Yellowstone National Park
Mammoth Hot Springs, Wyoming

National Park Service
U.S. Department of the Interior

YELLOWSTONE NATIONAL PARK

Bird Monitoring Report

2013

All photographs are NPS photos unless noted otherwise.

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Yellowstone National Park Bird Monitoring Report 2013

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Executive Summary

During 2013 Yellowstone National Park (YNP) maintained its 30-year long core bird monitoring program (YNP-BP) and continued the Yellowstone Raptor Initiative (YRI) for the third year, which is a five-year program ending in 2015. The YRI is designed to complement the YNP-BP by focusing on the role of aerial predators (hawks, eagles, and owls) in Yellowstone National Park that are not covered by the YNP-BP.

From April–July of 2013, we monitored 25 peregrine falcon eyries for evidence of breeding. Peregrines in YNP continue to be highly successful and the population remains stable although nesting success in 2013 (60%) was well below the 26-yr average (74%). In contrast, bald eagles and ospreys had the highest nesting success ever recorded during the 30 and 27-years of surveys, respectively. Of the 22 active bald eagle nests, 64% were successful and of the 29 active osprey nests, 87% were successful. It's normal for reproductive success to vary from year to year. Factors such as temperature and precipitation can play a significant role in these fluctuations.

We recently completed a study on the effects of cutthroat trout declines in Yellowstone Lake on the breeding success of ospreys and bald eagles during 1987-2009. We found that many ospreys no longer nest at Yellowstone Lake and those that do have reduced reproductive success. The declining osprey population at Yellowstone Lake is strongly associated with declines in cutthroat trout since lake trout were introduced there. The recovery of cutthroat trout at Yellowstone Lake is vital to maintaining a breeding population of ospreys at the lake. In contrast, the number of breeding pairs of bald eagles increased at Yellowstone Lake, while nesting success and other reproductive variables declined – a result that was not explained by cutthroat trout declines. The recovery of cutthroat trout may be less important for bald eagles nesting there partly because bald eagles are dietary generalists relying on many food sources including ducks and carcasses. The study was published in the Journal of Raptor Research in September 2013 and is available upon request.

Trumpeter swans were monitored in mid-winter and autumn as part of the Tri-state annual survey coordinated by USFWS. We also monitored breeding swans in YNP and the Paradise Valley. During the winter survey (February 11), 383 total swans were counted in YNP (2), on Hebgen Lake (356) and the Paradise Valley (25). During the autumn survey (September 16) 51 swans were counted in the three study areas: 27 in Paradise Valley, 24 in YNP, and 0 at Hebgen Lake. We released 10 swans (3 yearlings and 7 cygnets) into the park during the summer of 2013. The birds were released at 3 separate locations in the park: Delusion Lake (3 yearlings), Tern Lake (3 cygnets) and the Yellowstone River in Hayden Valley (4 cygnets). The goal is to increase the number of territorial pairs in YNP so that the population becomes self-sustaining in the future. The Grebe Lake pair did not nest this year, although they did return to Grebe Lake with 2 of their 4 young from the

previous year. A second pair of trumpeter swans nested at Riddle Lake and hatched 5 cygnets, however, the cygnets did not fledge for the 6th year in a row. During 2012 and 2013 predation by a bald eagle was likely responsible for the failures.

We surveyed colonial nesting birds on the Molly Islands, including Caspian terns, American white pelicans, double-crested cormorants, and California gulls. The nesting success of double-crested cormorants and American white pelicans appears to be stable despite large year-to-year variability in weather and lake water levels. American white pelicans fledged 353 young from a total of 601 nest attempts, while double-crested cormorants fledged 9 young from 37 nests. California gulls fledged 2 young this season with 6 observed nesting attempts. California gulls have been decreasing on the Molly islands in recent years and Caspian terns have not nested there since 2005 although were observed foraging in the Southeast arm of Yellowstone Lake in July.

Common loons were surveyed at 36 historically occupied sites from June through late September. We counted 23 adults, 3 sub-adults and 8 loonlets in YNP. YNP is currently working with the Biodiversity Research Institute (BRI) to learn more about the Wyoming population since it is isolated by more than 200 miles from the nearest breeding population in northwestern Montana. Yellowstone also supports the majority of loons occurring in Wyoming and is therefore of conservation value.

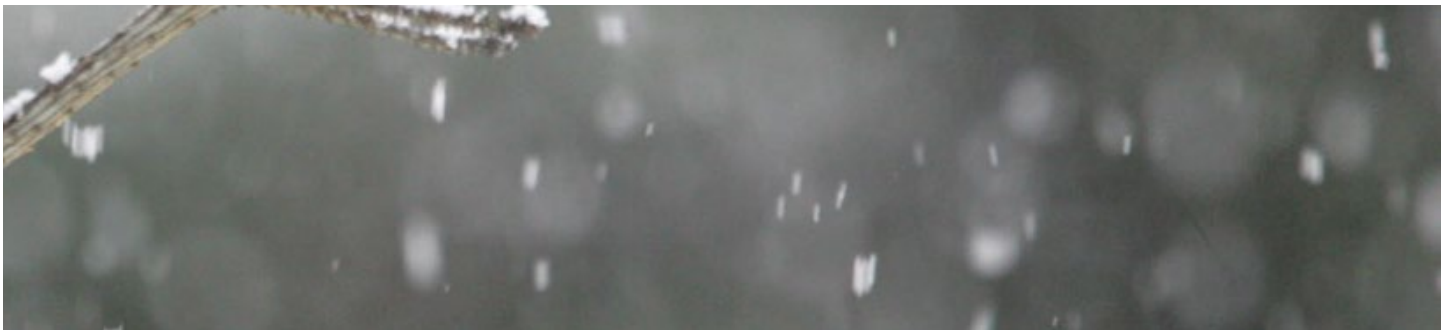
We continued to monitor songbirds via three methods: point counts in willow stands, forest burn point counts and the Breeding Bird Survey (BBS). The willow-bird study is designed to track songbird populations as they respond to increasing willow growth on the northern range. The forest burn surveys are designed to address increased fire frequency due to climate change and its impacts on the bird community, specifically woodpecker and songbird response by comparing recently burned plots to older burned plots. This year we added two new forest fires to the survey, the Cygnet Fire and the Point Fire. The BBS survey is an international survey designed to index bird population trends through time and we annually monitor three routes. On these routes we recorded 89 species and 3,441 individual birds.

We discovered four additional golden eagle territories over the 18 located during 2011 and 2012 bringing the total to 22 known territories in YNP. Over the past three years all golden eagle territories surveyed remained occupied; an important indicator of population health, but there is little consistency in nesting success and productivity over the three years of surveys. Differences among years in late winter and early spring prey may serve as a driver for these fluctuations. Since 2011 we documented 44 red-tailed hawk territories on the northern range. Although red-tailed hawks appear to be highly successful in YNP's northern range, nesting success was lower during 2013 (70%) than during 2012 (89%) and 2011 (79%).

We continued our raptor road survey designed to provide an estimate of population abundance at the end of the 5-year survey. A total of 294 detections across 12 species were made at the end of two surveys in 2013. Red-tailed hawks (64%) comprised the majority of detections followed by American kestrels (10%) and Swainson's hawks (7%). Unfortunately the autumn raptor migration counts in Hayden Valley were interrupted by the October government shutdown. Most eagles and rough-legged hawks migrate during October; therefore we missed the majority of these species. During September we documented 635 raptors across 15 species. The most abundant species observed were red-tailed hawks (27%), Swainson's hawks (27%), and sharp-shinned hawks (11%). All other species represented <10% of the total.

Visitors and YNP staff submitted 134 raptor observations during 2013, far fewer than during 2012. Most reports were observations of red-tailed hawks and some of these observations led to the discovery of new nests. In addition to our inventory and monitoring programs we participated in public outreach events including a raptor ecology discussion and observation field trip led by Interpretive Ranger K. Duffy on September 22. We also hosted a mid-winter bald and golden eagle survey that documented 57 eagles (48 bald eagles and 9 golden eagles) in YNP and the Paradise Valley. These programs served to foster enthusiasm and increase public appreciation for raptors in YNP. Lastly, we kept a species list that included all reliable bird sightings from the year in YNP. Notable sightings from this year include a Bullock's oriole, Forster's tern and a short-eared owl.

Introduction



Yellowstone National Park (YNP) is surprisingly rich in bird diversity given the harsh environmental conditions that characterize the landscape. The variation in elevation and broad array of habitat types found within YNP contributes to the region's relatively high diversity. The YNP bird program monitors a small portion of its breeding bird species with the broad goal 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 (>20 years) for several species. Maintenance of long-term monitoring efforts will help inform park staff of potential shifts in ecosystem function (e.g. climate change effects) for YNP's bird community and may guide future management decisions with the aim of conserving avian resources in the park. Over 3 million visitors are welcomed by YNP every year, many of them avid bird watchers or simply interested in all wildlife. It is our goal to share with the public information on YNP's diversity of bird life and the status of YNP's birds. This report summarizes data gathered for these programs during 2013. For details regarding field protocols and program history see the 2011 annual report.

The Yellowstone National Park core bird program (YNP-BP) is currently divided into three broad classes meant to include species representative of YNP's diversity: the Raptor Monitoring Program, the Wetland Bird Monitoring Program, and the Passerine and Near Passerine Monitoring Program. Three species - the bald eagle, peregrine falcon and osprey - are monitored under the Raptor Monitoring Program. With the removal of the peregrine falcon and bald eagle from the Federal List of Endangered and Threatened Wildlife and Plants in 1999 and 2007 respectively, there are currently no federally listed bird species in YNP. However, monitoring efforts for these species will continue to contribute to YNP's long-term dataset and to meeting the monitoring obligations outlined in the US Fish and Wildlife Service (USFWS) post-delisting monitoring plans.

Trumpeter swans, common loons, and colony nesting species, including double-crested cormorants and American white pelicans, are included in the Wetland Bird Monitoring Program. The trumpeter swan and common loon are of particular concern in YNP due to a locally declining population and low reproductive success during the last several decades.

The breeding bird survey (BBS), willow-bird survey, and forest burn survey are part of the Passerine and Near Passerine Monitoring Program. This program was recently expanded to fill the gap in knowledge regarding the abundance and habitat use by passerines and closely allied species in YNP. This program is particularly valuable since species in this group represent the majority of all species found within YNP.

The Yellowstone Raptor Initiative (YRI) is a new project focused on diurnal and nocturnal raptors within YNP. This effort was developed to compliment the YNP-BP focused on the role of aerial predators in YNP. Yellowstone supports 12 diurnal and seven nocturnal breeding species of raptor, and a further 14 species that have used or currently use the Yellowstone landscape during migrations and seasonal movements. Several are of growing conservation concern in the U.S. including golden eagle, Swainson's hawk, and northern goshawk. Yet despite Yellowstone's raptor diversity, large relatively undisturbed landscape, and heightened conservation focus for several species, little data exists regarding population size, productivity, and seasonal movements for raptors in Yellowstone other than for those monitored under the YNP-BP. The YRI is designed to fill this gap in knowledge by expanding inventory and monitoring efforts to select raptor species not traditionally covered under the YNP-BP.

2013 Breeding Season Weather

Precipitation during April was similar to the 30-year average while May, June and July were substantially drier (Figure 1). This trend reversed in August. Monthly average temperatures were slightly warmer during April and August, but were average during May-July (Figure 2).

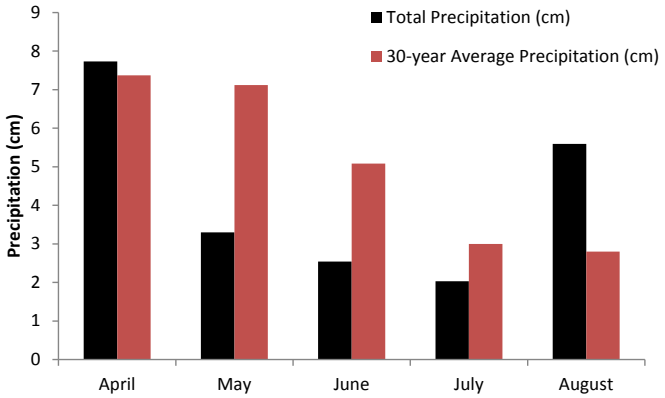


Figure 1. Monthly precipitation recorded at the Lake weather station during the core breeding season (April - August 2013).*

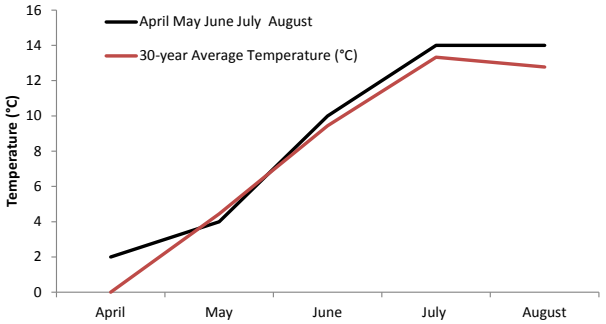


Figure 2. Monthly temperatures recorded at the Lake weather station during the core breeding season (April - August 2013).*

*Data gathered from the Natural Resources Conservation Service (http://www.wcc.nrcs.usda.gov/nwcc/site?sitenum=816&state=wy)

Climate Change

With rising temperatures and changing weather patterns, variance in the phenology of ecological events is expected. Within YNP however, it is largely unknown how climate change has affected or will affect ecosystem processes. In order to protect YNP's resources it is vital to be able to detect changes in ecosystem function so that appropriate management action can be taken. Birds have been 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 been shown to influence migration patterns, population size and distribution, and the timing of reproduction and nesting success (Crick, 2004).

