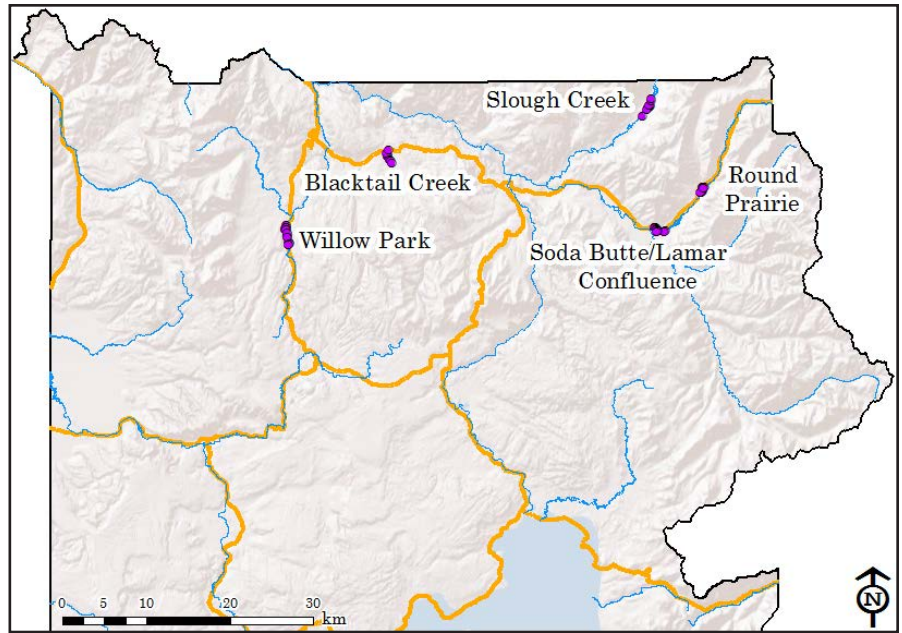


Figure 11. Map of willow point count locations in YNP.

We recorded 26 species across the range of willow growth conditions. Species richness, which is the average number of species found in a particular habitat, was slightly higher in previously tall willows than released willows and suppressed willows, which were about the same (figure 12). Wilson’s warblers, a willow specialist, were mostly found in previously tall willows, while gray catbirds were found mostly in released willows, although fewer than recorded in previous years (table 2). Since gray catbirds are ground nesters, released sites tend to be drier than previously tall sites, while still providing adequate shrubby cover not available in suppressed sites. Suppressed willows essentially function as grasslands and provide habitat for generalist species like Lincoln’s sparrows. Lincoln’s sparrows were found evenly in all three willow types. In addition to Lincoln’s sparrows, the most common species observed in previously tall sites were common yellowthroat and yellow warbler. Yellow warblers were most common in released willows and previously tall willows, while savannah sparrows were most common to released and suppressed willows. Song sparrows had a high relative abundance in all three willow types. Released willows exhibit similar structural characteristics to both previously tall and suppressed willows (i.e., tall but dispersed willow shrubs) which contribute to the species overlap. Willow stands are slowly changing, which will cause us to possibly reclassify stands in the near future.

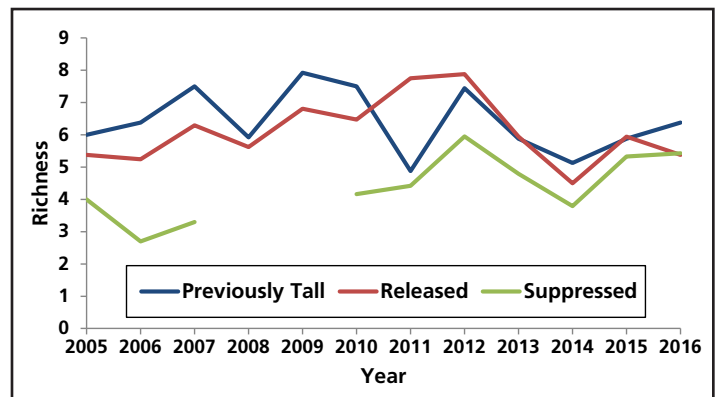


Figure 12. Species richness across three willow growth conditions during 2005–2016.



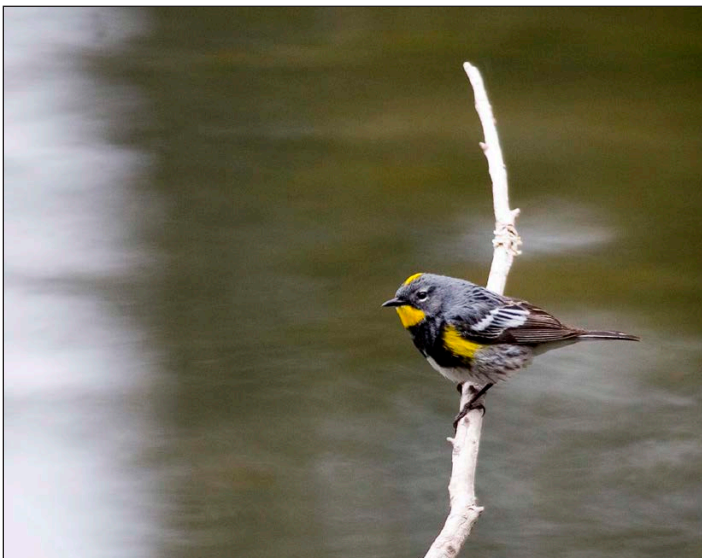
American robin. Photo © L. Dzurisin

Table 2. Relative abundance of songbirds observed in previously tall, released, and suppressed willow stands during 2016. Bold numbers indicate highest abundances.

