Yellowstone National Park
Yellowstone Bird Project 2018
Wyoming, Montana, Idaho

Yellowstone Center for Resources
National Park Service
Department of the Interior

Yellowstone Bird Project Annual Report

2018

GREEN-TAILED TOWHEE. (PHOTO - © G. ALBRECHTSEN)

SUMMARY

Raptors

In 2018, 12 of 28 monitored peregrine falcon territories were occupied. All attempted nests (n = 7) were successful and productivity of occupied territories was the highest observed since 2003. In contrast, the nesting success of both bald eagles and osprey was down from the previous several years. In 2018, 17 of 32 monitored bald eagle territories were occupied, with 9 of 16 (56%) eagle nests successful. Twenty-seven of 47 monitored osprey territories were occupied, and only 10 of 17 territories that attempted to nest (59%) were successful. One osprey pair initiated nesting on Yellowstone Lake but was not successful. In 2018, we visited 24 of 28 known golden eagle territories; 22 territories were occupied, nesting success was 30%, and productivity was 0.35 young per occupied territory. During the 2018 fall migration, 259 raptors across 14 species were documented migrating through Yellowstone National Park (YNP). During late winter/early spring owl surveys, observers detected 24 individuals belonging to six species of owls.

Waterbirds

One pair of trumpeter swans, located on Grebe Lake, attempted to nest in 2018 but was not successful in fledging any cygnets. In the fall, 24 adult swans were observed in the park and eight cygnets raised in captivity were released on the Yellowstone and Madison rivers. Sixteen pairs of common loons fledged nine young in YNP in 2018. An additional three unpaired loons were also observed. Two loons were captured and banded in 2018. Seven harlequin ducks, four males and three females, were caught and banded in May 2018. The males were additionally outfitted with satellite transmitters to track their annual movements.

From a small colony on the Molly Islands, American white pelicans fledged 51 young, while double-crested cormorants fledged 21 young. No California gulls or Caspian terns nested 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.

Passerines and Near Songbirds

We used five methods to monitor breeding songbirds in YNP in 2018: point counts in willow stands and mature forests, transects through plots in sagebrush steppe, a banding station, and the North American Breeding Bird Survey (BBS). We recorded 35 songbird species within three willow growth types and captured at least 32 species at our banding station in a willow-lined riparian corridor. Observers recorded 24 species in mature forests and 29 species in sagebrush steppe. We also observed over 3,100 individuals belonging to 82 species along three BBS routes in YNP. During fall migration, we also monitored migrating songbirds in three habitats (willows, mature forest, and sagebrush steppe) using transect methods and the continued operation of the banding station through late September.

FIELD BIOLOGISTS OBSERVE LOONS AT HEART LAKE. (PHOTO - © G. ALBRECHTSEN)

CORE BIRD PROGRAM

RAPTOR MONITORING PROGRAM

Peregrine Falcon

In 2018, the 31st year of YNP's peregrine falcon (*Falco peregrinus*) monitoring effort, we monitored 28 of 36 known breeding territories from late March through July. Twelve territories were occupied and 7 of 8 pairs with a known outcome successfully fledged 15 young. In 2018, nesting success per occupied territory (88%; figure 1) and productivity (1.9 young per occupied territory with known outcome) were the highest observed in YNP since 2003. The average brood size in 2018 was 2.1 young fledged per successful pair, an increase from the past few years.

Bald Eagle

We monitored 32 of the 51 known extant and historical bald eagle (*Haliaeetus leucocephalus*) territories for nesting activity in 2018. Similar to peregrines, not all territories are occupied every year and some have been inactive for years. We confirmed that 17 of the 32 territories were occupied by territorial individuals; 5 territories were unoccupied, and we were unable to determine occupancy at the remaining 10. We determined the breeding season outcome for 16 occupied territories, all of which attempted to breed. Nine nests successfully fledged 11 young (56% nest success per active territory; figure 1). Bald eagle productivity in 2018 was 0.7 young per active territory, the average brood size was 1.2 young per successful nest, and overall the population in YNP appears stable. This parkwide success may be in part due to a notable increase in nesting success around Yellowstone Lake, despite the substantial decrease in Yellowstone cutthroat trout (*Oncorhynchus clarkia bouvieri*; Koel et al. 2005), a historically important eagle prey item (Swenson et al. 1986). Eagles have likely switched to other prey, perhaps including the colonial nesting birds on the Molly Islands (pelicans, cormorants, and gulls) and waterfowl (Baril et al. 2013).