Since 2005, D. W. Smith has kept a record of spring arrival dates (migrants) in the Mammoth/Gardiner area for many common species. In the spring of 2012 we expanded the scope of this project by encouraging park staff to submit their first arrival sightings and continued it during 2013. Twenty-seven observers recorded 139 individuals across 65 species throughout YNP and the surrounding towns of Gardiner and West Yellowstone. Among the first migratory species recorded in early March were American robins, mountain bluebirds, red-tailed hawks and red-winged blackbirds followed by American kestrels, ospreys and western meadowlarks in early to mid-April (Table 1). Some American robins probably remained in and around YNP throughout the winter. In general, short distance migrants (red-tailed hawks) arrive first and are followed by long distance migrants (e.g. yellow warblers). All first arrivals listed in Table 1 were first observed on the northern range, however great blue herons were first observed in Gibbon Meadows on April 10 followed by turkey vultures on April 24 (Madison Campground) and American white pelicans (Hayden Valley) on April 25. Sandhill cranes, harbingers of spring, were first observed in Lamar Valley on March 31.

Because of changes in how these data are collected and the relatively short duration this information has been gathered (9 years), it is too early to determine trends in arrival dates for any one species. However, expanding the scope of the project to include area birders over the entire park has improved the utility of these data. It is intended that this dataset will be ongoing to determine if a shift in the mean arrival date is occurring for select species. In addition to first arrivals, the timing of nest initiation, incubation, and fledging will be monitored for several species of raptor and may be useful in determining the effects of climate change in Yellowstone.

Table 1. Spring arrival dates for common species in the Mammoth-Gardiner area from 2005-2013.

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013
Osprey		6-Apr		8-Apr	19-Apr	12-Apr	7-Apr	5-Apr	4-Apr
Red-tailed hawk		4-Apr	23-Mar	3-Apr		20-Mar*	18-Mar	19-Mar	9-Mar
American kestrel		4-Apr	12-Apr	14-Apr	30-Apr	17-Apr	18-Apr	16-Apr	6-Apr
Tree swallow		28-Apr	8-Apr	13-Apr	2-May	24-Apr	11-May	22-Apr	25-Apr
Ruby-crowned kinglet		28-Apr	29-Apr	21-Apr	3-May	17-Apr	10-May	9-Apr	17-Apr
Mountain bluebird	8-Mar	4-Mar	18-Mar	29-Mar	12-Mar	25-Mar	17-Mar	7-Mar	9-Mar
American robin	20-Mar	14-Apr	17-Mar	28-Mar	21-Mar	18-Mar	25-Mar	18-Feb	6-Mar
Yellow warbler	18-May	12-May	13-May	19-May	17-May	18-May	21-May	8-May	14-May
Yellow-rumped warbler		28-Apr	29-Apr	20-Apr	9-May	17-Apr		7-May	6-May
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	-
Western meadowlark		3-Apr	5-Apr	14-Apr	8-Apr	1-Apr		31-Mar	8-Apr
Red-winged blackbird	10-Mar	16-Mar	18-Mar	8-Apr	17-Mar	29-Mar	21-Mar	5-Mar	10-Mar

Note: * indicates estimated arrival from Paradise Valley (3/24) and Phantom Lake, YNP (3/17). 2011-2012 observations were collected by multiple observers.

Yellowstone Core Bird Program

Raptor Monitoring Program

Peregrine Falcon

We monitored 25 of the 33 known peregrine breeding territories from late-April through July to determine the number of occupied territories and reproductive success of each. Nineteen of the 25 territories were occupied by at least one adult peregrine. We confirmed 13 active nest attempts, nine of which fledged at least one young yielding 60% nesting success per occupied territory (Figure 3). Confirmed fledglings totaled 20, and productivity per occupied territory and brood size averaged 1.33 and 2.22, respectively (Figure 4). We formerly calculated nesting success and productivity per active nest because we lacked historic information on territory occupancy, however new data provided by Wyoming Game and Fish filled in some of the gaps in our dataset prior to 2008. Therefore, we were able to calculate these variables by occupied territory, a better measure of breeding success. Figures 3 and 4 are updated with this new information. Overall, YNP's peregrine population meets or exceeds the thresholds identified in the USFWS post-delisting monitoring plan (2003). In general, peregrines begin incubation in early May and fledge young during mid to late July (Table 2). Annual variability in egg laying is expected as birds respond to annual variation in spring weather conditions. Finally, we collected prey remains and eggshell fragments from four eyries during 2013 which were being analyzed at the time of publication.

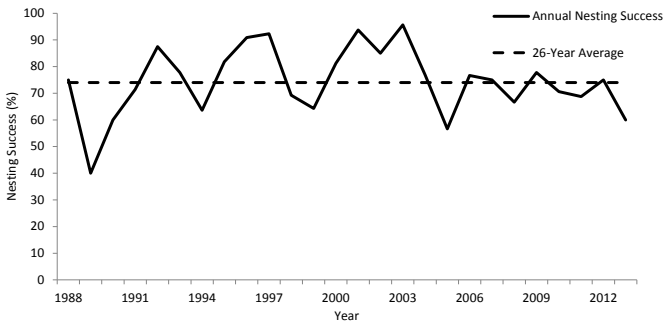


Figure 3. Peregrine falcon nesting success during 1988-2013 and comparison with the 26-year average.

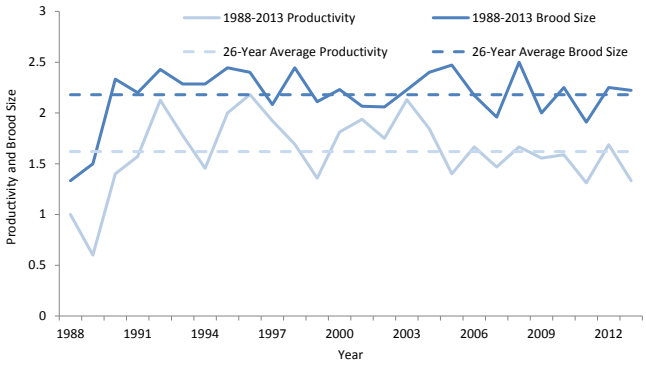
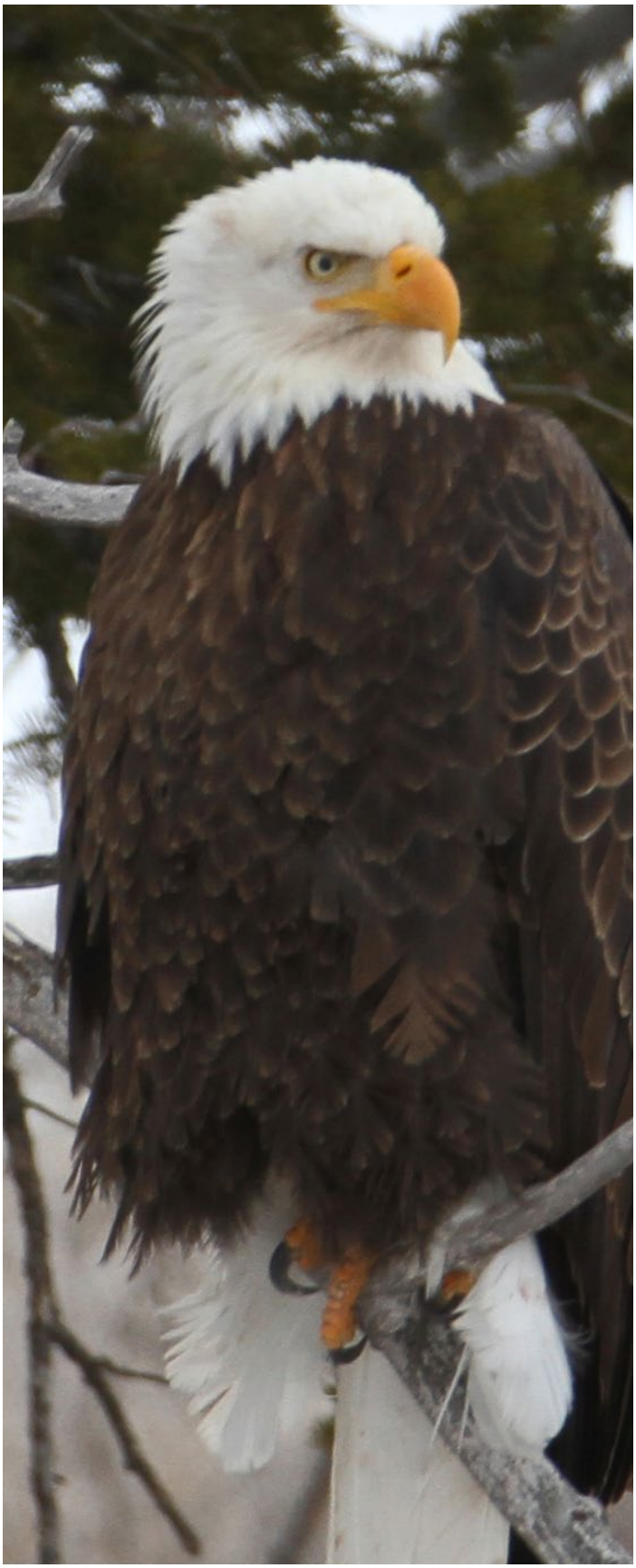


Figure 4: Peregrine falcon productivity and brood size during 1988-2013 and comparison with the 26-year average.

Table 2. Peregrine falcon nesting chronology in Yellowstone National Park during 2009-2013.

	Mean Incubation Range	Mean Hatching Range	Mean Fledging Range
Average for 2013 (*n* = 6)	May 9-11	Jun-13	July 20-24
Average for 2012 (n = 12)	May 2-4	June 5	July 13-17
Average for 2011 (*n* = 9)	May 9-12	June 10-15	July 19-24
Average for 2010 (*n* = 11)	May 1-4	June 3-6	July 11-15
Average for 2009 (*n* = 12)	May 5-8	June 10-13	July 20-23



Bald Eagle

We monitored 30 territories for nesting activity. Of the 30 territories two contained non-breeding pairs, two were unoccupied, and five were occupied, but nesting status could not be determined. There were 21 active nests, 14 (66%) were successful which is higher than the 30-year average (Figure 5). The 14 nests produced 19 young and productivity per active nest averaged 0.90 and the average brood size for the park was 1.36 (Figure 6). This year's nesting success per active nest rate and productivity were higher than 2012, but brood size was slightly lower.

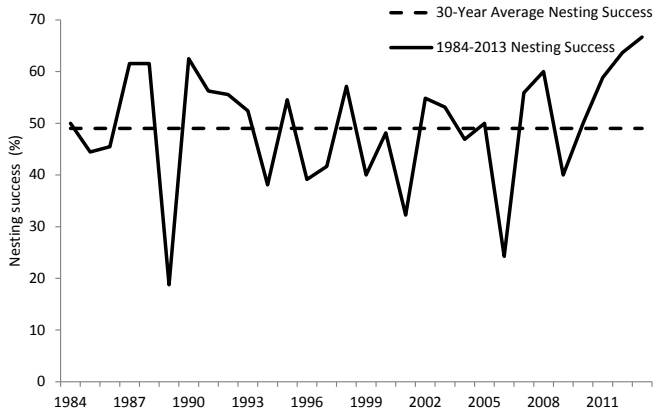


Figure 5. Bald eagle nesting success during 1984-2013 and comparison with the 30-year average.