Species	Previously tall	Released	Suppressed
American Robin	0.27	0.46	0.25
Black-billed Magpie	-	0.12	0.25
Brewer's Blackbird	0.15	0.31	0.21
Bank Swallow	-	0.39	-
Barn Swallow	-	-	0.36
Cedar Waxwing	-	-	0.07
Cliff Swallow	-	0.46	0.18
Common Yellowthroat	1.23	0.50	0.57
Dark-eyed Junco	0.02	-	-
European Starling	-	-	0.32
Fox Sparrow	0.31	-	0.04
Gray Catbird	0.02	0.08	-
Lincoln's Sparrow	0.40	0.40	0.40
Marsh Wren	0.04	-	-
Mountain Bluebird	-	-	0.07
Red-winged Blackbird	-	-	0.07
Savannah Sparrow	0.38	0.42	0.93
Song Sparrow	0.75	1.27	0.64
Tree Swallow	0.15	0.19	0.21
Violet-green Swallow	-	0.04	0.07
Warbling Vireo	0.02	0.04	-
Western Meadowlark	-	-	0.07
White-crowned Sparrow	0.33	0.08	-
Willow Flycatcher	0.67	0.27	0.14
Wilson's Warbler	0.65	0.04	-
Yellow Warbler	1.27	0.77	0.46



Willow catkins. NPS Photo-B. Cassidy



Yellow-rumped warbler. Photo © N. Bowersock

Forest Burn Surveys

The persistence of cavity nesting birds in YNP is dependent on patterns of fire across the landscape. Forest fires are predicted to increase in future years due to climate change, so park staff began sampling bird communities post-burn (e.g., for 5 years afterward) in 2009. Variations in burn severity, age, and post-burn forest structure create a mosaic that supports a diversity of species (Saab et al. 2007). Standing dead trees

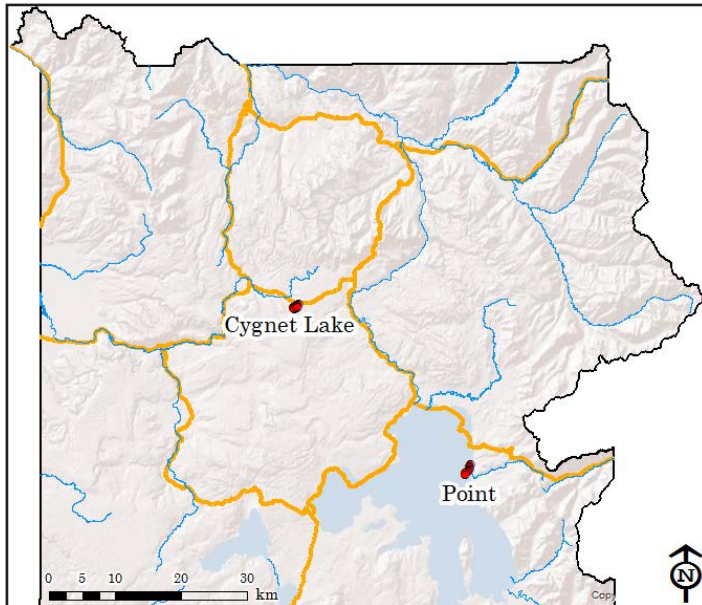


Figure 13. Map of burn point count locations in YNP.

attract bark and wood-boring beetles, the primary prey for woodpeckers (Saab et al. 2007). Woodpeckers excavate nest holes in standing dead trees, many of which have been softened by fungus, thus making excavation easier. Nest cavities created by woodpeckers are also used by a host of secondary cavity nesters, such as chickadees, nuthatches, and bluebirds. Fire size, frequency, and intensity in YNP is expected to increase, at least in the short-term, as the climate becomes warmer and drier (Rocca et al. 2014); however, it is not clear how changes in fire regimes will affect cavity nesting and fire-dependent bird species in the region. Since birds are among the first returning vertebrates to a fire-affected area, studying this ecological relationship is important.

We conducted point count surveys in two burned areas in YNP in 2016: the Point Fire (8 points) and the Cygnet Lake Fire (8 points; figure 13). The Point Fire burned 867 hectares along the east shore of Yellowstone Lake during 2011, and the Cygnet Fire burned 1,431 hectares south of the road between Norris and Canyon during 2012. These are considered recent fires (less than 5 years since time of burn).

We observed 20 species in the two study areas (table 3). Eight of the 20 species (40%) were obligate cavity nesters. The

most abundant species in these burns were the tree swallow, American robin, dark-eyed junco, and yellow-rumped warbler. Four of the 20 species recorded were primary cavity nesters (i.e., excavate their own nest holes) and occurred in low abundance (less than 10 detections) in both burn areas. Four of the species detected were secondary cavity nesters (i.e., use the abandoned holes of primary cavity nesters or natural holes). While American three-toed woodpeckers were recorded at both sites, black-backed woodpeckers were not detected at the Point Fire site, and Northern flickers and red-breasted nuthatches were not detected at the Cygnet Fire site.

The response of a given species may vary substantially from fire to fire (Smucker et al. 2005). These mixed responses are likely due to variation between and even within an individual fire (e.g., fire severity), and the type of forest and forest structure present prior to a fire. All burns included some points that contained a mixture of burned and live trees or wet meadow areas. Because of this, some species were recorded that may not have been strictly using burned habitat.

Table 3. Abundance by species occurring in recent (1–5 years since time of burn) burns during 2016. Nesting Guild: 1°CA = excavates own cavity, 2°CA = uses abandoned cavities, OC = open cup, PA = nest parasite.

Species	Abundance	Nesting guild
American Robin	0.28	OC
American Three-toed Woodpecker	0.13	1° CA
Black-backed Woodpecker	0.03	1° CA
Brewer's Blackbird	0.09	OC
Brown Creeper	0.03	2° CA
Brown-headed Cowbird	0.03	PA
Cassin's Finch	0.10	OC
Chipping Sparrow	0.09	OC
Dark-eyed Junco	0.53	OC
Gray Jay	0.09	OC
Mountain Bluebird	0.13	2° CA
Mountain Chickadee	0.03	2° CA
Northern Flicker	0.03	1° CA
Red-breasted Nuthatch	0.06	1° CA
Ruby-crowned Kinglet	0.22	OC
Townsend's Solitaire	0.06	OC
Tree Swallow	1.47	2° CA
Western Wood-pewee	0.06	OC
White-crowned sparrow	0.13	OC
Yellow-rumped warbler	0.31	OC
Richness per Point	4.04	
Abundance per Point	3.96	

Breeding Bird Surveys

The three Breeding Bird Survey (BBS) routes in YNP are part of a widespread, long-term international effort to monitor trends in bird populations in North America. During 2016, surveys were conducted in and near Mammoth on June 23, the Northeast Entrance on June 22, and along the route from Dunraven Pass to Mary Bay on June 23. More than 3,300 individual birds and 93 species were observed (figures 14 and 15). The number of species observed has declined since 2002 along all three routes, while the number of individuals has declined for the Mammoth and Northeast Entrance routes, but not for the Yellowstone route largely due to an increase in the number of Canada geese along the Yellowstone Route (figure 16).