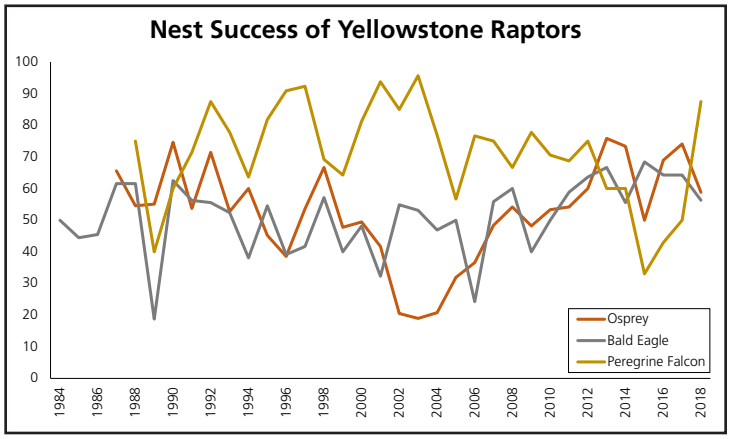
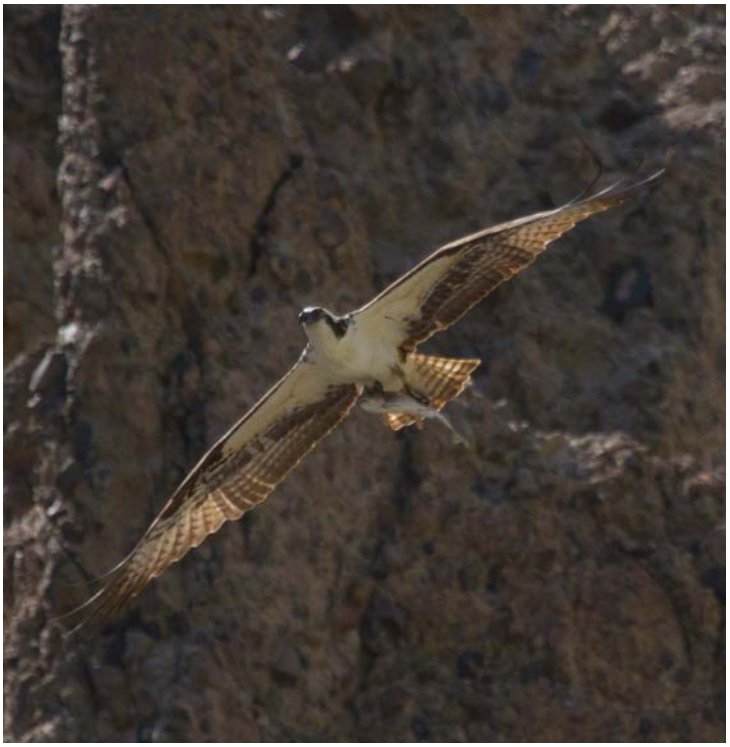


Figure 1. Nest success of three Yellowstone raptor species from 1984 to 2018.



OSPREY. (PHOTO - © G. ALBRECHTSEN)

Osprey

We monitored 47 of the 56 known osprey (*Pandion haliaetus*) territories from mid-May to mid-August. Of these territories, 27 were occupied, 2 were unoccupied, and the occupancy for the remaining 18 could not be determined. Twenty-five territories attempted to nest and we were able to determine the breeding season outcome for 17 territories. Ten territories were successful and fledged a total of 17 young for a nest success per active territory with known outcome of 59%, above the 32-year average of 52% (figure 1). In 2018, we calculated a productivity of 1.0 young per active nest and the average brood size was 1.7 young fledged per successful nest.

In 2018, one osprey pair nested on Yellowstone Lake but did not successfully produce young. From 1987 to 2018 numbers breeding on Yellowstone Lake, as well as the local nest success, have decreased dramatically (Baril et al. 2013), likely due to declines in their primary prey the Yellowstone cutthroat trout (Kaeding et al. 1996, Koel et al. 2005). However, osprey numbers elsewhere in the park have remained relatively stable.

WETLAND BIRD MONITORING PROGRAM

Trumpeter Swan

We observed three territorial trumpeter swan (*Cygnus buccinator*) pairs in YNP during the 2018 breeding season on Grebe, Riddle, and Swan lakes. Nesting was attempted only on Grebe Lake and was unsuccessful, which is consistent with the declining trend in swan population abundance and

YCR STAFF AND WYOMING WETLANDS SOCIETY STAFF/VOLUNTEERS CARRY TRUMPETER SWANS TO THE MADISON RIVER FOR RELEASE. (NPS PHOTO - D. SMITH)

breeding success observed in YNP since 1986 (figure 2). On Riddle Lake, where swans have nested in previous years, swans may have been discouraged from nesting in 2018 by the long-lasting snow cover in the early spring or by the flooded shorelines when the snow melted. Alternatively, this pair may have attempted a shoreline nest that was then inundated when water levels rose, causing it to fail. Because the trail to Riddle Lake is closed throughout much of the spring and summer, we are unable to say for sure whether this pair failed or simply never attempted to nest. We expect the new pair on Swan Lake is relatively young and, although the birds appeared territorial, they did not attempt to nest.

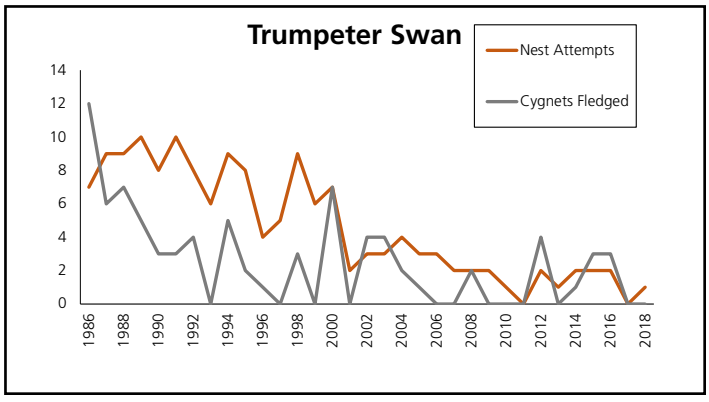


Figure 2. Trumpeter swan breeding pairs and cygnets fledged in Yellowstone from 1986 to 2018.