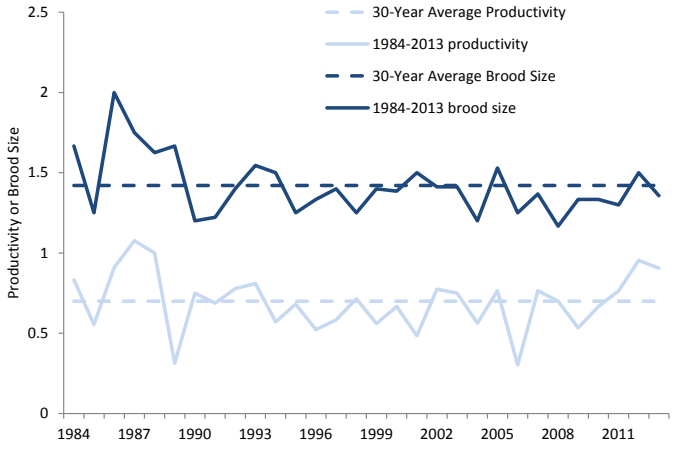


Figure 6. Bald eagle brood size and productivity during 1984-2013 and comparison with the 30-year average.

Osprey

We monitored 32 osprey territories and all but one was occupied. Two territories were occupied, but we could not determine the outcome. In total we monitored 29 active osprey nests from mid-May through mid-August. Of the 29 nesting pairs, 22 (87%) successfully fledged a total of 44 young, substantially more than during 2012 (Figure 7). The overall productivity in the park was 1.52 and the average brood size was 2.00 (Figure 8). Two of the three nests on Yellowstone Lake fledged a total of three young. Although only 3 young fledged, 2013 represents the most successful year on Yellowstone Lake since 2006. Park-wide, trends in nesting success and productivity continue to increase after reaching their lowest values during 2003.

Bald Eagle and Osprey Research Summary

In YNP, ospreys feed primarily on cutthroat trout and cutthroat trout represent approximately 23% of prey consumed by bald eagles during the breeding season. The introduction of exotic lake trout to Yellowstone Lake during the late 1980s caused substantial declines in cutthroat trout. Historically, more than half of all breeding pairs of ospreys and bald eagles in YNP have nested and foraged at Yellowstone Lake and the declines in cutthroat trout have affected rates of reproduction for these two species. We studied the relationship between an index of cutthroat trout abundance and spring weather on osprey (1987-2009) and bald eagle (1987-2007) reproduction. We found steep declines in osprey productivity and nesting success, and a dramatic decline in the number of osprey breeding pairs. Bald eagle productivity and nesting success also declined, but at a slightly slower rate than that of ospreys, and the number of bald eagle breeding pairs increased over the study period. Osprey reproduction was positively correlated with an index of cutthroat trout abundance and spring temperatures. The relationship between bald eagle reproduction and the index of cutthroat trout abundance however, remains unclear. Our results suggest that the recovery of cutthroat trout is important to maintaining a breeding population of ospreys at Yellowstone Lake, but may be less important for the Yellowstone Lake bald eagle population. In 2013 two of the three active osprey nests on Yellowstone Lake were successful and all six of the active bald eagle nests on Yellowstone Lake were successful. During the last few years osprey nesting activity increased at Yellowstone Lake, a trend we hope continues as cutthroat trout increase.

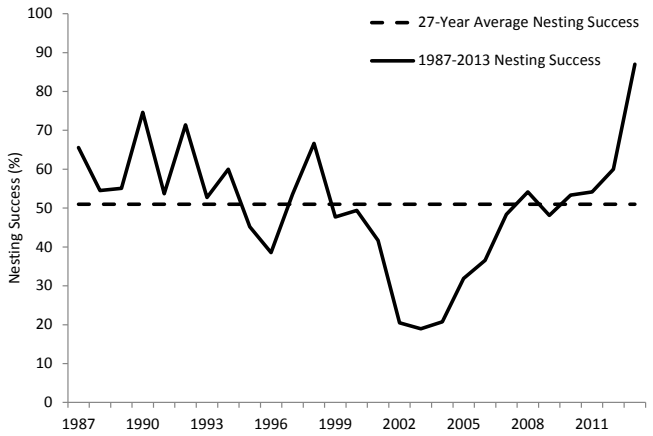


Figure 7. Osprey nest success during 1987-2013 and comparison with the 27-year average.

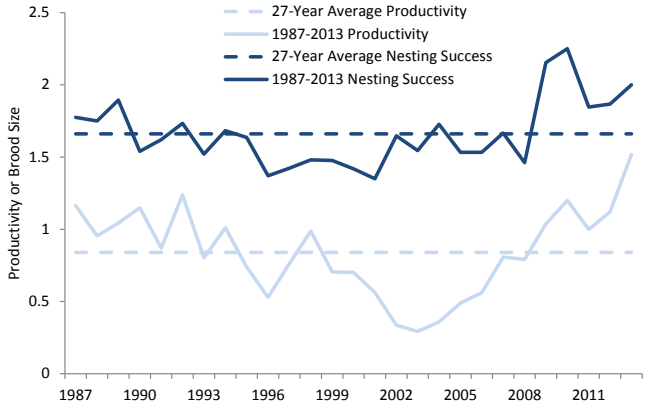


Figure 8. Osprey brood size and productivity during 1987-2013 and comparison with the 27-year average.

Trumpeter Swan

Winter Count of Trumpeter Swans

We counted 383 swans in Paradise Valley (25 swans), YNP (2 swans), and on Hebgen Lake (356 swans) during the mid-winter survey flight conducted on February 11th (Figure 9). Numbers in YNP decreased significantly from last year, while the Paradise Valley count stayed approximately the same. The Hebgen lake count increased significantly from last year, comprising the majority of the wintering population in the region. In the last 15 years, total swan numbers were highest during 2006 and lowest during 2009, although numbers tend to fluctuate from year to year.

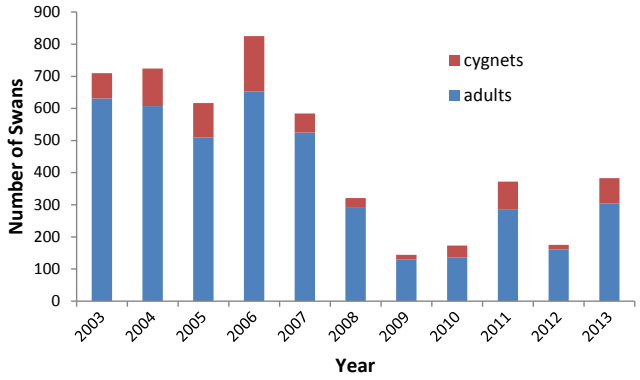


Figure 9. Summary of the total number of adult and cygnet trumpeter swans observed during the mid-winter aerial survey in YNP, the Paradise Valley and on Hebgen Lake during 2003-2013.

Swans were also counted weekly from mid-December through mid-March along the Madison River and Yellowstone River from Fishing Bridge to Chittenden Bridge. These surveys augment our one-day aerial survey held in February. Many swans spend the first half of winter in the park, but numbers depend on the availability of ice-free portions of the rivers. By late December as many as 50 adults and 14 cygnets were wintering on the Madison River. By March 14 only three adults and two cygnets were still there. In mid-December 141 adults and 42 cygnets were counted on the Yellowstone River. For the most part, the number of swans on the Yellowstone declined to about thirteen adults by early March. These surveys are important to understanding swan use of Yellowstone's rivers during winter.

Trumpeter Swan Reproduction and Breeding Season Observations

During the 2013 breeding season only one pair of trumpeter swans nested in YNP (Figure 10). The pair at Grebe Lake returned this spring with two of their four cygnets. They chose not to nest this spring and instead allowed their young from last year to stay at Grebe Lake for the summer. The Riddle Lake swan pair successfully nested and produced five cygnets; however three cygnets were predated at approximately four weeks of age and the two remaining cygnets were predated at approximately 10 weeks of age probably by a bald eagle. To protect nesting swans from human disturbance Riddle Lake was closed to all access until September 1 and the western half of Grebe Lake where the nest is located was closed throughout the summer. In addition to the two territorial pairs of swans we observed six other adult swans in YNP. Two of the six swans spent the majority of the summer on the Firehole River and one swan was seen at Richards Pond throughout the summer. The remaining three swans were usually observed together, often in the southern end of Yellowstone Lake. It is unknown if these swans recruited from areas outside of YNP or if they are swans produced from successful nests in YNP.

Trumpeter Swan Release

In collaboration with the Wyoming Wetlands Society, the YNP-BP released 10 captive-raised trumpeter swans in three locations throughout YNP during 2013. Three yearling swans were released at Delusion Lake, a historic swan territory, on June 15. We chose Delusion Lake because of its history as a former territory, remoteness and lack of visitor disturbance. By mid-August the yearlings moved to the Southeast Arm of Yellowstone Lake. On September 9 three 95-day-old cygnets were released to West Tern Lake, also a former nesting territory and one of the most historically productive. The three banded swans were observed on the Snake River in Rexburg, Idaho in late October. The anticipated result of this augmentation effort is that at least one of the released swans from each lake will become bonded to these lakes and return there with a mate next spring. Finally, four 83-day old cygnets were released on the Yellowstone River near Alum Creek in Hayden Valley on September 11. They were released near the Grebe Lake pair which moved there late in summer. Releasing swans near unmated swans increases the chances of new pair formation.

Trumpeter swans in YNP have declined since the early 1960's. Yellowstone's swan population is currently comprised of only two breeding pairs and five to eight non-breeding adults (excluding released swans) that reside in the park. As part of the current management plan, the NPS is collaborating with Wyoming Wetlands Society to augment the swan population with swans from the Greater Yellowstone Area. The goal is to increase the number of territorial pairs in YNP so that the birds become a self-sustaining population.

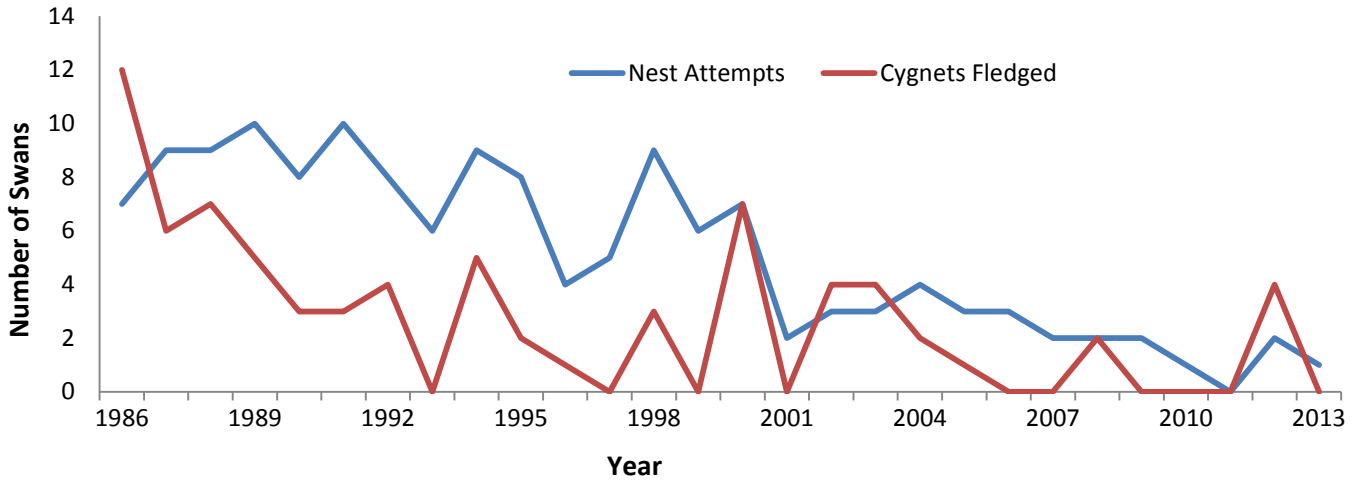


Figure 10. Trumpeter swan nest attempts and cygnets fledged from 1986-2013 in YNP.

Autumn Trumpeter Swan Count

We counted 27 swans (18 adults and 9 cygnets) in the Paradise Valley, 24 swans (17 adults and 7 cygnets) in YNP, and zero swans on Hebgen Lake for a total of 51 swans during the September 16 survey (Table 3). The number of swans observed during the autumn counts increased this year, however, the count included seven of the released swans (Figure 11).

Table 3. Autumn 2013 survey results for trumpeter swans.