Common yellowthroat. Photo © D. & L. Dzurisin

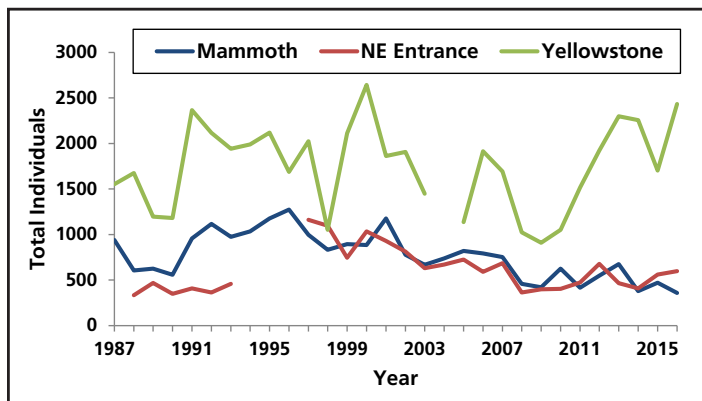


Figure 14. Number of total individuals observed during three breeding bird surveys from 1987–2016.

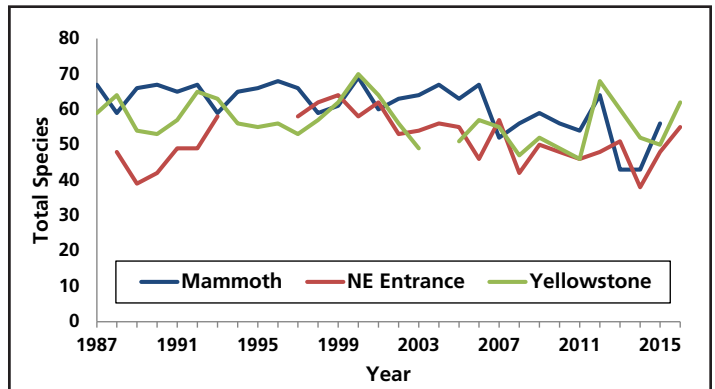


Figure 15. Number of total species observed during three breeding bird surveys from 1987–2016.



Brown-headed cowbird. NPS Photo–N. Herbert

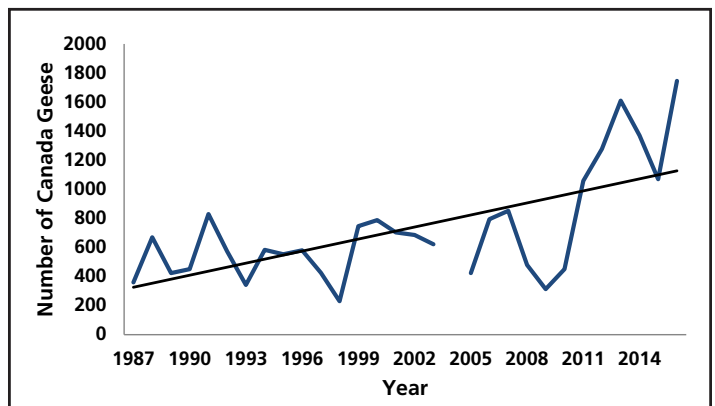


Figure 16. Number of Canada geese observed on the Yellowstone Breeding Bird Survey route during 1987–2016.

Mid-winter Bald and Golden Eagle Survey

The mid-winter bald and golden eagle survey was initiated by the National Wildlife Federation in 1979, but has been organized by the United States Geological Survey since 1992. The objectives are to establish an index of the winter population, determine winter distribution, and identify important wintering habitat for eagles. YNP has participated since at least 1987, but there were a few years surveyed prior to that date.

Thirteen volunteers participated in the mid-winter eagle survey on January 9, 2016. Observers recorded four adult bald eagles during the survey: three in the park interior and one on the northern range. Two adult golden eagles were observed during the survey: one on the northern range and one in the interior. No immature eagles were observed during the survey. Juvenile bald eagles usually migrate south and west, wandering over a wide area during their first 3–4 years until they reach adult plumage (Harmata et al. 1999). Many then return to the Greater Yellowstone Ecosystem to breed. There is no information on golden eagle movements in YNP.

Golden Eagle Monitoring

We monitored 26 of the 28 known territories in 2016, all of which were occupied. We determined the breeding season outcome for 22 territories: 14 pairs nested and 7 were confirmed as non-breeders. For the remaining territory, we were unable to determine if nesting was initiated but were able to confirm no young were fledged. Nine of the 14 pairs that initiated nesting successfully fledged a total of 10 young for a nest success of 41% per occupied territory, with known outcome and a productivity of 0.45 per occupied territory with known outcome.

Over the past six years, nesting success and productivity has fluctuated substantially (figure 17). Despite these fluctuations, all known territories remained occupied. Additionally, we documented the establishment of two new golden eagle territories in the northern range and located previously undiscovered territories through continued surveys. Density in YNP's northern range of 49.7 km²/pair falls at the higher end of the density ranges found in nearby regions. This relatively high density of golden eagles may limit productivity through competition for food resources, and may be most limited in



Ravens, bald eagle, and magpies feeding on a carcass. NPS Photo—J. Peaco

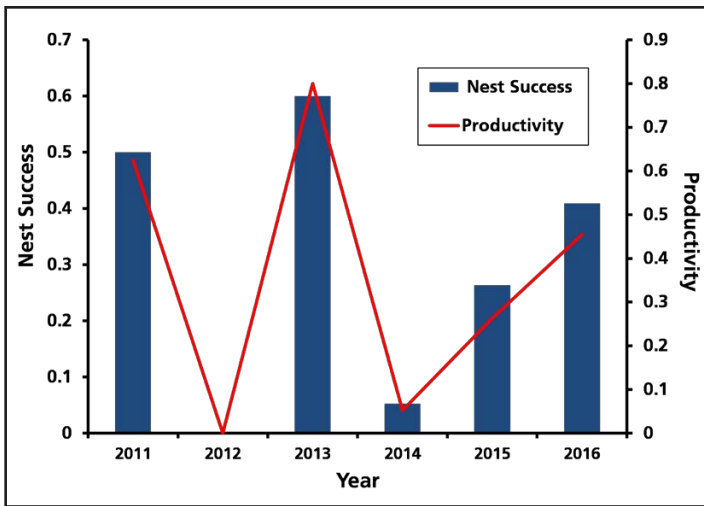


Figure 17. Nesting success and productivity of Golden Eagles in YNP, 2011–2016.

late winter and early spring (crucial period for egg laying). In the western U.S., densities range from 28–251 km²/pair (Kochert et al. 2002). Density ranged from 34–89 km²/pair in Wyoming (Philips et al. 1984) to 65–192 km²/pair in Montana (Reynolds 1969). In southwestern Idaho density was 66 km²/pair (Kochert 1972). In comparison, Denali National Park in Alaska had the highest density with 28 km²/pair (McIntyre and Adams 1999).