As on Grebe Lake, Swan Lake has a floating nest platform that may help this pair overcome water level fluctuations in future breeding seasons.

In addition to the pairs on Grebe, Riddle, and Swan lakes, we periodically observed 11 other swans that moved around central YNP from Grizzly Lake to Fishing Bridge throughout the summer. Additionally, a single bird was frequently sighted on the Firehole River and six birds were observed near the southern end of Yellowstone Lake. During our annual fall survey in September, we counted 24 adult trumpeter swans within YNP, which is the most since 1995.

Since 2013, the YNP bird program has partnered with the Wyoming Wetlands Society (WWS) to increase the number of resident swans in YNP through the release of captive-raised cygnets. On 10 September 2018, YNP biologists and WWS released four female swans on the Yellowstone River in the Hayden Valley, near the confluence with Trout Creek. Additionally, four swans were released onto the Madison River near 7-Mile Bridge. Including birds released in 2018, the park has released a total of 31 cygnets over the six-year program.

Colony Nesting Birds

We made three flights over the Molly Islands (comprised of Sandy and Rocky islands) from June to August 2018.

From aerial photographs taken during those flights, we observed approximately 197 American white pelican (*Pelecanus erythrorhynchos*) nests that fledged an estimated 51 young. We counted 33 nesting double-crested cormorants (*Phalacrocorax auritus*) that fledged an estimated 21 young. Although we observed several California gulls (*Larus californicus*) perched on the islands, we did not observe any nesting attempts. We also did not observe any Caspian terns (*Hydroprogne caspia*) on the Molly Islands in 2018.

To better understand the drivers of colonial waterbird decline, bird program staff conducted on the ground observations of the Molly Islands from the lakeshore in early August 2018. At least four bald eagles were observed on the islands during four hours of observation, confirming previous observations from aerial surveys.

Common Loon

In 2018, Wyoming's common loon (*Gavia immer*) population was comprised of 50 total adult birds, 22 territorial pairs, and 17 nesting pairs. Thirteen successful nests fledged 13 young. In YNP, biologists from the Biodiversity Research Institute (BRI), the Ricketts Conservation Fund (RCF), and the park's bird program checked 28 known or historic loon territories. Seventeen of the territories were occupied by at least one loon; in total, the park housed 35 adult loons and 16 pairs (figure 3). Eleven pairs attempted to nest, and two of those failed. The nine successful pairs produced nine loonlets during 2018 (figure 3) for a productivity of 0.56 chicks per territorial pair. In 2018, bird program staff and biologists from BRI and RCF also captured and banded a pair of loons on the South Arm of Yellowstone Lake. Blood and feather samples were collected from each captured bird to be tested for mercury contamination.

YNP provides the majority of occupied loon breeding habitat in Wyoming; in 2018, the park hosted 73% of the state's total loon population and 65% of the breeding pairs. Furthermore, loons in YNP produced 69% of the Greater Yellowstone Ecosystem's (GYE) fledged chicks, highlighting the park's important role in population stability and persistence. In 2018, three birds were killed by gill nets in Yellowstone Lake: one in June and two in early October. Although the October captures may have been migrant birds, the loon netted in June was likely a resident and represents the only known adult loon mortality from the GYE population in 2018. RCF biologists conducted a detailed review of Yellowstone's gillnetting records in the fall of 2018 to better assess patterns in gillnetting mortalities.

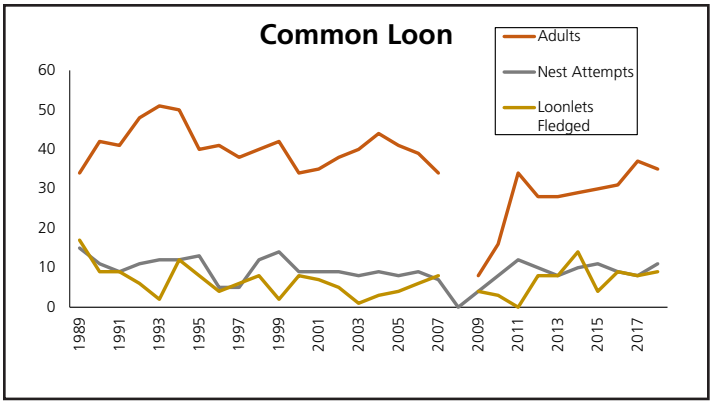


Figure 3. Common loon adults, breeding pairs, and young fledged in Yellowstone from 1989 to 2018.