Location	Adults	Cygnets
Paradise Valley	18	9
Yellowstone	14	0
Hebgen Lake	0	0
Total	**32**	**9**

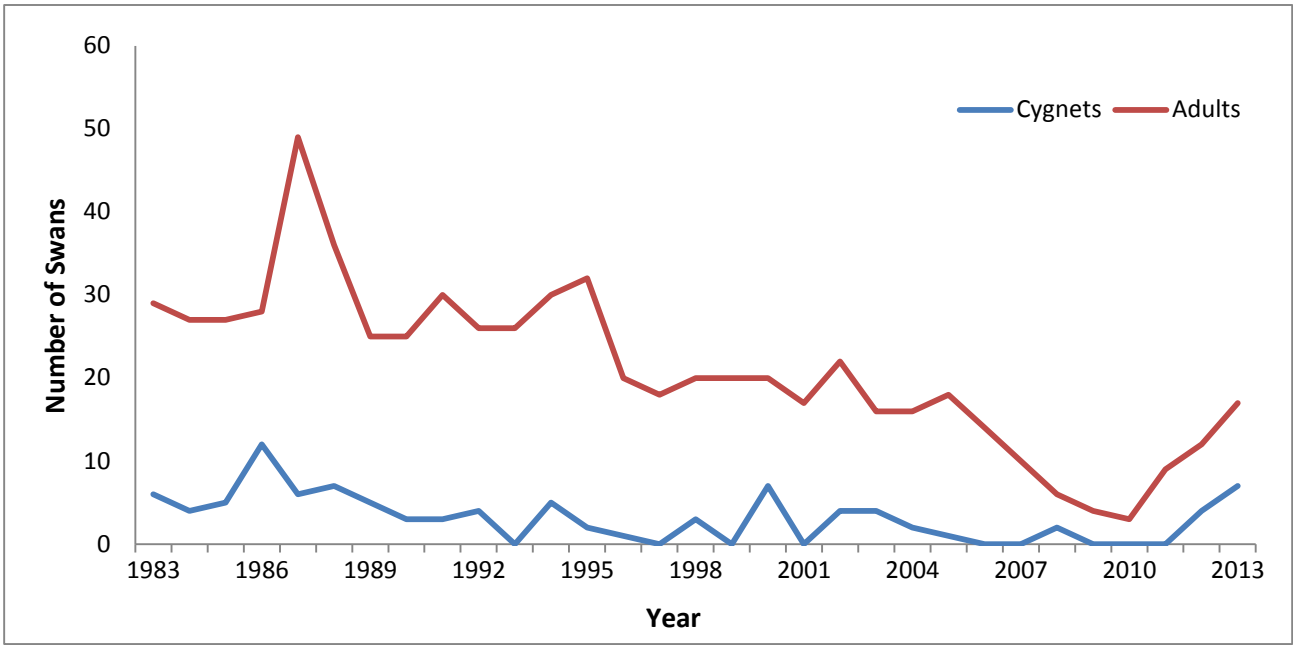


Figure 11. YNP autumn counts of trumpeter swans, 1983-2013.

Colony Nesting Birds

Through photographic interpretation from four overflights made during May through August 2013 we observed approximately 601 American white pelican nests that fledged an estimated 353 young (Table 4). We counted 37 nesting double-crested cormorants that fledged an estimated 9 young. Six California gull nests were observed that fledged at least 2 young. None of the four photosets show Caspian terns nesting on the Molly Islands, however Caspian tern adults were observed foraging in the southeast arm of Yellowstone Lake during the beginning of July. It is possible that Caspian terns continue to nest in the park, although it has not been confirmed since 2005.

Table 4. Colony nesting birds fledged from the Molly Islands 1989-2013.

Year	California gull	American white pelican	Caspian tern	Double-crested cormorant
1989	270	535	25	20
1990	295	572	28	203
1991	51	466	10	156
1992	70	522	0	210
1993	141	344	9	141
1994	240	210	22	240
1995	220	265	14	298
1996	0	3	0	61
1997	0	42	0	140
1998	21	295	3	147
1999	90	102	2	225
2000	255	584	0	152
2001	95	105	3	75
2002	65	180	3	280
2003	77	328	6	214
2004	207	237	3	154
2005	58	234	0	86
2006	81	362	0	261
2007	No data	No data	No data	No data
2008	0	13	0	16
2009	0	54	0	30
2010	0	184	0	59
2011	0	0	0	0
2012	19	270	0	21
2013	2	353	0	9

Common Loon

This year brought a new partnership between YNP and the Biodiversity Research Institute (BRI), an international leader in loon research and management. YNP bird staff worked closely with BRI staff to conduct surveys throughout the park, including more time spent at historical breeding territories. Surveys were conducted by plane, boat, canoe, and foot. Additional information was supplemented by park staff, volunteers, and visitors. We surveyed 36 lakes for loon activity (some lakes had more than one loon territory, e.g. Yellowstone Lake). Eight territorial pairs were documented with seven unpaired adults and three sub-adult birds totaling 26 loons (not counting young-of-the-year) in YNP (Table 5). Six (75%) of these pairs nested and all of them hatched at least one chick (100%). Eight chicks hatched and all of them fledged. Loon productivity for YNP was 1.00 (chicks surviving/territorial pair). The following lakes supported territorial pairs: Wolf, Cygnet, Shoshone Lake East (did not nest), Riddle, South Delusion, Yellowstone Lake-South Arm, Lewis (did not nest), and Buela. Both Cygnet and Buela fledged two chicks. Three sub-adults were observed, one on Buela Lake (probably a chick from that pair the previous year) and two at Mary Bay on Yellowstone Lake. Most (8 of 14 territorial pairs; 57%) of Wyoming's loons reside in YNP. One immature loon was caught in a lake trout gill-net on Yellowstone Lake August 20th and another in October. The bird caught in August was probably a YNP resident, while the bird caught in October was probably a migrant. The Fisheries Program is working closely with the bird program to address this matter. A necropsy was performed on both loons and the results are consistent with drowning as a result of net entanglement. Body condition of the August caught bird was excellent.

Table 5. Summary of 2013 common loon observations in YNP.

Year	Adults	Nest Attempts	Loonlets Fledged
1989	34	15	17
1990	42	11	9
1991	41	9	9
1992	48	11	6
1993	51	12	2
1994	50	12	12
1995	40	13	8
1996	41	5	4
1997	38	5	6
1998	40	12	8
1999	42	14	2
2000	34	9	8
2001	35	9	7
2002	38	9	5
2003	40	8	1
2004	44	9	3
2005	41	8	4
2006	39	9	6
2007	34	7	8
2009	8	4	4
2010	16	8	3
2011	34	12	0
2012	28	10	8
2013	28	8	8

Passerine and Near Passerine Monitoring

Willow-songbird Surveys

This year was the 9th consecutive year of monitoring willow-songbird communities in YNP. For details of protocol and sample plots, refer to Baril et al., 2011. In most years, three types of willows were surveyed for breeding passerines including previously tall (averaging >1.5 meters in height and experiencing little browsing), suppressed (generally <1 meter and experiencing heavy browsing), and released (formerly height suppressed - now similar in height to protected willows but with lower overall canopy cover) (Figure 12).

Our objective is to determine presence and abundance of breeding birds in these three willow growth conditions. A total of 15 species were recorded across the range of willow growth conditions. Waterfowl and shorebirds are excluded since point counts are not designed to adequately sample these species. We also exclude fledglings, birds flying through the point count but not landing within the 40-meter radius, and those with less than 5 occurrences.

Species richness (the average number of species found in a particular habitat) was similar between previously tall and released willows, while suppressed willows had the fewest species (Figure 13). Since 2005, richness increased in both suppressed and released willows while there is no trend richness for previously tall willows. American robins, yellow warblers and warbling vireos were present in some suppressed willows during the last few years; however their abundances are low with only 1-2 occurrences per breeding season. Some species such as Wilson's warblers and fox sparrows occur in released willows in some years, but not all, accounting for some of the variability in richness among years. Although previously tall willows have a more complex structure, which generally allows for greater richness and abundance, the tall but patchily distributed released willows provide habitat for birds depending on either grass/sedge habitat or tall willow habitat therefore accommodating a variety of species.

Overall abundance was similar between released and previously tall willows and both were greater than suppressed willows. Since surveys began in 2005, abundance has increased across all three willow types and may be a result of increased willow growth, especially in suppressed and released willows; however the high abundances recorded in 2012 are an exception and appear to be driving the trend (Figure 14). Wilson's warblers were only found in previously tall willows although their abundance was low while willow flycatchers, gray catbirds, and fox sparrows were absent from suppressed willows (Table 6). Yellow warblers were most strongly associated with previously tall and released willows while willow flycatchers appeared to be most strongly associated with released willows. Lincoln's sparrows occurred in similar abundance in all three stand types and are considered generalists.

Forest Burn Surveys

The persistence of cavity nesting birds in YNP is dependent on patterns of fire across the landscape. Vari-

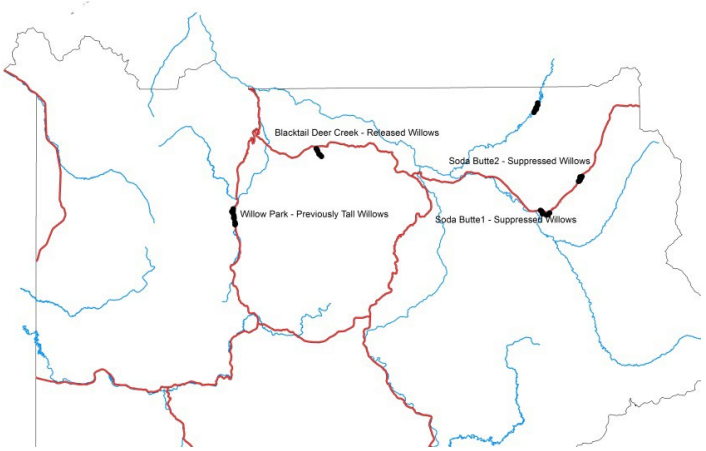


Figure 12. Map of willow point count locations in YNP.

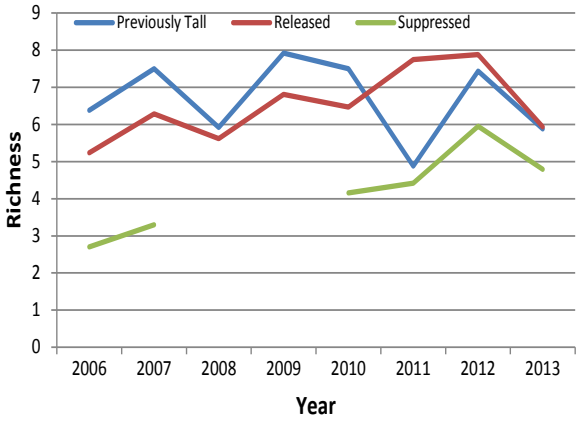


Figure 13. Species richness across three willow growth conditions during 2005-2013.

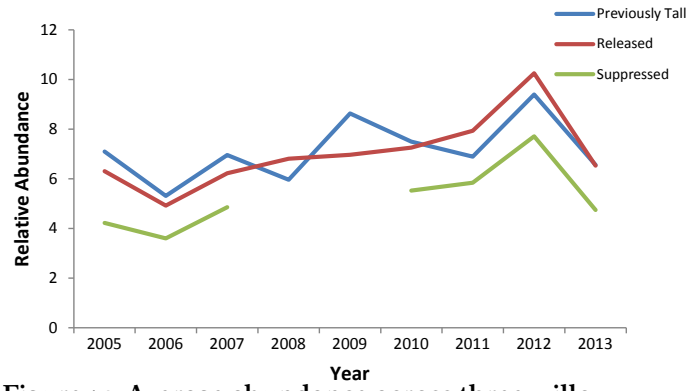


Figure 14. Average abundance across three willow growth conditions during 2005-2013.

Table 6. Relative abundance of songbirds observed in previously tall, released, and suppressed willow stands during 2013. Bold numbers indicate highest abundances.