We collected prey remains and eggshell fragments from five golden eagle nest sites. Nests were entered in August after chicks fledged and breeding activity subsided. This sampling method only identifies what eagles feed young during the nestling stage. Prey remains from 2016 have not been analyzed, but the results of collection from 11 nests (2011–2015) revealed 85 individual prey items representing a minimum of 21 species. Species diversity was high with birds representing the majority of individual items. The most common species identified was yellow-bellied marmot, which represented 27% of the total individuals, followed closely by dusky grouse at 21% of individuals (figure 18). Bird species ranged from small passerines such as mountain bluebird to red-tailed hawk, with mammals ranging from small gopher size to pronghorn fawns. Eggshell fragments are measured for thickness as an indicator of environmental contaminants, primarily the chemical compound DDE (a derivative of DDT), and may later be analyzed for specific compounds. As of the writing of this report, only eggshell fragments collected during 2011 and 2013 have been measured. Eggshell thicknesses ranged from 0.448 mm to 0.555 mm and averaged 0.489 mm, excluding the membrane. We excluded one set of unusually thin eggshell fragments since there was some doubt as to whether they were from golden eagle eggs.

There are two studies from which to compare eggshell thickness for golden eagles. In a study of eggshell thickness of four

captive eagles, Grier (1973) found that average eggshell thickness measured 0.55 mm with the membrane and 0.476 mm without the membrane, using an average membrane thickness of 0.074 mm from YNP eggshells collected during our study. In Montana, eggshell thickness for seven eggs averaged 0.637 mm (Anderson and Hickey 1972). Although the latter thickness was greater than what we found in YNP, it is not clear if this value includes the membrane. In Montana, organochlorine pesticides were found to be low in eggs, adult tissue, and nestling tissue (Reynolds 1969). Species that prey on mammals were generally less affected by DDT than species that prey on fish and birds, although in England, golden eagles showed a highly significant decrease in eggshell thickness from 1951 to 1966 (Ratcliffe 1970).

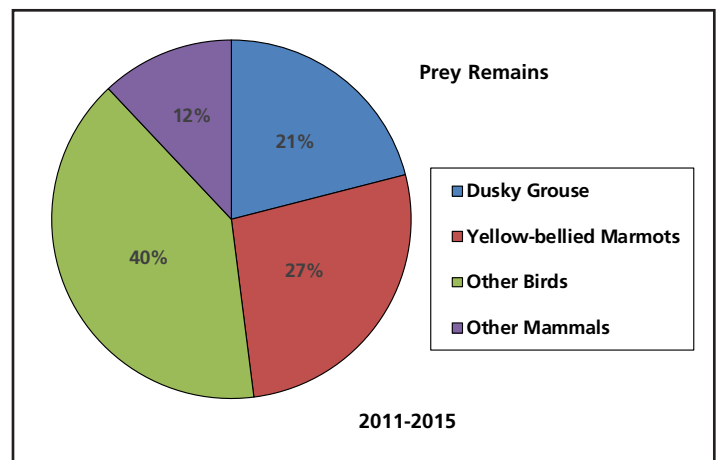


Figure 18. Most common prey remains from golden eagle nest sites, 2011–2015.



Golden eagle. Photo © D. & L. Dzurisin

Owls

We conducted nocturnal surveys for owls from February 17 through April 28 in YNP's northern range using passive listening, call playback, and observations of perched owls. Owl surveys, commenced in 2013 as part of the Yellowstone Raptor Initiative (YRI), have continued after completion of the YRI because they are conducted solely by volunteers. Surveys are designed to provide an index of sites that attract advertising males of several northern forest owl species. Observers detected individuals of five owl species: great horned owl (5), boreal owl (12), northern saw-whet owl (9), northern pygmy-owl (3), and long-eared owl (1). Boreal owls were calling when surveys began in mid-February and were detected through late March. Northern saw-whet owls were not detected until early March. Northern pygmy-owls were vocalizing by mid-February. One male long-eared owl vocalized during a survey for boreal owls.

Public Outreach and Education

For the sixth year, retired education ranger Katy Duffy led hawk ecology and identification programs during September. Forty visitors met at the Fishing Bridge Visitor Center to learn about raptor ecology and identification using mounts of raptors. The talk was followed by a field trip to Hayden Valley with 60 visitors to observe migrating raptors, and discuss identification tips and the ecology of migration. Duffy also taught an owl ecology and identification class for the Yellowstone Association Institute in May at the Lamar Buffalo Ranch, and a raptor ecology and identification course for the Yellowstone Association Institute in September. Duffy presented three talks on Yellowstone birds for the Yellowstone Co-op Employee Recreation Programs during the summer and led a field trip on park birds for Iowa State University students in March. Doug Smith presented three talks for the Sacajawea Audubon Society, Montana Audubon Society, and Raptor Fest at Bridger Bowl Ski Area.

Noteworthy Birds and Bird Sightings Program

Since 2010, visitors and park staff submitted more than 1,600 observations from 25 species of raptors. Red-tailed hawks and bald eagles are most commonly reported; also reported are rarely observed species, such as short-eared owls, broad-winged hawks, and merlin. These sightings help staff locate new breeding territories and refine the bird species checklist. We encourage park staff and visitors to submit all raptor sightings and observations of rare or unusual birds at <http://www.nps.gov/yell/naturescience/wildlife-sightings.htm>.