A COMMON LOON FLOATS IN THE SOUTHEAST ARM OF YELLOWSTONE LAKE. (NPS PHOTO - N. HERBERT)

Songbirds and Near-Passerine Monitoring

Willow Point Count Surveys

The YNP bird program has monitored willow-songbird communities in the park since 2005. In most years, three types of willows were surveyed for breeding passerines (see Baril et al. 2011 for detailed methods): tall, suppressed, and released (or formerly height-suppressed). In 2018, we recorded 35 songbird species across this range of willow growth conditions. Both species richness (figure 4) and average songbird abundance was highest in previously tall willows. Wilson's warblers (*Cardellina pusilla*), willow specialists, were most abundant in previously tall willows (table 1). In contrast, song sparrows (*Melospiza melodia*) were most common in released willow stands with the shrub cover necessary for ground and low nesting species. For other species, such as American robin (*Turdus migratorius*), gray catbird (*Dumetella carolinensis*), and willow flycatcher (*Empidonax traillii*), released and previously tall willows supported similar numbers of individuals. Suppressed willows appear to provide habitat for generalist and grassland species. We documented savannah sparrows (*Passerculus sandwichensis*) and tree swallows (*Tachycineta bicolor*) most commonly in suppressed willows and house wrens (*Troglodytes aedon*), vesper sparrows (*Pooecetes gramineus*), bank swallows (*Riparia riparia*), and yellow-rumped warblers (*Setophaga coronata*) were only observed in this stand type. Although they were most abundant in taller willow stands, Lincoln's sparrows (*M. lincolnii*), yellow warblers (*S. petechia*), and willow flycatchers were relatively common in all stands; common yellowthroats (*Geothlypis trichas*) and white-crowned sparrows (*Zonotrichia leucophrys*) were similarly abundant across all three stand types. In many places released willows exhibit similar structural characteristics to both previously tall and suppressed willows (i.e., tall but dispersed willow shrubs), which contributes to songbird species overlap.

Mature Forest Point Count Surveys

The bird program conducts point count surveys of three mature forest stands that varied in forest structure and tree species composition: mid-successional to climax lodgepole pine (*Pinus contorta*), mixed late-successional lodgepole pine and Engelmann spruce (*Picea engelmannii*), and mixed climax Engelmann spruce and Douglas-fir (*Pseudotsuga menziesii*).

We observed 24 songbird species in the three mature forest study areas (table 2) and, in general, the most abundant species were yellow-rumped warblers, dark-eyed juncos (*Junco hyemalis*), pine siskins (*Spinus pinus*), and American robins. Species richness increased with forest complexity from 11 species in lodgepole-dominated forests to 19 species in Douglas-fir and spruce. Nine species detected in the climax forest were not found at either of the other two sites, including three species of flycatcher.

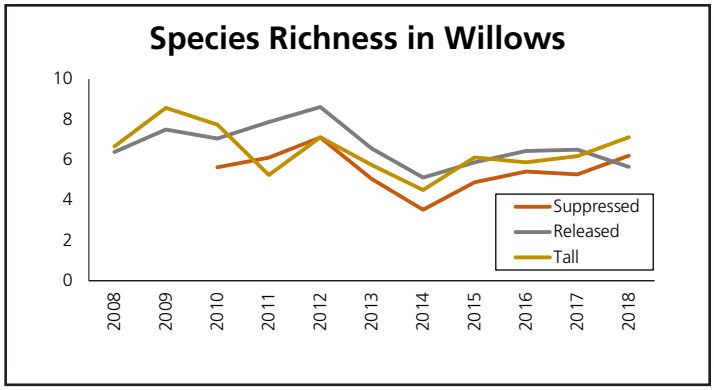


Figure 4. Average songbird species richness across three willow growth conditions from 2008 to 2018.

Sagebrush Steppe Point Count Surveys

In a new survey for 2018, bird program staff and volunteers surveyed songbirds in sagebrush steppe and grassland plots using a double-observer transect method (Nichols et al. 2000). To assess the effects of bison grazing, we surveyed plots identified as high and low bison grazing intensity.

We observed 29 species of songbird in grasslands and sagebrush steppe in 2018, including 21 in plots with high grazing intensity and 22 in low grazing intensity plots (table

BIRD BIOLOGIST LAUREN WALKER RELEASES A BANDED CASSIN'S VIREO. (PHOTO - © G. ALBRECHTSEN)

Table 1. Average abundance of songbird species observed in suppressed, released, and tall willow stands in 2018.

Species	Suppressed	Released	Tall
American Robin	0.05	0.72	0.56
Bank Swallow	0.05	--	--
Black-billed Magpie	0.16	0.09	--
Brown-headed Cowbird	--	0.13	0.06
Brewer's Blackbird	0.32	0.34	0.03
Black-throated Gray Warbler	--	0.03	--
Cassin's Finch	0.05	--	0.03
Chipping Sparrow	0.05	--	0.03
Clark's Nutcracker	--	--	0.03
Common Raven	0.05	0.03	0.06
Common Yellowthroat	0.68	0.38	0.53
Fox Sparrow	--	0.13	0.63
Gray Catbird	--	0.03	0.06
Green-tailed Towhee	0.03	--	--
House Wren	0.03	--	--
Lincoln's Sparrow	0.55	0.72	0.91
Marsh Wren	--	--	0.13
MacGillivray's Warbler	--	0.13	0.09
Mountain Bluebird	--	0.03	--
Pine Siskin	0.71	0.28	0.16
Ruby-crowned Kinglet	--	--	0.03
Red-winged Blackbird	0.11	0.13	--
Savannah Sparrow	1.45	0.56	0.16
Song Sparrow	0.16	0.69	0.38
Swainson's Thrush	--	0.03	--
Tree Swallow	0.11	--	0.03
Vesper Sparrow	0.16	--	--
Violet-green Swallow	0.03	0.06	--
Warbling Vireo	0.05	0.13	0.03
White-crowned Sparrow	0.24	0.16	0.31
Western Meadowlark	--	0.03	--
Willow Flycatcher	0.26	0.66	0.63
Wilson's Warbler	--	0.03	0.53
Yellow-rumped Warbler	0.03	--	--
Yellow Warbler	0.97	1.06	1.63

3). On average, plots in areas of low bison grazing intensity had slightly greater species richness (mean = 6.77, SE = 0.88) than plots in areas with high levels of grazing (mean = 5.63, range = 0.73). In high grazing intensity plots, the most abundant species were Brewer's sparrows (*Spizella breweri*), vesper sparrows, and cliff swallows (*Petrochelidon pyrrhonota*). Brewer's and vesper sparrows were also abundant in low grazing intensity plots, along with green-tailed towhees (*Pipilo chlorurus*) and western meadowlarks (*Sturnella neglecta*). Notably, towhees and meadowlarks were significantly more abundant in low grazing plots than in areas with high grazing intensity.