Species	Previously tall	Released	Suppressed
American robin	0.31	0.59	0.19
Brewer's blackbird	0.09	0.19	0.31
Common yellowthroat	0.56	0.16	0.56
Fox sparrow	0.13	0.06	-
Gray catbird	0.03	0.28	-
Lincoln's sparrow	1.09	1.16	1.17
Red-winged blackbird	0.06	0.06	0.11
Savannah sparrow	0.06	0.28	1.19
Song sparrow	0.31	0.09	0.36
Warbling vireo	0.38	0.53	0.03
White-crowned sparrow	0.16	0.22	0.14
Willow flycatcher	0.38	0.84	-
Wilson's warbler	0.25	-	-
Yellow warbler	2.69	1.94	0.17

ation in burn severity, time since burn, and post-burn forest structure create a mosaic of different aged and structured stands that provide specialized habitat for a variety of species (Saab et al., 2007). For example, black-backed, three-toed, and hairy woodpeckers are associated with recently (2–4 years), low to moderate severity burned forests (Saab et al., 2007) while northern flickers are associated with three-year-old, high-severity burns (Smucker et al., 2005). Standing dead trees left behind after a fire attract bark and wood-boring beetles—primary prey for woodpeckers (Saab et al., 2007). Woodpeckers excavate nest holes in standing dead trees, many of which have been softened by fungus 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 Yellowstone is expected to increase as climate becomes warmer and drier (Westerling et al., 2006); 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. Therefore, we initiated a monitoring program in 2009 to evaluate the presence and abundance of post-fire adapted bird species

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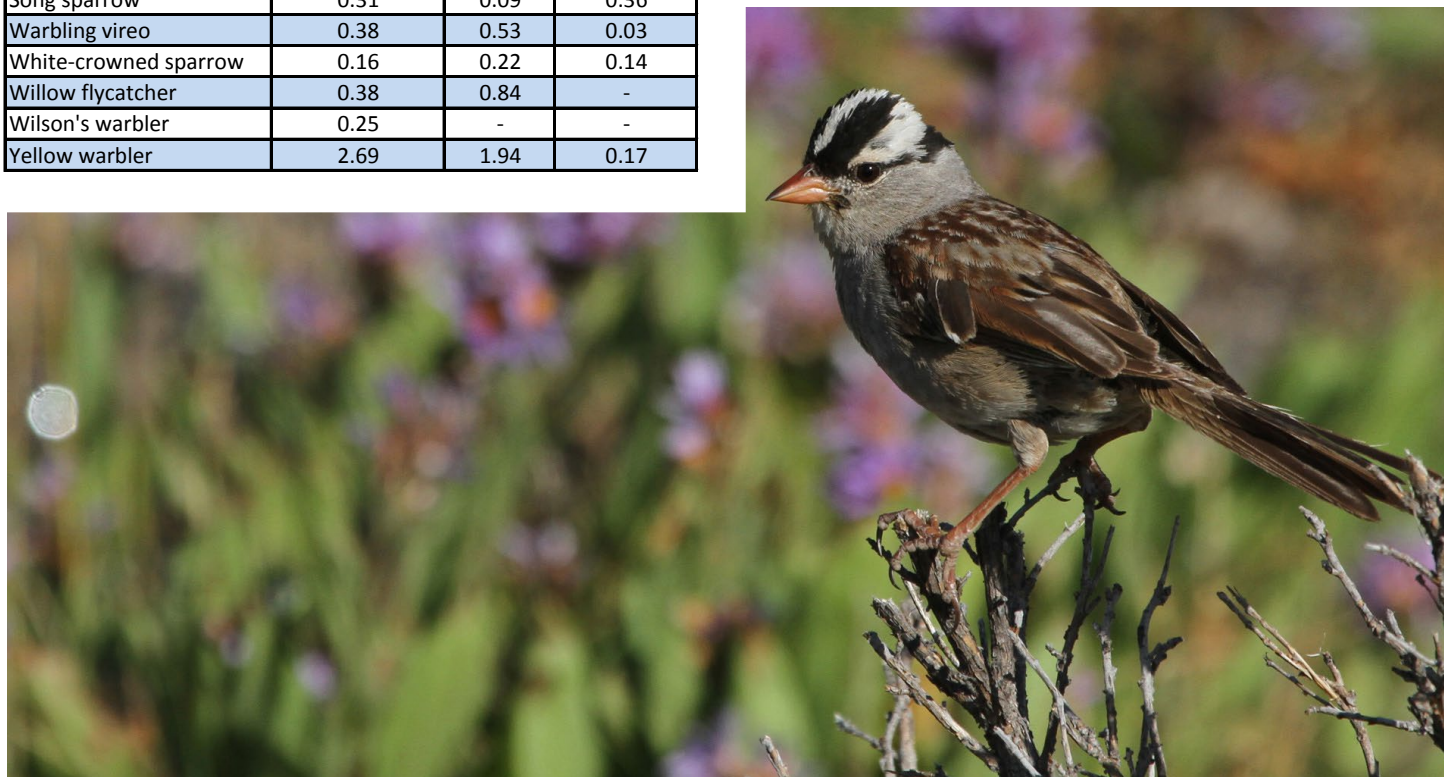


We established point count surveys in two new fires during 2013: the Point Fire (8 points) and the Cygnet Fire (8 points) (Figure 15). The Point Fire burned 867 ha along the east shore of Yellowstone Lake during 2011 and the Cygnet Fire burned 1,431 ha south of the road between Norris and Canyon during 2012. These are considered recent fires (< 4 yrs since time of burn). We also surveyed the Arnica Fire (8 points) and the Le-Hardy Fire (4 points). LeHardy and Arnica burned in 2008 and 2009 respectively and are considered mature fire stands (4-8 years since time of burn). Note that in the 2011 report we referred to recent burns as 1-5 years since time of burn and mature burns as 6-10 years since burn, however the new age structure defined here also applies to the fires surveyed in 2011. We discontinued surveys in the East Fire (2003) because it has been 10 years since burn as of 2013 and the Antelope Fire (2010) due to road closure issues.

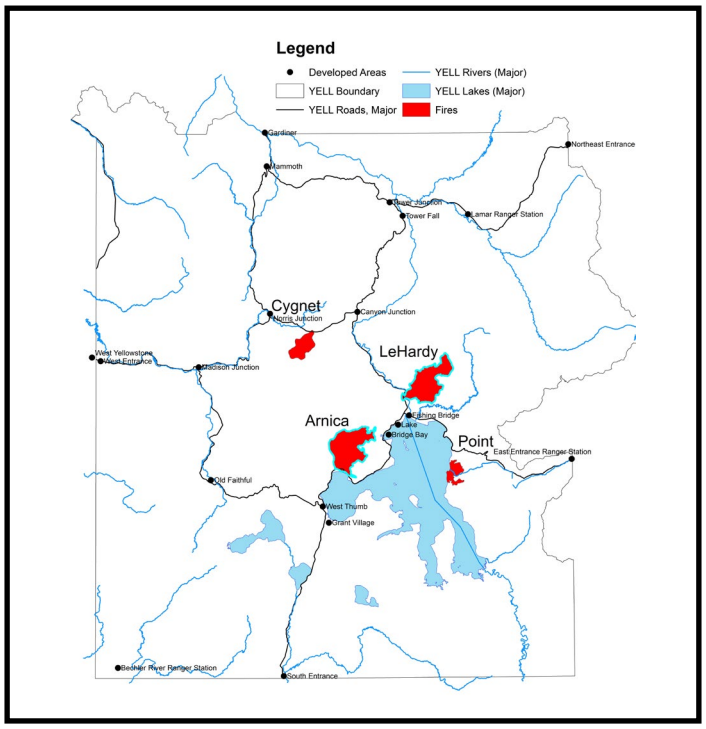


Figure 15. Point count survey areas for forest burn monitoring.

Results

We observed 20 species across the four study areas (17-recent, 18-mature) in 2013 (Table 7). Nine (45%) of the 20 species recorded were obligate cavity nesters.

Table 7. Abundance by species occuring in recent (1-3 yrs since time of burn) and mature burns (4-8 yrs since time of burn) during 2013.

Species	Recent Burn	Mature Burn	Nesting guild*
American robin	0.38	0.63	OP
American three-toed woodpecker	0.03	-	1° CA
Black-backed woodpecker	0.09	0.04	1° CA
Cassin's finch	0.03	-	OC
Chipping sparrow	-	0.08	OC
Clark's nutcracker	0.03	0.75	OC
Dark-eyed junco	0.47	0.58	OC
Gray jay	0.13	0.08	OC
Hairy woodpecker	0.19	0.21	1° CA
House wren	-	0.04	2° CA
Mountain bluebird	0.72	0.25	2° CA
Mountain chickadee	0.31	0.38	2° CA
Northern flicker	0.06	0.08	1° CA
Red-breasted nuthatch	0.16	0.17	1° CA
Ruby-crowned kinglet	0.63	0.08	OC
Townsend's solitaire	0.03	0.04	OC
Tree swallow	0.44	1.42	2° CA
Warbling vireo	-	0.03	OC
Western wood-pewee	0.04	0.03	OC
Yellow-rumped warbler	0.59	0.63	OC

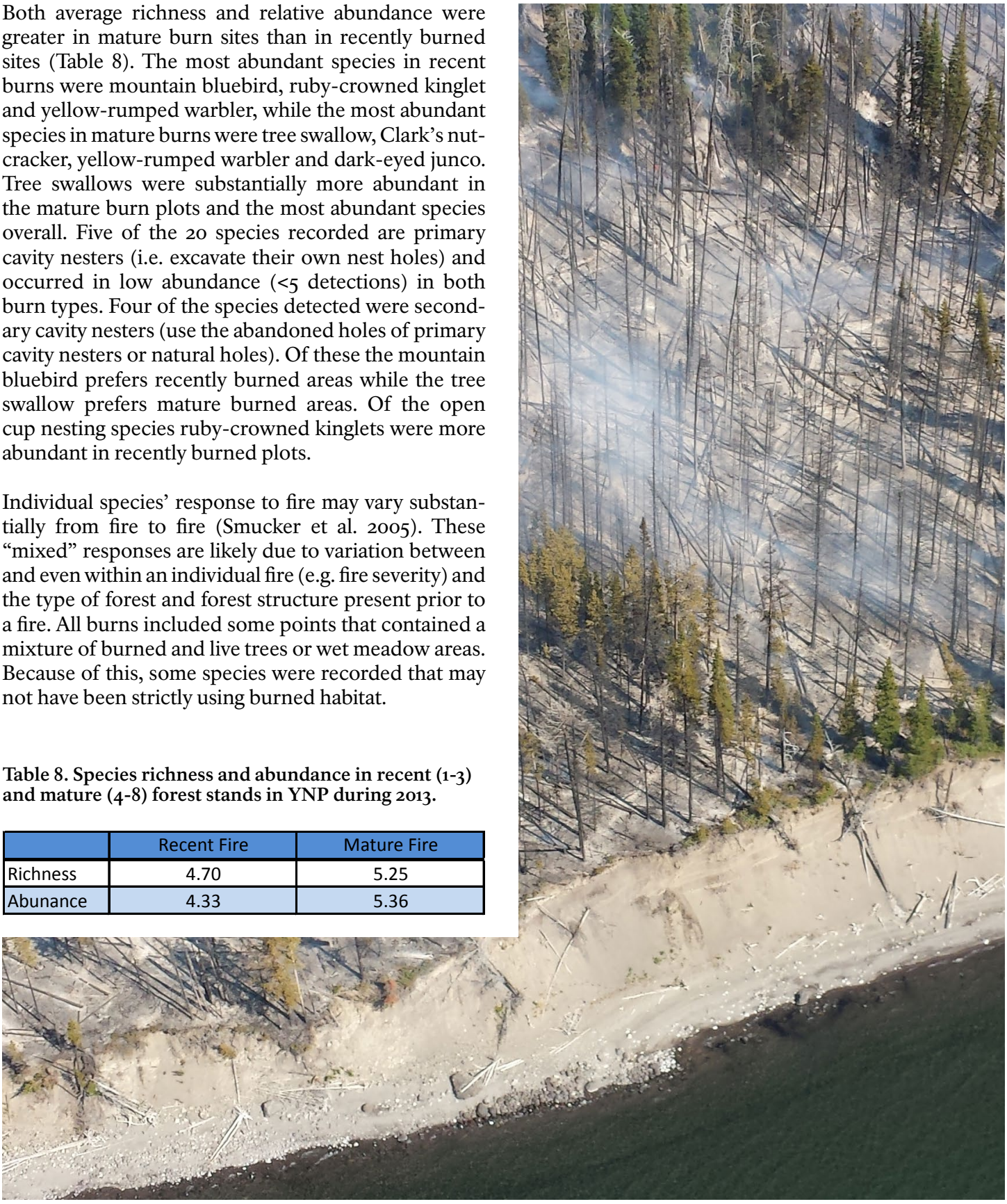
*Nesting Guild: 1°CA = excavates own cavity, 2° CA = uses abandoned cavities, OC = open cup, PA = nest parasite.