Great horned owl owlets. NPS Photo–N. Herbert

A lark sparrow was seen in juniper/sage habitat, which is an occasional visitor to YNP. An eastern kingbird was also spotted in the park before the breeding season. Large flocks of gray-crowned rosy finches and common redpolls were seen in Lamar Valley early in the year. Gray-crowned rosy finches are rare in the winter and occasional visitors to YNP in the summer, while common redpolls are uncommonly found in YNP in the winter. A western grebe was observed in June at Yellowstone Lake. Western grebes are considered rare in the summer. All of the unusual or rare species reported were observed during spring or autumn when birds are migrating and more likely to wander or get blown off course. For this reason, the shoulder seasons are excellent times to birdwatch. These observations provide important information regarding distribution, occurrence, and breeding status of species for which we have little information (see Appendix B for a complete list of birds observed during 2016).

Acknowledgments

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American kestrel. Photo © L. Dzurisin

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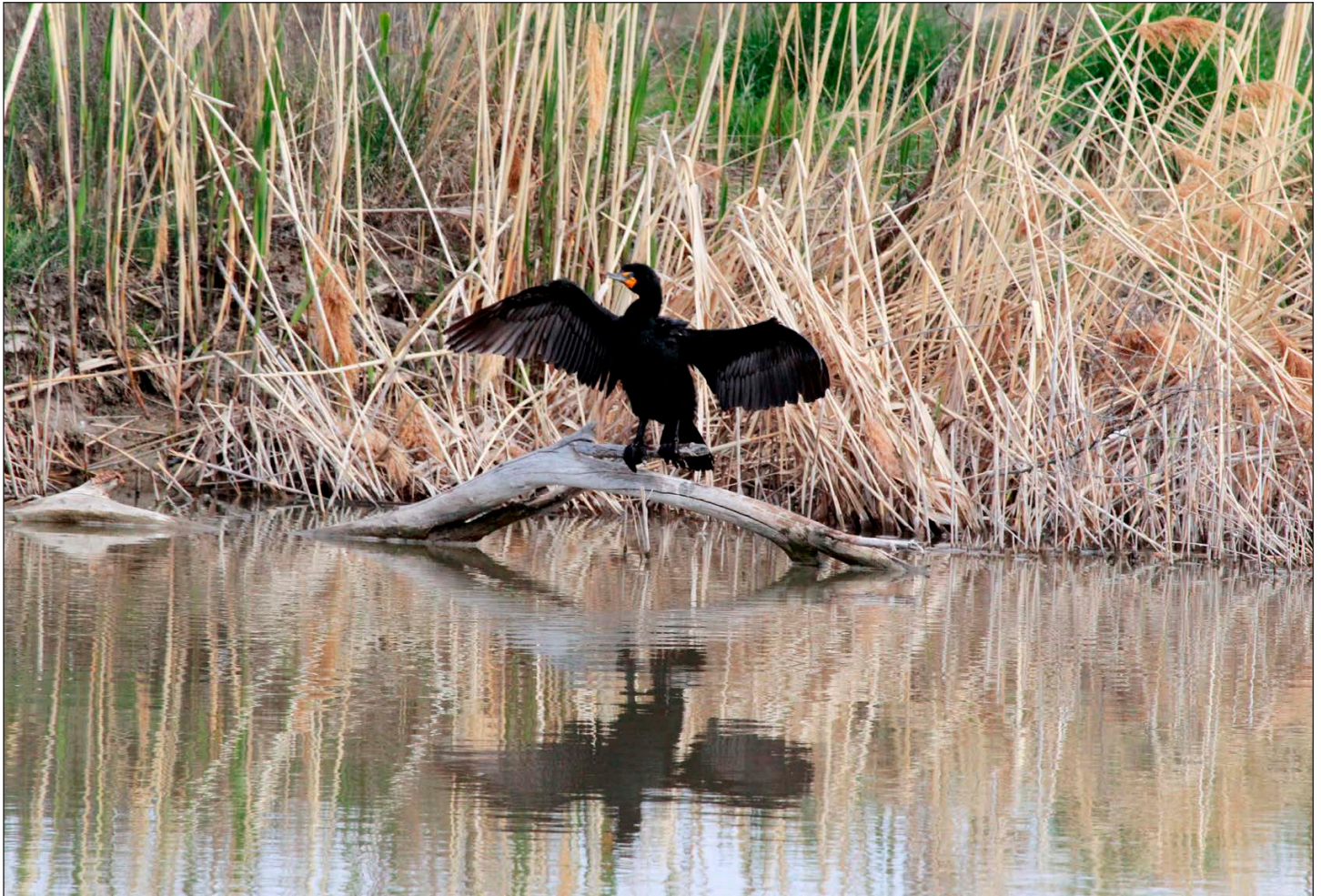
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Double-crested cormorant. Photo © B. Cassidy

Appendix A: Raptor Nesting Terminology

Active nest – a nest in which eggs have been laid. A nest is considered active if evidence of reproduction (e.g., one adult is observed sitting low in the nest, eggs or young are seen, or food is delivered into eyrie [nest site]).

Breeding – a mated pair of birds that have laid eggs or raised young. Often breeding areas contain multiple nests or eyries.

Brood size - the average number of young fledged per successful nest.

Nest or Eyrie – a structure built or occupied by birds for the purposes of breeding. For cliff-nesters this definition denotes an individual scrape or ledge (i.e., eyrie).

Nesting success per active territory – the percentage of active nests in a monitoring region in which one or more young fledge successfully (used for ospreys and bald eagles). Young at least 80% of fledging age for eagles and ospreys are expected to fledge and are, therefore, considered successful nests at this point.

Nesting success per occupied territory - the percentage of occupied nests/territories in a monitoring region in which one or more young fledge successfully (used for all raptors except ospreys and bald eagles). Young reaching at least 28 days old for peregrines and 80% of fledging age for eagles and ospreys are expected to fledge and are, therefore, considered successful nests at this point. This is a better measure of nesting success since not all raptors, particularly eagles, nest annually. Including non-breeding territorial pairs in measures of nesting success is important to understanding population health. It also allows for the inclusion of nesting pairs that failed early or territorial pairs discovered late in the season that may have nested, but did not produce young.