Table 2. Average abundance of songbird species observed in mature forests in 2018.

Species	Lodgepole	Pine/ Spruce Mix	Douglas-Fir/Spruce Mix
American Robin	--	0.88	1.38
Brown Creeper	--	--	0.19
Cassin's Finch	0.06	--	0.19
Chipping Sparrow	0.13	0.13	0.44
Clark's Nutcracker	0.25	--	--
Dark-eyed Junco	0.19	0.63	1.56
Golden-crowned Kinglet	--	0.06	--
Gray Jay	0.25	--	--
Hammond's Flycatcher	--	0.06	0.31
Hermit Thrush	--	--	0.13
Lincoln's Sparrow	--	0.06	0.06
MacGillivray's Warbler	--	--	0.13
Mountain Chickadee	0.25	0.75	0.19
Olive-sided Flycatcher	--	--	0.13
Pine Siskin	2.13	0.88	1.19
Plumbeous Vireo	--	--	0.06
Pygmy Nuthatch	--	0.13	--
Red-breasted Nuthatch	0.06	0.13	0.13
Ruby-crowned Kinglet	0.50	0.88	0.81
Swainson's Thrush	--	0.38	0.13
Tree Swallow	0.13	--	--
Warbling Vireo	--	0.31	0.06
Western Tanager	--	0.50	0.38
Yellow-rumped Warbler	0.38	1.25	1.00

North American Breeding Bird Surveys (BBS)

In YNP, three BBS routes have been monitored during most summer breeding seasons since the mid-1980s: Mammoth, Northeast Entrance, and Yellowstone. In 2018, we observed more than 3,100 individual birds and a total of 82 species across all three routes. The greatest species diversity and individual bird abundance were both observed along the Yellowstone route (figure 5), which extends from Dunraven Pass southeast to Mary Bay. The number of Canada geese (*Branta canadensis*) in Hayden Valley has increased dramatically in recent years, boosting the total count along the Yellowstone route and compensating for decreases in observations of other waterbird species, including lesser scaup (*Aythya affinis*) and Barrow's goldeneye (*Bucephala islandica*).

Bird Banding Station

For the first time in the history of YNP the bird program operated a banding station in 2018, located in a willow-lined riparian corridor on the northern range. During the breeding season we operated the station in accordance with MAPS (Monitoring Avian Productivity and Survivorship) protocol (DeSante et al. 2018), setting up mist nets and banding songbirds and other near-passerines (e.g., woodpeckers) once every 10-day period throughout the summer. To help assess use of riparian habitats by juvenile and migrating songbirds, we also continued banding operations into the fall (through the end of September).

During the breeding season, we captured 175 individuals belonging to at least 27 different species (table 4). Most captured individuals were adults and the most commonly captured species were yellow warbler and warbling vireo (*Vireo gilvus*). In late summer and early fall, we captured and banded an additional 117 birds of 25 species. Although most fall captures were hatch year birds, the most commonly captured bird in the fall was an adult Wilson's warbler. In total, we captured 32 species utilizing this willow corridor, including 14 songbird species that were not identified during point count surveys of the same area.

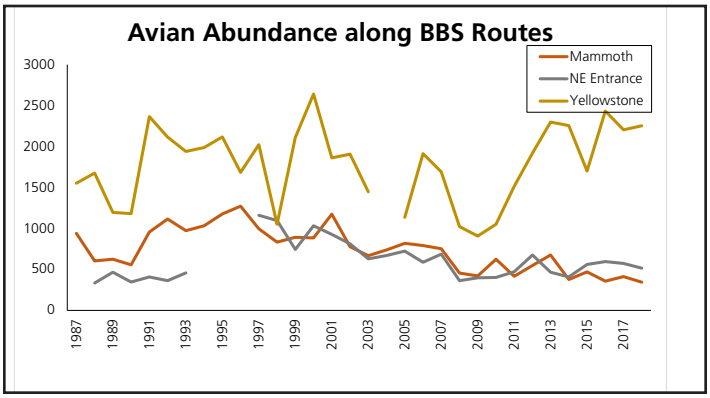


Table 3. Average abundance of songbird species observed in grasslands and sagebrush steppe under high and low levels of grazing intensity in 2018.