Both average richness and relative abundance were greater in mature burn sites than in recently burned sites (Table 8). The most abundant species in recent burns were mountain bluebird, ruby-crowned kinglet and yellow-rumped warbler, while the most abundant species in mature burns were tree swallow, Clark's nutcracker, yellow-rumped warbler and dark-eyed junco. Tree swallows were substantially more abundant in the mature burn plots and the most abundant species overall. Five of the 20 species recorded are primary cavity nesters (i.e. excavate their own nest holes) and occurred in low abundance (<5 detections) in both burn types. Four of the species detected were secondary cavity nesters (use the abandoned holes of primary cavity nesters or natural holes). Of these the mountain bluebird prefers recently burned areas while the tree swallow prefers mature burned areas. Of the open cup nesting species ruby-crowned kinglets were more abundant in recently burned plots.

Individual species' response to fire 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 8. Species richness and abundance in recent (1-3) and mature (4-8) forest stands in YNP during 2013.

	Recent Fire	Mature Fire
Richness	4.70	5.25
Abunance	4.33	5.36



Breeding Bird Surveys

Dates of the surveys were as follows: Mammoth on June 27, Northeast Entrance on June 21, and the Yellowstone route on June 28. Along these three routes we recorded a record of 3,441 individuals and 89 species (Figures 16, 17). The Yellowstone route had both a greatest diversity and number of individuals. The Yellowstone route had 3 to 4 times the number of individuals than either of the other 2 routes. This is attributed in part to large flocks of Canada geese along the Yellowstone River, which accounted for 70% of all observations. Canada goose numbers vary widely year to year, however their numbers have been increasing recently with 2013 having the highest numbers since the survey began in 1987 (Figure 18).

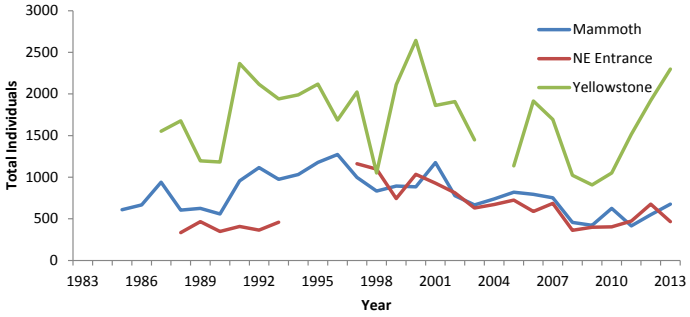


Figure 16. Number of total individuals observed during three breeding bird surveys in 2013.

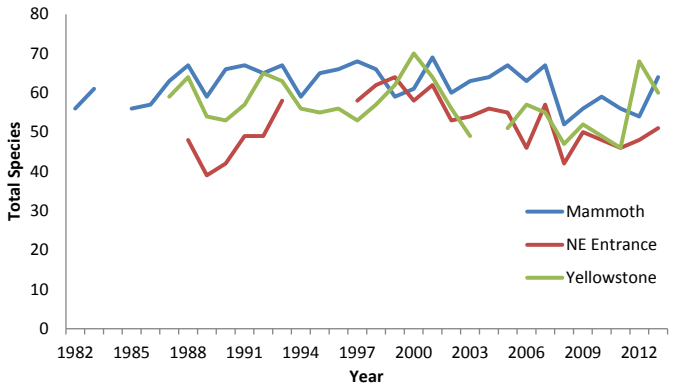


Figure 17. Number of total species observed during three breeding bird surveys in 2013.

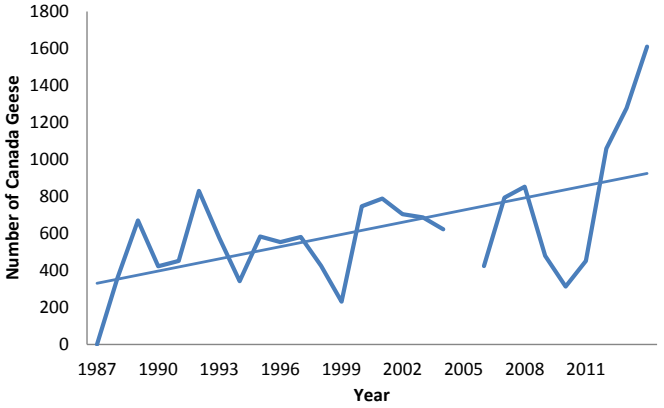


Figure 18. Number of geese observed on the Yellowstone Breeding Survey route during 1987-2013.

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 Society since 1992. The objectives are to establish an index of the winter population, determine winter distribution, and identify important wintering habitat for eagles. Yellowstone has participated since at least 1987, but there were a few years surveyed prior to 1987.

On January 11 and 18, 19 volunteers participated in the mid-winter eagle survey. Observers recorded 57 eagles (48 bald eagles and 9 golden eagles) in the park and north to Livingston. Most eagles (45) were counted outside the park between Gardiner/Jardine to Livingston. The milder climate, road-killed deer and elk and hunter carcasses attract eagles to this area. Nevertheless, a few eagles persist in the park every year. During the survey there were 2 adult bald eagles along the Madison River, an immature bald eagle at Black Sands Geyser Basin, 7 golden eagles from Mammoth to the northeast entrance, and 2 adult bald eagles from Mammoth to the north entrance. Because this is a one-day survey and observations are restricted to the road sometimes eagles happen to be elsewhere during the count and this was the case in a few places. An adult bald eagle was seen along the Yellowstone River between Canyon and Fishing Bridge during the count week and at other times throughout the winter. A bald eagle has also been seen at the south entrance and at Lewis Falls this winter. Although those sightings don't count towards the national effort we record them for our records.

Yellowstone Raptor Initiative

Golden Eagle

In 2013 we continued to monitor known golden eagle territories in addition to searching for new breeding territories. We located four additional territories in 2013 bringing our total known golden eagles pairs to 22 park-wide. We confirmed occupancy at 21 territories leaving one unknown due to time constraints and accessibility (Table 9). Of the 21 occupied territories we were able to determine the breeding season outcome of 14 (the outcome could not be determined for the remaining seven occupied territories). Nine of the 14 pairs successfully fledged a total of 12 young yielding an overall nesting success rate of 64%. Productivity was 0.86 and brood size was 1.33. We observed an increase in nesting attempts compared to 2011 and 2012 and nesting success during 2013 is more reflective of known averages in other study areas within the Greater Yellowstone Ecosystem (R. Crandall and C.R. Preston pers. comm.). Over the past 3 years all golden eagle territories surveyed remained occupied, an important indicator of population health, but, there is little consistency in nesting success and productivity over the three years of surveys. Differences among years in late winter and early spring prey sources may serve as a driver for these fluctuations.

We collected prey remains and eggshell fragments from two successful golden eagle nests in August after chicks fledged. Prey remains collected from in and around the nest is an indicator of nestling diet and prey selection by the adults. The thickness of eggshell fragments is an indicator of environmental contaminants. The prey remains and eggshell fragments were being analyzed at the time of this report. Breeding chronology was determined by ageing golden eagle nestlings and backdating to determine average incubation initiation, hatch date, and fledging date (Table 10). Estimates were similar between 2011 and 2013.

Photo by Joe Keel

Table 9. Summary of golden eagle reproduction in Yellowstone National Park during 2011 - 2013.

Year	Total Known Territories	Occupied Territories*	Non-Breeders	% Nesting Success	Productivity
2011	16	15	0	80	0.56
2012	18	16	7	0	0.00
2013	22	21	3	64	0.86

* The remainder of the territories were either unoccupied or occupancy could not be determined.

Table 10. Golden eagle nesting chronology.

Nesting Chronology	2011 Average (n=5)	2012 Average (n=0)	2013 Average (n=8)
Mean Incubation	Mar 28-Apr 1	NA	Mar 31-Apr 4
Mean Hatching	May 10-14	NA	May-13
Mean Fledging	July 18-22	NA	July 23-30

Red-tailed Hawk

During 2011-2013 we documented 44 red-tailed hawk territories in Yellowstone's northern range. Many additional locations were recorded that likely accommodate breeding territories, but remain unconfirmed due to time constraints. The goal is to monitor a minimum of 30 territories annually to obtain reproductive estimates rather than document all territories although we will continue to document the location of nesting territories as we find them.

All but two of the 44 territories were confirmed occupied with the remaining two left unknown due to minimal observations related to road construction (Table 11). We monitored 37 territories for reproduction. Twenty-six pairs were successful, yielding a nesting success rate of 70%. The successful nests fledged a minimum of 43 young. Productivity was 1.16 and brood size was 1.65. Nest success dropped by approximately 20% with productivity at its lowest compared to 2011 and 2012. Furthermore, we observed several non-breeding pairs this year, but not in previous years which may indicate some limiting resource(s) during the early spring period. The nesting success, though lower than observed over the past two years still indicates a stable to increasing population in comparison with other populations. Breeding chronology was determined by ageing red-tailed hawk nestlings and backdating to determine average incubation initiation, hatch date, and fledging date (Table 12). Estimates were similar between 2011 and 2012.

Table 11. Summary of red-tailed hawk reproduction in Yellowstone National Park during 2011-2013.

Year	Total Known Territories	Occupied Territories*	Non-Breeders	% Nesting Success	Productivity	Brood Size
2011	17	17	0	79	1.36	1.73
2012	34	34	0	89	1.70	2.00
2013	44	42	7	70	1.16	1.65

* The remainder of the territories were either unoccupied or occupancy could not be determined.

Table 12. Red-tailed hawk nesting chronology in Yellowstone's northern range during 2011-2013.

Nesting Chronology	2011 Average (n=10)	2012 Average (n=24)	2013 Average (n=16)
Mean Incubation	May 8-10	May 6-8	May 10-12
Mean Hatching	June 8-10	Jun-13	Jun-13
Mean Fledging	July 22-24	July 13-17	July 20-24

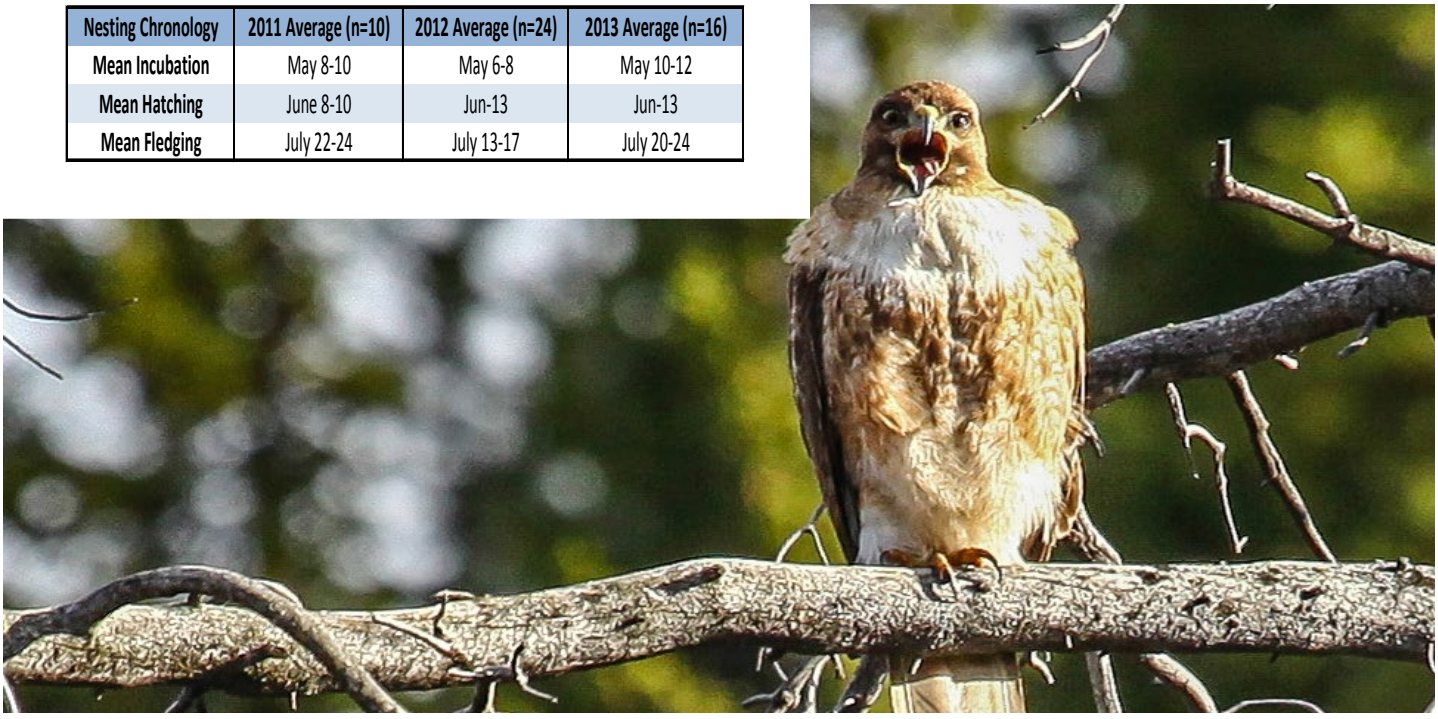


Photo by David Hopkins

Swainson's Hawk

YRI staff confirmed occupancy at 15 territories but were only able to document nest locations and productivity at three of these. A minimum of seven additional territories were observed throughout the season, but remain unconfirmed until further observations can be made. Our surveys show that much of the YNP Swainson's hawk population occurs at higher elevations within the interior of the park. The interior is mostly forested, dominated by Lodgepole pine with breeding territories located along the edges of open valleys and meadows. Some nests are situated near the top of live conifers set back from the forest edge creating difficulty in determining actual nest locations. Of the three active nests observed two were successful, fledging a total of two young.