Occupied territory – a territory where either a mated pair of birds is present, or a single bird is present that exhibits territorial display or other reproductive-related activity. A territory is also considered occupied if there is evidence of reproduction (e.g., one adult is observed sitting low in the nest, eggs or young are seen, or food is delivered into eyrie [nest site]). Fresh nesting material added to a nest structure may also indicate occupancy, but care must be taken to be sure these materials were added by the species in question. Occupancy within a region is the number of occupied territories divided by the number of territories that were checked for occupancy.

Productivity per active territory – the total number of young fledged per active nest (used for ospreys and bald eagles). Although accurate, a better measure of productivity would be productivity per occupied territory (described below); however, since these data were historically calculated in this way, it is not possible to calculate productivity per occupied territory.

Productivity per occupied territory – used for all raptors except ospreys and bald eagles. This is an accurate measure of productivity since not all raptors, particularly eagles, nest annually. Including non-breeding territorial pairs in measures of productivity is important to understanding population health. It also allows for the inclusion of nesting pairs that failed early or territorial pairs discovered late in the season that may have nested, but did not produce young.

Unoccupied – a known breeding area containing a nest or group of nests at which none of the activity patterns diagnostic of an occupied nest were observed.

Definitions based on Postupalsky 1974, and Steenhof and Newton 2007.

Appendix B: Bird Species Observed in 2016

American Avocet (<i>Recurvirostra americana</i>)+	Calliope Hummingbird (<i>Stellula calliope</i>)+
American Coot (<i>Fulica americana</i>)	Canada Goose (<i>Branta canadensis</i>)
American Crow (<i>Corvus brachyrhynchos</i>)	Canvasback (<i>Aythya valisineria</i>)
American Dipper (<i>Cinclus mexicanus</i>)	Caspian Tern (<i>Sterna caspia</i>)+
American Goldfinch (<i>Spinus tristis</i>)+	Cassin's Finch (<i>Carpodacus cassinii</i>)
American Kestrel (<i>Falco sparverius</i>)*	Cedar Waxwing (<i>Bombycilla cedrorum</i>)
American Pipit (<i>Anthus rubescens</i>)	Chipping Sparrow (<i>Spizella passerine</i>)
American Redstart (<i>Setophaga ruticilla</i>)+	Cinnamon Teal (<i>Anas cyanoptera</i>)
American Robin (<i>Turdus migratorius</i>)	Clark's Grebe (<i>Aechmophorus clarkii</i>)+
American Three-toed Woodpecker (<i>Picoides dorsalis</i>)+	Clark's Nutcracker (<i>Nucifraga columbiana</i>)
American Tree Sparrow (<i>Spizella arborea</i>)	Cliff Swallow (<i>Petrochelidon pyrrhonota</i>)
American White Pelican (<i>Pelecanus erythrorhynchos</i>)	Common Goldeneye (<i>Bucephala clangula</i>)
American Wigeon (<i>Anas americana</i>)	Common Loon (<i>Gavia immer</i>)
Baird's Sandpiper (<i>Calidris bairdii</i>)+	Common Merganser (<i>Mergus merganser</i>)
Bald Eagle (<i>Haliaeetus leucophalus</i>)*	Common Nighthawk (<i>Chordeiles minor</i>)
Bank Swallow (<i>Riparia riparia</i>)	Common Raven (<i>Corvus corax</i>)
Barn Swallow (<i>Hirundo rustica</i>)	Common Redpoll (<i>Acanthis flammea</i>)
Barrow's Goldeneye (<i>Bucephala islandica</i>)	Common Tern (<i>Sterna hirundo</i>)+
Belted Kingfisher (<i>Ceryle alcyon</i>)	Common Yellowthroat (<i>Geothlypis trichas</i>)
Black Tern (<i>Chlidonias niger</i>)	Cooper's Hawk (<i>Accipiter cooperii</i>)*
Black-and-white Warbler (<i>Mniotilta varia</i>)+	Cordilleran Flycatcher (<i>Empidonax occidentalis</i>)+
Black-backed Woodpecker (<i>Picoides arcticus</i>)+	Dark-eyed Junco (<i>Junco hyemalis</i>)
Black-bellied Plover (<i>Pluvialis squatarola</i>)+	Double-crested Cormorant (<i>Phalacrocorax auritus</i>)
Black-billed Magpie (<i>Pica hudsonia</i>)	Downy Woodpecker (<i>Picoides pubescens</i>)
Black-capped Chickadee (<i>Poecile atricapillus</i>)	Dusky Flycatcher (<i>Empidonax oberholseri</i>)
Black-crowned Night-Heron (<i>Nycticorax nycticorax</i>)	Dusky Grouse (<i>Dendragapus obscurus</i>)
Black-headed Grosbeak (<i>Pheucticus melanocephalus</i>)+	Eared Grebe (<i>Podiceps nigricollis</i>)
Black-necked Stilt (<i>Himantopus mexicanus</i>)+	Eastern Kingbird (<i>Tyrannus tyrannus</i>)+
Black-rosy Finch (<i>Leucosticte atrata</i>)	Eurasian Collared-Dove (<i>Streptopelia decaocto</i>)+
Blackburnian Warbler (<i>Setophaga fusca</i>)+	European Starling (<i>Sturnus vulgaris</i>)
Blackpoll Warbler (<i>Setophaga striata</i>)+	Evening Grosbeak (<i>Coccothraustes vespertinus</i>)
Blue Jay (<i>Cyanocitta cristata</i>)+	Ferruginous Hawk (<i>Buteo regalis</i>)*
Blue-winged Teal (<i>Anas discors</i>)	Forster's Tern (<i>Sterna forsteri</i>)+
Bohemian Waxwing (<i>Bombycilla garrulous</i>)	Fox Sparrow (<i>Passerella iliaca</i>)
Bonaparte's Gull (<i>Larus philadelphia</i>)+	Franklin's Gull (<i>Larus pipixcan</i>)+
Boreal Owl (<i>Aegolius funereus</i>)*	Gadwall (<i>Anas strepera</i>)
Brewer's Blackbird (<i>Euphagus cyanocephalus</i>)	Golden Eagle (<i>Aquila chrysaetos</i>)*
Brewer's Sparrow (<i>Spizella breweri</i>)	Golden-crowned Kinglet (<i>Regulus satrapa</i>)
Broad-tailed Hummingbird (<i>Selasphorus platycercus</i>)+	Grasshopper Sparrow (<i>Ammodramus savannarum</i>)+
Broad-winged Hawk (<i>Buteo platypterus</i>)*	Gray Catbird (<i>Dumetella carolinensis</i>)
Brown Creeper (<i>Certhia americana</i>)	Gray Jay (<i>Perisoreus canadensis</i>)
Brown-headed Cowbird (<i>Molothrus ater</i>)	Gray-crowned Rosy-Finch (<i>Leucosticte tephroctis</i>)+
Bufflehead (<i>Bucephala albeola</i>)	Great Blue Heron (<i>Ardea herodias</i>)
Bullock's Oriole (<i>Icterus bullockii</i>)+	Great Gray Owl (<i>Strix nebulosa</i>)*
Burrowing Owl (<i>Athene cunicularia</i>)	Great Horned Owl (<i>Bubo virginianus</i>)*
California Gull (<i>Larus californicus</i>)	Greater Scaup (<i>Aythya marila</i>)+