	Grazing Intensity	
Species	High	Low
American Robin	0.25	0.22
Black-billed Magpie	0.50	0.00
Brown-headed Cowbird	0.00	0.11
Brewer's Blackbird	0.56	0.72
Brewer's Sparrow	3.56	3.00
Cassin's Finch	0.06	0.33
Chipping Sparrow	0.31	0.50
Cliff Swallow	4.13	0.11
Common Raven	0.00	0.11
European Starling	0.13	0.00
Green-tailed Towhee	0.31	2.89
Hammond's Flycatcher	0.00	0.06
House Wren	0.06	0.00
Lazuli Bunting	0.25	0.00
Lincoln's Sparrow	0.00	0.06
Mountain Bluebird	0.38	0.00
Mountain Chickadee	0.00	0.17
Pine Siskin	0.44	0.22
Ruby-crowned Kinglet	0.00	0.06
Sage Thrasher	0.13	0.00
Savannah Sparrow	0.63	0.28
Townsend's Solitaire	0.00	0.06
Tree Swallow	0.13	0.11
Vesper Sparrow	3.38	5.06
Violet-green Swallow	0.13	0.00
Warbling Vireo	0.00	0.06
White-crowned Sparrow	0.13	0.22
Western Meadowlark	0.13	1.50
Western Tanager	0.06	0.06

Figure 5. (left) Number of total individuals observed during three Breeding Bird Survey routes from 1987 to 2018.

A YELLOW WARBLER IS BANDED AND MEASURED BY A YNP BIOLOGIST. (NPS PHOTO - D. SMITH)

Fall Migration

Between 29 August and 25 September 2018, we conducted 12 surveys for migrant (breeds in YNP or passes through during migration but does not stay year-round) and resident songbirds (species is present in YNP throughout the year) along line transects in three habitat types (willows, grasslands, and mature forest). Songbirds, particularly migrants, were most diverse and most abundant in willows in the fall. Per survey kilometer (km), we observed 60 migrant songbirds belonging to 12 species and 20 residents belonging to 5 species. Yellow-rumped warblers, who breed in Yellowstone but migrate south each winter, were the most abundant species observed in willow stands. In mature forests, we observed 8 migrants of only 2 species and 23 residents belonging to 4 species per km of survey. The resident mountain chickadee (*Poecile gambeli*) was the most commonly observed bird in mature forest in the fall. Sagebrush steppe provided habitat for an average of 17 migrant songbirds belonging to 4 species and only 1 resident bird per km. American pipit (*Anthus rubescens*), a migrant species, was the most abundant songbird observed in sagebrush steppe in the fall.

ADDITIONAL PROJECTS

Arrival of Spring Migrants

Since 2005, D.W. Smith and bird program staff and volunteers have recorded the arrival dates of spring 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. Notable observations in 2018 included red-tailed hawk (*Buteo jamaicensis*) on 11 March, tree swallow on 18 April, vesper sparrow on 2 May, and yellow warbler on 13 May (table 5). For two species, American robins and red-tailed hawks, the first arrival date has become significantly earlier over the past 14 years.

Bald Eagle Population Genetics & Connectivity

Complementing early banding efforts going back to the 1980s, researchers from the Teton Raptor Center (TRC) are currently collaborating to band nestling bald eagles throughout the GYE. In 2018, TRC banded and collected feather and blood samples from three nestlings in three YNP nests. On 20 June researchers accessed bald eagle nests in the Lamar Valley and near the Goose Lake complex, and on 2 July entered the nest on Frank Island on Yellowstone Lake. Young successfully fledged from all three nests.

Golden Eagle Monitoring

We monitored 24 golden eagle (*Aquila chrysaetos*) territories in 2018, of which 22 were occupied. We determined the breeding season outcome for 20 territories. Nine pairs nested and ten were confirmed as non-breeders. For the remaining territory, we were unable to confirm if nesting was initiated, but we did determine no young fledged. Six of nine nesting pairs were successful and fledged a total of seven young. Nest success in 2018 was 30% per occupied territory with known

Table 4. Passerine and near-passerines identified at the Yellowstone banding station in 2018.

	Breeding Season		Post-breeding/Fall Migration		
Species	**Adult**	**Hatch Year**	**Adult**	**Hatch Year**	**Unknown**
American Robin	11	0	0	0	0
Brown-headed Cowbird	3	0	0	0	0
Brewer's Sparrow	8	1	4	6	2
Cassin's Vireo	0	0	1	0	0
Cedar Waxwing	2	0	0	0	0
Chipping Sparrow	0	0	1	5	1
Common Yellowthroat	1	1	0	2	0
Dark-eyed Junco	3	0	3	3	1
Dusky Flycatcher	1	0	2	0	2
Unknown Flycatcher	3	0	0	0	0
Gray Catbird	5	3	0	0	0
Green-tailed Towhee	3	0	0	1	0
House Wren	0	0	0	0	1
Lazuli Bunting	1	0	0	1	0
Lincoln's Sparrow	0	1	0	4	2
MacGillivray's Warbler	8	3	0	2	1
Mountain Chickadee	2	0	0	1	0
Northern Flicker	0	0	0	1	0
Orange-crowned Warbler	5	0	6	3	0
Pine Siskin	2	0	0	0	0
Ruby-crowned Kinglet	1	2	0	3	0
Red-naped Sapsucker	3	2	0	1	0
Rufous Hummingbird	2	0	0	0	0
Song Sparrow	6	6	0	3	1
Swainson's Thrush	3	0	1	0	0
Vesper Sparrow	2	0	0	0	1
Warbling Vireo	27	0	3	1	0
White-crowned Sparrow	0	0	3	4	0
Western Tanager	1	0	0	0	0
Willow Flycatcher	10	0	0	1	1
Wilson's Warbler	1	0	13	6	3
Yellow-rumped Warbler	4	3	4	3	0
Yellow Warbler	22	13	1	8	0
Total Number of Individuals	**140**	**35**	**42**	**59**	**16**
Total Number of Species	**27**	**10**	**12**	**20**	**11**

outcome, equivalent to the average success rate since 2011 (figure 6). Average productivity in 2018 was 0.35 young per occupied territory with known outcome, only slightly below the eight-year average of 0.36.