Most described habitat of breeding Swainson's hawk includes a substantial agricultural influence, scattered forest structure, and generally lower elevations (Bechard et al. 2010) which differs greatly from the primarily high elevation undisturbed habitat of YNP. Understanding Yellowstone's Swainson's hawk population can provide insight to habitat selection and behavior in a relatively natural ecosystem that more likely represents historical northern Rocky Mountain breeders.

Prairie Falcon/American Kestrel

Prairie falcons occupied three of the five known territories in the northern range of the park during the 2013 breeding season. Breeding was confirmed in one territory and successfully fledged two young. No other ledges were located mainly due to time constraints, but all sightings were documented and may lead to additional territories in the future. Prairie falcons appear to have a high level of competition for breeding territories and in some instances are being outcompeted by peregrine falcons and golden eagles.

American kestrels were observed at a relatively high abundance in the park but no measures of population size have been made so far. YRI staff documented 76 sightings instances of a territorial individual, mated pair, fledglings, or a nest cavity during 2010-2013. This includes repeat locations. American kestrel populations are suspected of decline throughout much of North America and most research is being conducted through occupancy and data collected from artificial nest box programs (Smallwood et al. 2009). Outside the possibility that American kestrels could nest in artificial structures such as buildings in the developed areas of Yellowstone, all territories use natural nest cavities and may serve as a valuable comparison to other studies.

Raptor Road Survey

The road-side survey objective is to estimate raptor density for select species within the northern range of YNP and complements nest monitoring surveys. By the end of 2015, the YRI plans to have a complete estimate of the adult red-tailed hawk, Swainson's hawk and American kestrel populations on the northern range, including an estimate of the number of breeding pairs. The survey consists of points of unlimited distance beginning at Indian Creek Campground and ending at Barronnette Peak. Each point is surveyed twice: once in May and once in June. For more details regarding this survey please refer to the 2012 annual report. A total of 294 detections across 12 species were made at the end of two surveys in 2013. Red-tailed hawks (64%) comprised the majority of detections followed by American kestrels (10%) and Swainson's hawks (7%) (Table 13).

Table 13. Results of the raptor roadside survey for 2013.

Species	Total abundance	Percent
Red-tailed hawk	188	64%
American kestrel	29	10%
Swainson's hawk	22	7%
Golden eagle	19	6%
Sharp-shinned hawk	9	3%
Bald eagle	7	2%
Unknown raptor	5	2%
Cooper's hawk	4	1%
Osprey	3	1%
Turkey vulture	3	1%
Northern harrier	3	1%
Peregrine falcon	1	0%
Prairie falcon	1	0%
Grand Total	294	100%

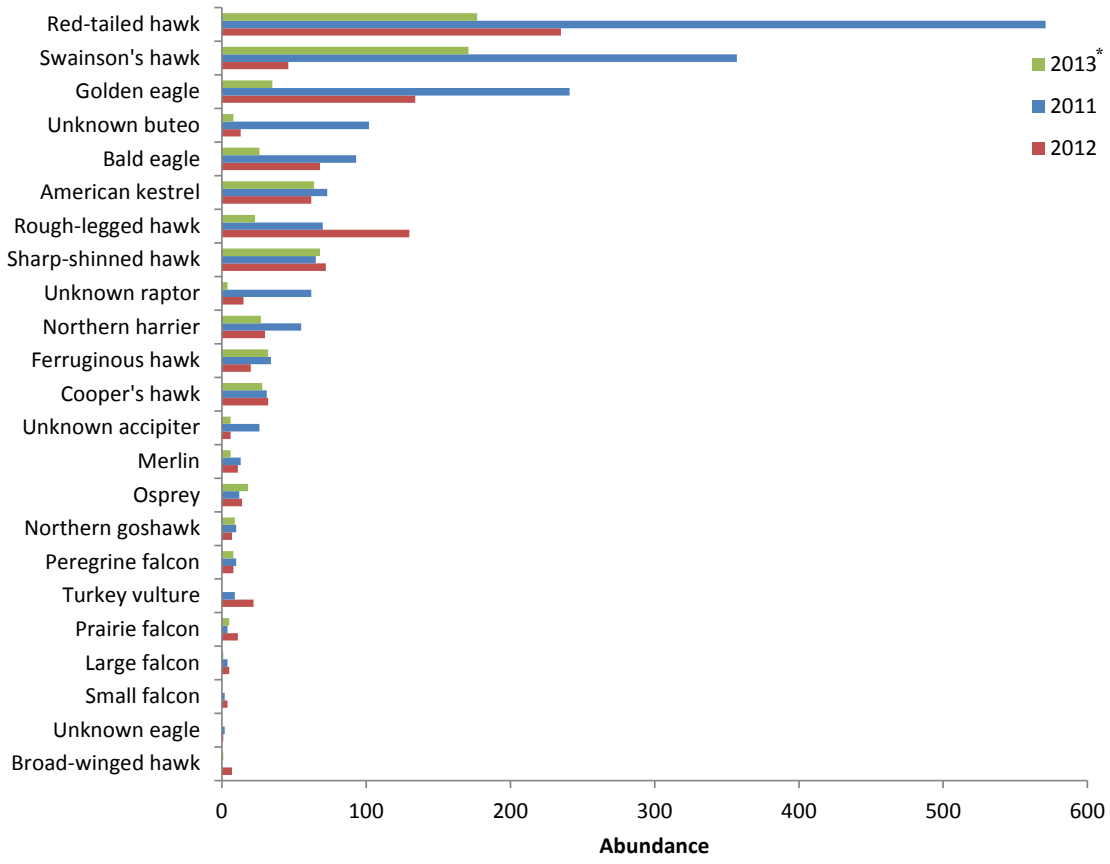
Raptor Migration Count

The raptor migration count in Hayden Valley began during autumn of 2010. The goal is to provide long-term information on populations of raptors migrating through Yellowstone's Hayden Valley during autumn. The Hayden Valley migration site is located within the northern portion of the Rocky Mountain Flyway.

Observations began on September 3 and continued through September 30 after which all National Parks were closed due to a government shutdown. Weather and staffing allowed for counts on 19 of the 28 available observation days. Counts typically began at 1000 hours and were completed by 1600 hours MST. Seven observers participated in the count over the study period with an average of 2-3 observers per day. The observation point was staffed for 100 observation hours and observer hours (total hours*number of observers per day then summed over all days) totaled 297.

A total of 635 raptors across 15 species were recorded over 19 days in September. Migrant sightings averaged approximately 6.35 raptors per hour. The majority of all raptors observed were buteos (60%) followed by accipiters (17%), falcons (13%), harriers (4%), eagles and osprey each (3%). The most abundant species observed were red-tailed hawks (27%), Swainson's hawks (27%), and sharp-shinned hawks (11%). All other species represented <10% of the total (Figure 19).

The Hayden Valley site was revisited after the government shutdown for 3 days between 10/18-10/21 for approximately 15.5 hours of observation. A total of 82 raptors across 11 species were recorded. Eagles comprised the majority of sightings (49%) followed



* The results for 2013 include counts for September only due to the October government shutdown.

Figure 19. Count of migrating raptors in Hayden Valley, Yellowstone National Park during 2011-2013.

by buteos (38%) and falcons (4%); accipiters, harriers, ospreys, and unknown raptors each represented 2% of the count. The most abundant species observed were golden eagles (34%), rough-legged hawks (28%), and bald eagles (15%). All other species represented <8% of the total.

For two days, October 23-24, YRI staff counted from the top of Observation Peak which lies north of Hayden Valley at the southern end of a north-south ridge on the western side of the Washburn range. With over 10 km of north-south ridgeline, Observation Peak provides topography that can promote orographic lift and serve as a more traditional count site. A total of 23 raptors across seven species were recorded over approximately 10 hours of observation. Golden eagles (26%) were the most abundant species followed by bald eagles (17%), red-tailed hawk (17%) and sharp-shinned hawks (13%). All other species represented <9% of the total. YRI plans to revisit this site in 2014 and conduct simultaneous counts with Hayden Valley for comparison.

The interruption of migration counts from 10/1-10/17 due to the government shutdown severely affected data collection for 2013 and prevents comparison to prior years. Peak golden eagle migration through the Northern Rocky Mountains generally occurs during the first two weeks of October. Over the previous two years golden and bald eagles average approximately 20% of the season total with 85% of all eagles observed in October.

Raptor Sightings Program

Since the raptor sightings program began in 2010 we received more than 1300 sightings across 24 raptor species (Table 14). Red-tailed hawks continue to be the most commonly reported raptor identified to species followed by bald eagles, and ospreys. Observers ranged from park staff to visitors exploring YNP for just a day. Previous annual reports included observations made by YRI staff; however, these were separated from visitor observations for this report. Far fewer visitors and YNP staff submitted sightings in 2013 (135) compared to 2012 (704).

Report forms assisted in narrowing YRI staff search efforts for breeding raptors and contributed to locating several of the red-tailed hawk nests monitored during 2011 and 2012. In general, owls and accipiters (sharp-shinned hawk, Cooper's hawk, and goshawk) are infrequently reported in large part because of their secretive nature and/or nocturnal behavior (most owls). Sightings of these species are especially important since little is known about their distribution and abundance in Yellowstone. In addition to aiding YRI staff in understanding raptor distribution throughout YNP, the raptor sightings program stimulates interest in YNP's raptors and enables visitors to contribute to scientific research within Yellowstone. Many of the raptor species visitors observe and report on in YNP also occur in their own states or even backyards therefore endowing the public with the ability to recognize and appreciate these species in their home states or countries.