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Greater Yellowlegs (*Tringa melanoleuca*)
 Green-tailed Towhee (*Pipilo chlorurus*)
 Green-winged Teal (*Anas crecca*)
 Hairy Woodpecker (*Picoides villosus*)
 Hammond's Flycatcher (*Empidonax hammondi*)
 Harlequin Duck (*Histrionicus histrionicus*)+
 Hermit Thrush (*Catharus guttatus*)
 Herring Gull (*Larus argentatus*)+
 Hooded Merganser (*Lophodytes cucullatus*)
 Horned Grebe (*Podiceps auritus*)+
 Horned Lark (*Eremophila alpestris*)
 House Sparrow (*Passer domesticus*)
 House Wren (*Troglodytes aedon*)
 Killdeer (*Charadrius vociferus*)
 Lark Sparrow (*Chondestes grammacus*)
 Lazuli Bunting (*Passerina amoena*)
 Least Sandpiper (*Calidris minutilla*)+
 Lesser Scaup (*Aythya affinis*)
 Lesser Yellowlegs (*Tringa flavipes*)+
 Lewis's Woodpecker (*Melanerpes lewis*)+
 Lincoln's Sparrow (*Melospiza lincolni*)
 Loggerhead Shrike (*Lanius ludovicianus*)+
 Long-billed Curlew (*Numenius americanus*)+
 Long-billed Dowitcher (*Limnodromus scolopaceus*)+
 Long-eared Owl (*Asio otus*)*
 MacGillivray's Warbler (*Geothlypis tolmiei*)
 Mallard (*Anas platyrhynchos*)
 Marbled Godwit (*Limosa fedoa*)+
 Marsh Wren (*Cistothorus palustris*)+
 Merlin (*Falco columbarius*)*
 Mountain Bluebird (*Sialia currucoides*)
 Mountain Chickadee (*Poecile gambeli*)
 Mourning Dove (*Zenaidura macroura*)
 Nashville Warbler (*Oreothlypis ruficapilla*)+
 Northern Flicker (*Colaptes auratus*)
 Northern Goshawk (*Accipiter gentilis*)*
 Northern Harrier (*Circus cyaneus*)*
 Northern Hawk Owl (*Surnia ulula*)
 Northern Pintail (*Anas acuta*)
 Northern Pygmy-Owl (*Glaucidium gnoma*)*
 Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)
 Northern Saw-whet Owl (*Aegolius acadicus*)*
 Northern Shoveler (*Anas aclypeata*)
 Northern Shrike (*Lanius excubitor*)+
 Northern Waterthrush (*Seiurus noveboracensis*)+
 Olive-sided Flycatcher (*Contopus cooperi*)
 Orange-crowned Warbler (*Oreothlypis celata*)
 Osprey (*Pandion haliaetus*)*
 Pectoral Sandpiper (*Calidris melanotos*)+
 Peregrine Falcon (*Falco peregrinus*)*
 Pied-billed Grebe (*Podilymbus podiceps*)
 Pileated Woodpecker (*Dryocopus pileatus*)+
 Pine Grosbeak (*Pinicola enucleator*)
 Pine Siskin (*Spinus pinus*)
 Pinyon Jay (*Gymnorhinus cyanocephalus*)+
 Prairie Falcon (*Falco mexicanus*)*
 Red Crossbill (*Loxia curvirostra*)
 Red-breasted Merganser (*Mergus serrator*)
 Red-breasted Nuthatch (*Sitta canadensis*)
 Red-headed Woodpecker (*Melanerpes erythrocephalus*)+
 Red-naped Sapsucker (*Sphyrapicus nuchalis*)
 Red-necked Grebe (*Podiceps grisegena*)+
 Red-necked Phalarope (*Phalaropus lobatus*)+
 Red-tailed Hawk (*Buteo jamaicensis*)*
 Red-winged Blackbird (*Agelaius phoeniceus*)
 Redhead (*Aythya americana*)
 Ring-billed Gull (*Larus delawarensis*)
 Ring-necked Duck (*Aythya collaris*)
 Rock Pigeon (*Columba livia*)
 Rock Wren (*Salpinctes obsoletus*)
 Ross's Goose (*Chen rossii*)+
 Rough-legged Hawk (*Buteo lagopus*)*
 Ruby-crowned Kinglet (*Regulus calendula*)
 Ruddy Duck (*Oxyura jamaicensis*)
 Ruddy Turnstone (*Arenaria interpres*)+
 Ruffed Grouse (*Bonasa umbellus*)
 Rufous Hummingbird (*Selasphorus rufus*)+
 Sage Thrasher (*Oreoscoptes montanus*)
 Sanderling (*Calidris alba*)+
 Sandhill Crane (*Grus canadensis*)
 Savannah Sparrow (*Passerculus sandwichensis*)
 Semipalmated Plover (*Charadrius semipalmatus*)+
 Semipalmated Sandpiper (*Calidris pusilla*)+
 Sharp-shinned Hawk (*Accipiter striatus*)*
 Short-billed Dowitcher (*Limnodromus griseus*)+
 Short-eared Owl (*Asio flammeus*)*
 Snow Bunting (*Plectrophenax nivalis*)+
 Snow Goose (*Chen caerulescens*)+
 Solitary Sandpiper (*Tringa solitaria*)+
 Song Sparrow (*Melospiza melodia*)
 Sora (*Porzana carolina*)
 Spotted Sandpiper (*Actitis macularia*)
 Spotted Towhee (*Pipilo maculatus*)+
 Steller's Jays (*Cyanocitta stelleri*)
 Swainson's Hawk (*Buteo swainsoni*)*
 Swainson's Thrush (*Catharus ustulatus*)
 Tennessee Warbler (*Oreothlypis peregrina*)+
 Townsend's Solitaire (*Myadestes townsendi*)
 Townsend's Warbler (*Setophaga townsendi*)+
 Tree Swallow (*Tachycineta bicolor*)
 Trumpeter Swan (*Cygnus buccinator*)+