To learn more about golden eagle survival and movements on Yellowstone's northern range, YNP biologists and the University of Montana (UM) are partnering to capture and band local adult golden eagles, and, for the first time in Yellowstone, affix them with satellite transmitters.

Table 5. Spring arrival dates for common bird species in the Mammoth/Gardiner area from 2005 to 2018.

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
American Kestrel		4 Apr.	12 Apr.	14 Apr.	30 Apr.	17 Apr.	18 Apr.	16 Apr.	6 Apr.	5 Apr.		12 Apr.		17 Apr.
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.		11 Mar.
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.	12 Mar.	11 Mar.
Osprey		6 Apr.		8 Apr.	19 Apr.	12 Apr.	7 Apr.	5 Apr.	4 Apr.	6 Apr.		11 Apr.	5 Apr.	10 Apr.
Red-tailed Hawk		4 Apr.	23 Mar.	3 Apr.		20 Mar.	18 Mar.	19 Mar.	9 Mar.	21 Mar.		12 Mar.	6 Mar.	11 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.	6 Mar.	22 Mar.
Ruby-crowned Kinglet		28 Apr.	29 Apr.	21 Apr.	3 May	17 Apr.	10 May	9 Apr.	17 Apr.	11 Apr.	12 Apr.	13 Apr.		
Tree Swallow		28 Apr.	8 Apr.	13 Apr.	2 May	24 Apr.	11 May	22 Apr.	25 Apr.	27 Apr.		12 Apr.	27 Apr.	18 Apr.
Vesper Sparrow		3 May	13 May	4 May	6 May	7 May			9 May				9 May	2 May
Western Meadowlark		3 Apr.	5 Apr.	14 Apr.	8 Apr.	1 Apr.		31 Mar.	8 Apr.	16 Mar.	12 Mar.	20 Mar.		4 Apr.
White-crowned Sparrow				1 May	1 May	7 May		26 May				21 Mar.	6 May	
Yellow Warbler	18 May	12 May	13 May	19 May	17 May	18 May	21 Mar.	8 May		4 June		13 May	19 May	13 May
Yellow-rumped Warbler		28 Apr.	29 Apr.	20 Apr.	9 Mary	17 Apr.		7 May	6 May	16 May		13 Apr.		

*Arrival date estimated from observations in Paradise Valley on 24 Mar. and Phantom Lake on 17 Mar.

In August 2018, a UM graduate student caught a female golden eagle southeast of Blacktail Ponds and data collection from her transmitter began immediately, recording movements as far away as northern Paradise Valley. A second female eagle was captured, banded, and outfitted with a transmitter in December.

Raven Movements

Common ravens (*Corvus corax*) are large, intelligent, and wide-ranging birds that frequently scavenge, utilizing a variety of food sources including human trash and wolf-killed carcasses. In 2018, scientists from YNP, the University of Washington, and the Max Planck Society in Germany partnered to begin a study into raven movements in Yellowstone, anticipating seasonal variability as different

Figure 6. Golden eagle nest success and productivity in Yellowstone from 2011 to 2018.

DAVID HAINES, UNIVERSITY OF MONTANA GRADUATE STUDENT STUDYING GOLDEN EAGLES FOR HIS MS DEGREE, HOLDS FOR INSTRUMENTATION THE FIRST GOLDEN EAGLE EVER CAPTURED IN YNP. (BLACKTAIL DEER PLATEAU, YNP.) THIS ADULT FEMALE LATER DIED DUE TO LEAD POISONING WHICH WAS ASSOCIATED WITH MOVEMENTS NORTH OF THE PARK.

HARLEQUIN DUCKS. (NPS PHOTO - B. CASSIDY)

food resources become more or less available. The first ravens of this study, a territorial pair located near Mammoth Hot Springs, were caught and banded in October of 2018. Blood samples were taken from both birds and the male was additionally outfitted with a transmitter to collect location data, a first for a YNP songbird.

Fall Raptor Migration

By monitoring raptors migrating through YNP, the bird program aims to establish baseline information on the abundance, diversity, and timing of raptor migration. In 2018, we conducted one count at our traditional migration count location in Hayden Valley. Additionally, in an effort to assess a more easily accessible count location, we conducted eight raptor migration counts in the Rescue Creek area (north of Mammoth Hot Springs). At least two people counted each survey day and counts lasted 5.3 hours on average. Across all observation days, we counted 259 raptors of at least 14 species (table 6). The highest daily count of 90 raptors was recorded on 8 October, and we observed the fewest migrating raptors (6 individuals) on 10 September. As expected from previous seasons of raptor migration observation (Baril et al. 2017a,b), red-tailed hawks were a common migrating raptor and accounted for 25% of our observations (77 individuals). Contrary to patterns observed in previous migration seasons, golden eagles were recorded 96 times (31% of total observations) and were the most frequently observed migrating raptor in 2018, with 54 tallied on 8 October alone.