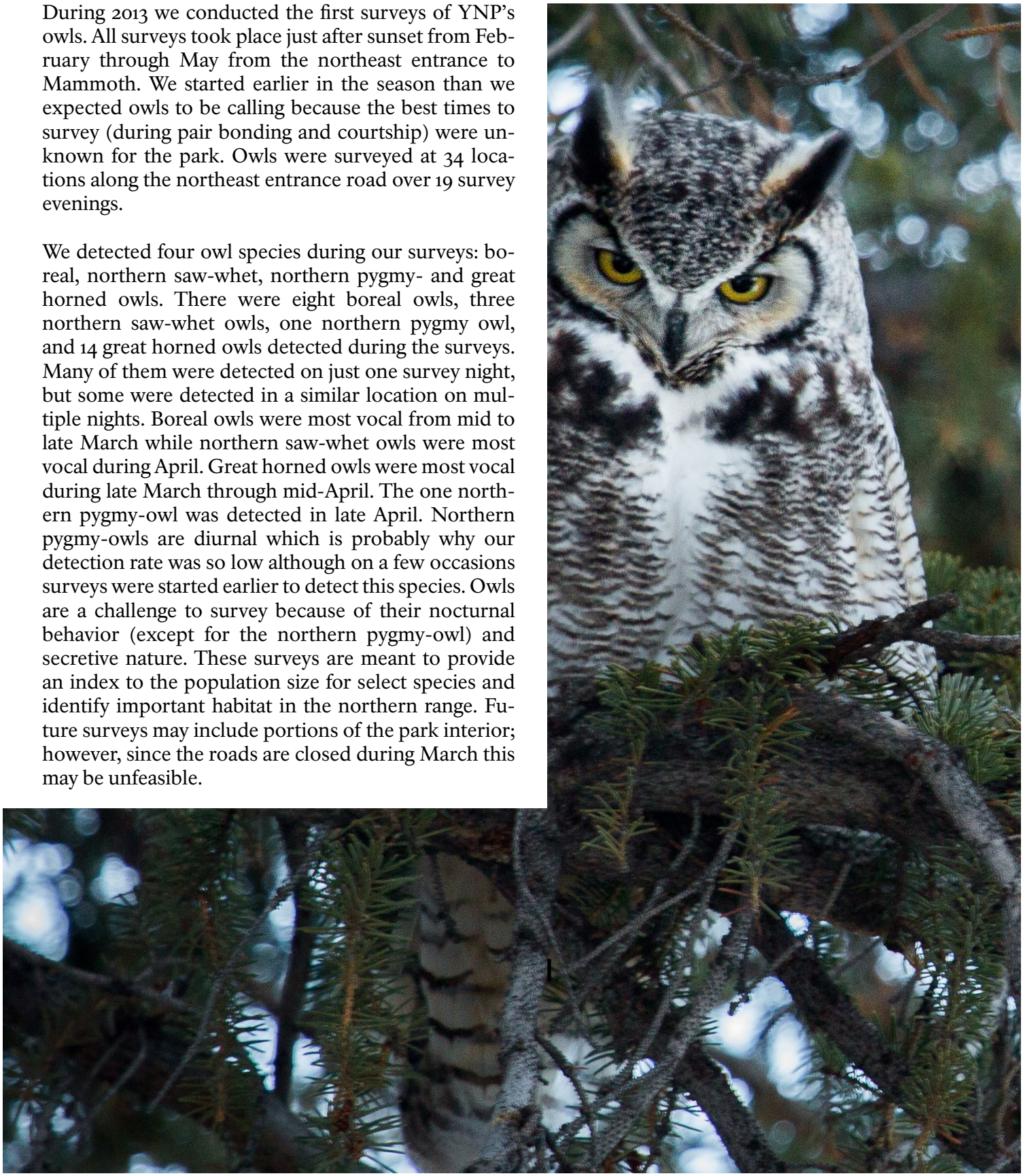
Table 14. Summary of rapotor observations submitted by YNP visitors and staff.

Species	2010	2011	2012	2013
Red-tailed hawk	33	75	149	28
Bald eagle	7	55	130	22
Osprey	12	37	143	18
Northern goshawk	2	0	19	15
Golden eagle	4	38	32	10
Great grey owl	5	4	10	9
Northern harrier	6	13	35	8
Prairie falcon	1	10	12	5
American kestrel	9	30	39	4
Northern pygmy owl	2	0	2	3
Boreal owl	5	0	1	2
Cooper's hawk	4	0	6	2
Ferruginous hawk	1	1	3	2
Great horned owl	1	1	12	2
Swainson's hawk	7	16	57	2
Northern saw-whet owl	0	0	2	1
Peregrine falcon	8	16	29	1
Rough-legged hawk	0	1	5	1
Broad-winged hawk	0	0	1	0
Long-eared owl	0	1	1	0
Merlin	1	3	3	0
Short-eared owl	0	2	0	0
Sharp-shinned hawk	3	2	2	0
Turkey vulture	10	24	11	0
Total	**121**	**329**	**704**	**135**

Owls

During 2013 we conducted the first surveys of YNP's owls. All surveys took place just after sunset from February through May from the northeast entrance to Mammoth. We started earlier in the season than we expected owls to be calling because the best times to survey (during pair bonding and courtship) were unknown for the park. Owls were surveyed at 34 locations along the northeast entrance road over 19 survey evenings.

We detected four owl species during our surveys: boreal, northern saw-whet, northern pygmy- and great horned owls. There were eight boreal owls, three northern saw-whet owls, one northern pygmy owl, and 14 great horned owls detected during the surveys. Many of them were detected on just one survey night, but some were detected in a similar location on multiple nights. Boreal owls were most vocal from mid to late March while northern saw-whet owls were most vocal during April. Great horned owls were most vocal during late March through mid-April. The one northern pygmy-owl was detected in late April. Northern pygmy-owls are diurnal which is probably why our detection rate was so low although on a few occasions surveys were started earlier to detect this species. Owls are a challenge to survey because of their nocturnal behavior (except for the northern pygmy-owl) and secretive nature. These surveys are meant to provide an index to the population size for select species and identify important habitat in the northern range. Future surveys may include portions of the park interior; however, since the roads are closed during March this may be unfeasible.



Partnerships & Public Outreach

The YRI continued partnerships developed in 2011 with local raptor ecologists. J. Kirkley, Ph.D. from University of Montana – Western, surveyed for Swainson's hawks in the Yellowstone Lake region during July-August. YPF funding provided trailer rental space as well as reimbursement for travel expenses during July-August. Collaborations with the Draper Museum in Cody, WY and Beringia South working in Paradise Valley on golden eagle surveys also occurred in 2013. The YNP-BP partnered with The Biodiversity Research Institute and Wyoming Game and Fish Department to increase our understanding and better management of common loons in YNP and with the Wyoming Wetlands Society to help with trumpeter swan restoration.

We revised Yellowstone's Checklist of Birds in 2013. This checklist follows American Ornithologists' Union 7th edition guidelines and was revised in August, 2013 to include the seasonal abundance of each species. Bird species that are accidental, vagrants and those with few verified observations have been grouped at the end of the checklist. Some species listed in previous revisions lacked adequate documentation, so they were removed from the current checklist. The checklist, raptor observation and rare bird form, as well as further information on Yellowstone's birds can be found at:

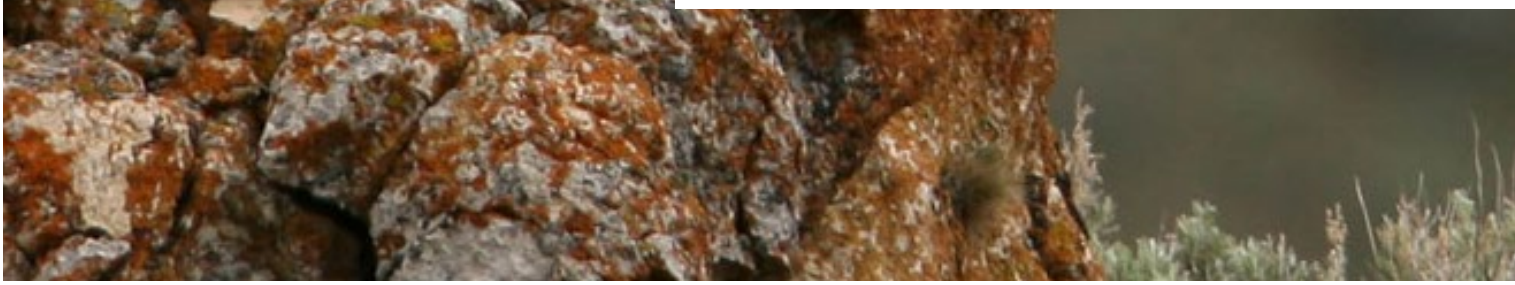
www.nps.gov/yell/naturescience/birds.htm

For the fourth year, education ranger Katy Duffy led hawk ecology and identification programs on September 22. Sixty 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 Duffy pointed out migrating raptors and discussed identification tips and the ecology of migration for 100 visitors. Duffy also taught an owl ecology and identification class for the Yellowstone Association Institute on May 25-26 at the Lamar Buffalo Ranch and a raptor ecology and identification course for the Yellowstone Association Institute on September 6-8. Duffy presented a session on the park's diurnal and nocturnal raptors for a Yellowstone Association Institute course on citizen science in November. YRI staff led a session on raptors and other aspects of the bird program at spring resource education training attended by more than 200 NPS education rangers, Yellowstone Association Institute guides, Xanterra tour guides, and commercial guides operating in the park. The YRI also hosted a winter bald and golden eagle volunteer survey on January 11 and 18 to document winter use in YNP, Gardiner, and Paradise Valley. These programs help raise awareness of raptors in YNP while contributing to the larger goal of increased knowledge regarding these species.

On December 22, 2013 Woody Martin and Katy Duffy organized and hosted the 41st annual Audubon Christmas Bird Count. Twenty-five observers fanned out from the YNP's north entrance to survey birds in Mammoth, Jardine, and Gardiner. Participants observed nearly 3,000 individuals of 36 species during the count day including a merlin, belted kingfisher, brown creeper, and over 2,000 bohemian waxwings (Table 15). Yellowstone encourages participation in these events. Thank you to all who made this a successful day.

Table 15. Species and total for birds observed during the 2013 Christmas Bird Count on December 22.

Species	MT	YNP - MT	YNP - WY	Totals
Green-winged teal		6	20	26
Mallard	17	17	23	57
Common goldeneye	10	7	2	19
Barrow's goldeneye	8		6	14
Common merganser	17			17
Bald eagle	2	1	6	9
Northern harrier			1	1
Golden eagle	1		3	4
Merlin	1		1	2
Gray partridge	6			6
American coot			4	4
Rock pigeon	179			179
Northern pygmy owl			1	1
Belted kingfisher	1	2		3
Downy woodpecker	1			1
Hairy woodpecker	1			1
Northern flicker	1	3		4
Gray jay			2	2
Pinyon Jay	27			27
Clark's nutcracker			15	15
Black-billed magpie	31	4	28	63
Common raven	144	25	19	188
Black-capped chickadee	9	2		11
Mountain chickadee	6		18	24
Red-breasted nuthatch			1	1
Brown creeper	1		1	2
American dipper	4	12	28	44
Townsend's solitaire	23	13	58	94
American robin			2	2
Bohemian waxwing	46	725	1245	2016
Dark-eyed junco			1	1
Pine grosbeak	13			13
House finch	9			9
Common redpoll	1			1
Pine siskin	1			1
House sparrow	40			40
Total	**600**	**817**	**1485**	**2902**



2012 Noteworthy Birds

Bird program staff photographed a Bullock's oriole on the east shore of Yellowstone Lake in June and a Forster's tern with a Franklin's gull in August. We observed a short-eared owl in Lamar Valley and a Virginia rail in Mammoth during August. Please see Appendix B for the complete list of species observed in YNP during 2013. Brad Barth, a long-time Yellowstone guide and birder reported a Canada-domestic goose hybrid at Alum Creek.

All bird sightings of note are forwarded to the Montana, Idaho, or Wyoming Rare Bird Committee who are responsible for assessing the reliability of rare or unusual bird sightings for their respective states. We encourage park staff and visitors to report rare or unusual bird sightings. You can find a rare bird observation form and a checklist at:

go.nps.gov/yellbirdchecklist.

Acknowledgments

We would like to thank K. Duffy for many hours volunteering with peregrine falcon, prairie falcon, bald eagle, osprey, and owl monitoring in addition to hosting public outreach programs; YRI interns B. Cassidy, J. Stein, and Angela Woodside; YNP-BP volunteer G. Gilbert; pilots S. Ard and R. Stradley; B. Long and D. Reed from the Wyoming Wetlands Society for their expertise and help with Trumpeter Swan activities; V. Spagnuolo, C. Persico, C. Anderson. M. Kneeland and D. Evers from Biodiversity Research Institute for their work, help and knowledge of common loons; B. Price for raptor nest searching and monitoring and for prey remains and eggshell fragment collection from peregrine and golden eagle nests sites. We thank J. Kirkley for Swainson's hawk nest searching and monitoring; M. Hanna, M. Moore, J. Nicholson, A. Trnka, R. Berger and L. Tuohy for weekly winter swan counts along the Yellowstone and Madison Rivers. Thanks to Diane Renkin for her yellow warbler observation.

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We also thank all visitors, YNP staff and Yellowstone Association staff who submitted bird sightings.

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We appreciate interest in YNP birds and are open to input and volunteering efforts to help with monitoring birds across YNP.

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Appendix A

Raptor Nesting Terminology (definitions based on Postupalsky, 1974 and Steenhoff and Newton, 2007).

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 Territory: an area that contains, or that was previously known to contain, one or more nests or eyries within the territorial range of a mated pair of birds. 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 nest: the percentage of active nests in a monitoring region in which one or more young fledges successfully (used for ospreys and bald eagles). Young > 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 nest/territory: the percentage of occupied nests/territories in a monitoring region in which one or more young fledges successfully (used for all raptors except ospreys and bald eagles). Young reaching > 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 that exhibits territorial display or other reproductive-related activity. A territory is also considered occupied 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)]. Fresh nesting material added to a nest structure may also indicate occupancy, but care must to 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 nest: 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), but 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 a better 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 Breeding Territory: a nest or group of alternate nests at which none of the activity patterns diagnostic of an occupied nest were observed.

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