Tundra Swan (*Cygnus columbianus*)+
 Turkey Vulture (*Cathartes aura*)+
 Upland Sandpiper (*Bartramia longicauda*)+
 Veery (*Catharus fuscescens*)
 Vesper Sparrow (*Poocetes gramineus*)
 Violet-green Swallow (*Tachycineta thalassina*)
 Virginia Rail (*Rallus limicola*)+
 Warbling Vireo (*Vireo gilvus*)
 Western Bluebird (*Sialia mexicana*)+
 Western Grebe (*Aechmophorus occidentalis*)+
 Western Kingbird (*Tyrannus verticalis*)+
 Western Meadowlark (*Sturnella neglecta*)
 Western Sandpiper (*Calidris mauri*)+
 Western Screech-Owl (*Megascops kennicottii*)*
 Western Tanager (*Piranga ludoviciana*)
 Western Wood-Pewee (*Contopus sordidulus*)
 White-breasted Nuthatch (*Sitta carolinensis*)
 White-crowned Sparrow (*Zonotrichia leucophrys*)
 White-faced Ibis (*Plegadis chihi*)
 White-rumped Sandpiper (*Calidris fuscicollis*)+
 White-throated Swift (*Aeronautes saxatalis*)
 White-winged Crossbill (*Loxia leucoptera*)
 Willet (*Tringa semipalmata*)+
 Williamson's Sapsucker (*Sphyrapicus thyroideus*)
 Willow Flycatcher (*Empidonax traillii*)
 Wilson's Phalarope (*Phalaropus tricolor*)+
 Wilson's Snipe (*Gallinago delicata*)
 Wilson's Warbler (*Cardellina pusilla*)
 Wood Duck (*Aix sponsa*)+
 Yellow Warbler (*Setophaga petechia*)
 Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)
 Yellow-rumped Warbler (*Setophaga coronata*)

Accidentals and Vagrants

American Bittern (*Ardea herodias*)
 Arctic Tern (*Sterna paradisaea*)
 Ash-throated Flycatcher (*Myarchis cinerascens*)
 Band-tailed Pigeon (*Patagioenas fasciata*)
 Black Tern (*Chlidonias niger*)
 Black-billed Cuckoo (*Coccyzus erythrophthalmus*)
 Black-legged Kittiwake (*Rissa tridactyla*)
 Black-throated Sparrow (*Amphispiza bilineata*)
 Blue-gray Gnatcatcher (*Poliophtila caerulea*)
 Bobolink (*Dolichonyx oryzivorus*)
 Burrowing Owl (*Athene cunicularia*)
 Cackling Goose (*Branta hutchinsonii*)
 Canyon Wren (*Catherpes mexicanus*)
 Cape May Warbler (*Setohaga tigrina*)
 Cattle Egret (*Bubulcus ibis*)

Chestnut-sided Warbler (*Setophaga pensylvanica*)
 Chukar (*Alectoris chukar*)
 Clay-colored Sparrow (*Spizella pallida*)
 Common Grackle (*Quiscalus quiscula*)
 Crested Caracara (*Caracara plancus*)
 Eurasian Widgeon (*Anas penelope*)
 Flammulated Owl (*Otus flammeolus*)+
 Gray Partridge (*Perdix perdix*)
 Great Egret (*Ardea alba*)
 Greater White-fronted Goose (*Anser albifrons*)
 Green Heron (*Butorides virescens*)
 Harris's Sparrow (*Zonotrichia querula*)
 Hooded Warbler (*Cardellina citrina*)
 House Finch (*Carpodacus mexicanus*)
 Hudsonian Godwit (*Limosa haemastica*)
 Lapland Longspur (*Calcarius lapponicus*)
 Lark Bunting (*Calamospiza melanocorys*)
 Least Flycatcher (*Empidonax minimus*)
 Lesser Goldfinch (*Spinus psaltria*)
 Long-tailed Duck (*Clangula hyemalis*)
 Mallard x American Black Duck hybrid
 McCown's Longspur (*Rhynchophanes mccownii*)
 Mew Gull (*Larus canus*)
 Orchard Oriole (*Icterus spurius*)
 Ovenbird (*Seirus aurocapilla*)
 Pacific Loon (*Gavia pacifica*)
 Prairie Warbler (*Setophaga discolor*)
 Prothonotary Warbler (*Protonotaria citrea*)
 Red-eyed Vireo (*Vireo olivaceus*)
 Red-shouldered Hawk (*Buteo lineatus*)
 Rose-breasted Grosbeak (*Pheucticus ludovicianus*)
 Rusty Blackbird (*Euphagus carolinus*)
 Sabine's Gull (*Xema sabini*)
 Sage Sparrow (*Amphispiza belli*)
 Say's Phoebe (*Sayornis saya*)
 Scissor-tailed Flycatcher (*Tyrannus forficatus*)
 Snowy Egret (*Egretta thula*)
 Snowy Owl (*Nyctea scandiaca*)+
 Surf Scoter (*Melanitta perspicillata*)
 Swamp Sparrow (*Melospiza georgiana*)
 Tricolored Heron (*Egretta tricolor*)
 Varied Thrush (*Ixoreus naevius*)
 White-throated Sparrow (*Zonotrichia albicollis*)
 White-winged Scoter (*Melanitta fusca*)
 Whooper Swan (*Cygnus cygnus*)
 Whooping Crane (*Grus americana*)
 Wild Turkey (*Meleagris gallopavo*)
 Yellow Rail (*Coturnicops noveboracensis*)
 Yellow-breasted Chat (*Icteria virens*)

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Above and right: A raven scavenging sharp-shinned hawk remains.
NPS Photos J. Frank



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