Table 6. Migrating raptors observed from two count locations in Yellowstone in 2018. Eight counts were conducted from Rescue Creek and one in Hayden Valley.

Species	Rescue Creek	Hayden Valley
American Kestrel	7	0
Bald Eagle	13	1
Cooper's Hawk	11	0
Ferruginous Hawk	2	1
Golden Eagle	94	2
Merlin	2	0
Northern Goshawk	2	1
Northern Harrier	6	1
Osprey	9	0
Peregrine Falcon	2	0
Prairie Falcon	1	0
Red-tailed Hawk	53	24
Rough-legged Hawk	1	0
Sharp-shinned Hawk	14	1
Unknown Accipiter	2	0
Unknown Buteo	2	1
Unknown Falcon	2	0
Unknown Raptor	4	0
Total	**227**	**32**

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 U.S. Geological Survey since 1992. YNP has participated in the mid-winter count since at least 1987. Nine volunteers participated in the mid-winter eagle survey on 12 January 2019. Observers recorded seven adult bald eagles, one immature bald eagle, and two adult golden eagles.

Harlequin Ducks

As part of a broad-scale effort to better understand the breeding and wintering habits of harlequin ducks (*Histrionicus histrionicus*) across the west, researchers from BRI and Wyoming Game and Fish caught and banded seven harlequin ducks, four males and three females, in YNP in May 2018. All four male harlequin ducks were outfitted with satellite transmitters, enabling researchers to track their movements in real time. Three males departed Yellowstone in June and arrived on wintering grounds off the Pacific Coast within five or six days. The fourth male left Yellowstone in early July and appears to have died during migration on the Fraser River, British Columbia around 14 July.

Owls

We conducted nocturnal surveys for owls from February through May in the northern portion of YNP using passive listening, call playback, and observations of perched owls. Owl surveys are conducted by volunteers, enabling them to continue after the completion of the YRI in 2015. Surveys are designed to provide an index of sites that attract advertising males of several northern forest owl species. Across the six-year period during which owl surveys have been conducted, we observed the greatest owl species diversity in 2018 (table 7). Observers detected individuals of six owl species: boreal owl (*Aegolius funereus*; n = 6), great horned owl (*Bubo virginianus*; n = 8), northern saw-whet owl (*A. acadicus*; n = 6), northern pygmy-owl (*Glaucidium gnoma*; n = 2), long-eared owl (*Asio otus*; n = 1), and great grey owl (*Strix nebulosi*; n = 1).

In addition to the single long-eared owl detection during our active survey period, a nesting pair of long-eared owls

Table 7. Owl detections during nocturnal surveys in the late winter-early spring from 2013 to 2018.

	Survey Year					
Species	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Boreal Owl	8	5	8	12		6
Northern Saw-whet Owl	3	1	3	7	9	6
Northern Pygmy Owl	1	1	3	6	2	2
Great-horned Owl	12	8	7	6	4	8
Long-eared Owl				1		1
Great Gray Owl		3				1
Total Owl Abundance	**24**	**18**	**21**	**32**	**15**	**24**
Owl Species Richness	**4**	**5**	**4**	**5**	**3**	**6**

was observed in Indian Creek Campground in July. This is the second consecutive year long-eared owls successfully nested in this area. In 2017, two young fledged from the first confirmed long-eared owl nest within the park since 2009.

Public Outreach and Education

For the ninth year, retired education ranger Katy Duffy led hawk ecology and identification programs during September. Fourteen 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, where over 120 visitors stopped to observe migrating raptors, discuss identification tips, and learn about the ecology of raptor migration. Thirty visitors participated in bird migration activities led by Duffy, celebrating International Migratory Bird Day in May. Duffy also taught three classes for the Yellowstone Forever Institute, including a migration course in late May, an owl ecology and identification class in early June at the Lamar Buffalo Ranch, and a raptor ecology and identification course in September. Finally, Duffy presented four talks on raptors for the Yellowstone Co-op Employee Recreation Programs during the summer.

Noteworthy and Rare Bird Sightings

Reports of rare or unexpected birds provide important information regarding distribution, occurrence, and breeding status of species for which we have little information or for which population distributions are changing. We encourage park staff and visitors to submit all raptor sightings and observations of rare or unusual birds to **yell_bird_observations@nps.gov** or at **http://www.nps.gov/yell/naturescience/wildlife-sightings.htm.**

In 2018, the bird program received reports of a chestnut-sided warbler (*Setophaga pensylvanica*) near Artist's Point in June and a Bullock's oriole (*Icterus bullockii*) along the Hellroaring trail at the end of May. A black-throated gray warbler (*S. nigrescens*) was identified along Blacktail Deer Creek in June and in late September a Cassin's vireo (*Vireo cassinii*) was seen in the same area. Several uncommon shorebirds were also reported in Yellowstone in 2018, including white-faced ibis (*Plegadis chihi*), American avocet (*Recurvirostra americana*), marbled godwit (*Limosa fedoa*), and black-necked stilt (*Himantopus mexicanus*) in Hayden Valley and both Clark's (*Aechmophorus clarkii*) and western grebes (*A. occidentalis*) near Pelican Creek.

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MOUNTAIN CHICKADEE. (PHOTO - ©G. ALBRECHTSEN)

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