NONGAME SECTION

2024-2025 ANNUAL COMPLETION REPORT

NONGAME SECTION PERSONNEL

Zack Walker
Nongame Wildlife Supervisor

Heather O'Brien
Nongame Mammal Biologist

Zach Wallace
Nongame Bird Biologist

Andy Gygli
Small Carnivore Biologist

Laura Beard
Bat Biologist

Courtney Rudd
Nongame Biologist

Katherine Sauer
Nongame Biologist

Frank Stetler
Nongame Biologist

Kaitlyn Jackson
Nongame Technician

Amber DeValk
Nongame Technician

Adam Nash
Bat Technician

Britney Force
Bat Technician

Taylor Howe
Bat Technician

Chloe Hernandez
Goshawk Technician

Tucker Grigsby
Goshawk Technician

Olivia Poore
University of Wyoming
Wildlife Fellow

Kayla Wenzler
University of Wyoming
Wildlife Fellow

Vera Walker
Volunteer
ACR Compilation Assistant

The Wyoming Game and Fish Nongame Section would like to thank the volunteers and wildlife professionals from this and other natural resource management agencies for their valuable contributions. We would also like to extend our gratitude to the landowners across the state that allow us access and ability to perform fieldwork on private land. Without the generous contribution from these stakeholders, the work of the Nongame Section would not be possible.

The Nongame Section would additionally like to thank all funding sources that contribute to work on nongame species throughout the state.

The reports included in this document are the annual summaries of current work the Nongame Section has completed from April 15, 2024 - April 15, 2025. If additional information is needed for any of the projects listed in this report, please contact the Nongame Section at (307) 332 - 2688.

Front Cover: American Pika / Credit: Frank Stetler
Back Cover: Swift Fox / Credit: Frank Stetler

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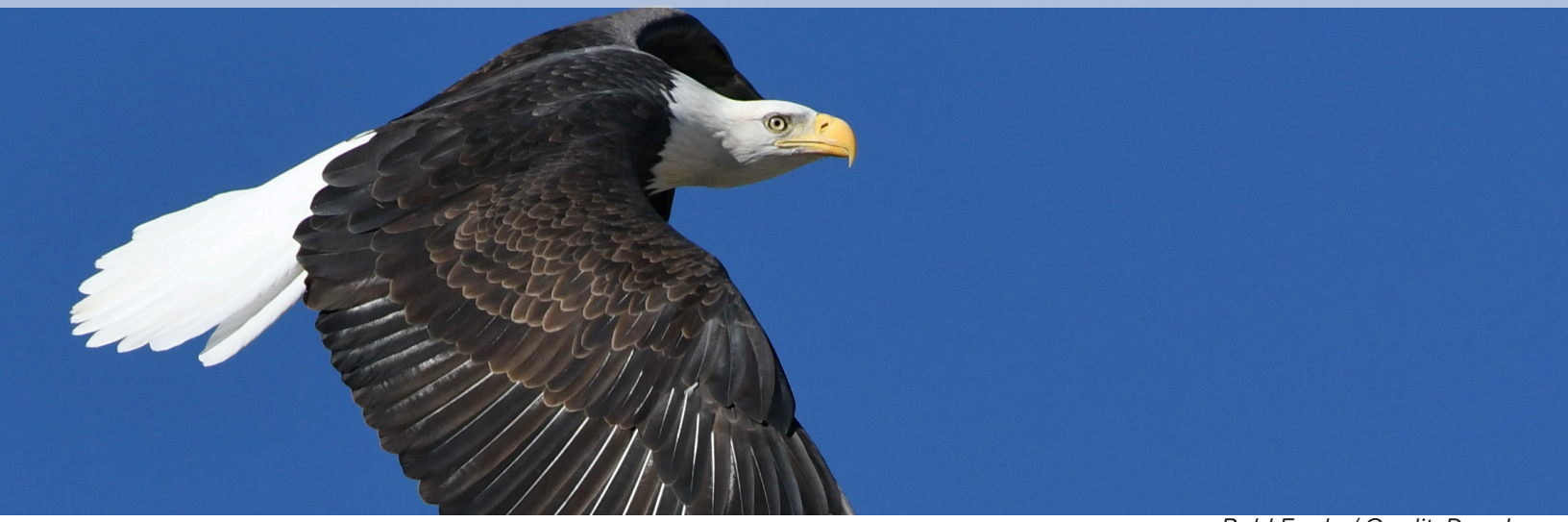


Bald Eagle / Credit: Don Jones

The Wyoming Game and Fish Department (WGFD) initiated statewide monitoring for Bald Eagles in 1978. Although Bald Eagles nest along all major river systems in the state and increasingly in upland habitats near water bodies, the largest population is found in northwestern Wyoming along the Snake River and its tributaries. Following severe range-wide declines from effects of organochloride pesticides, recovery of the species in Wyoming began in the 1980s, centered on the Jackson area. As the distribution of the species continues to expand in the state, the numerous territories located along the Snake River likely still serves as a source population for other parts of Wyoming and the Greater Yellowstone Area.

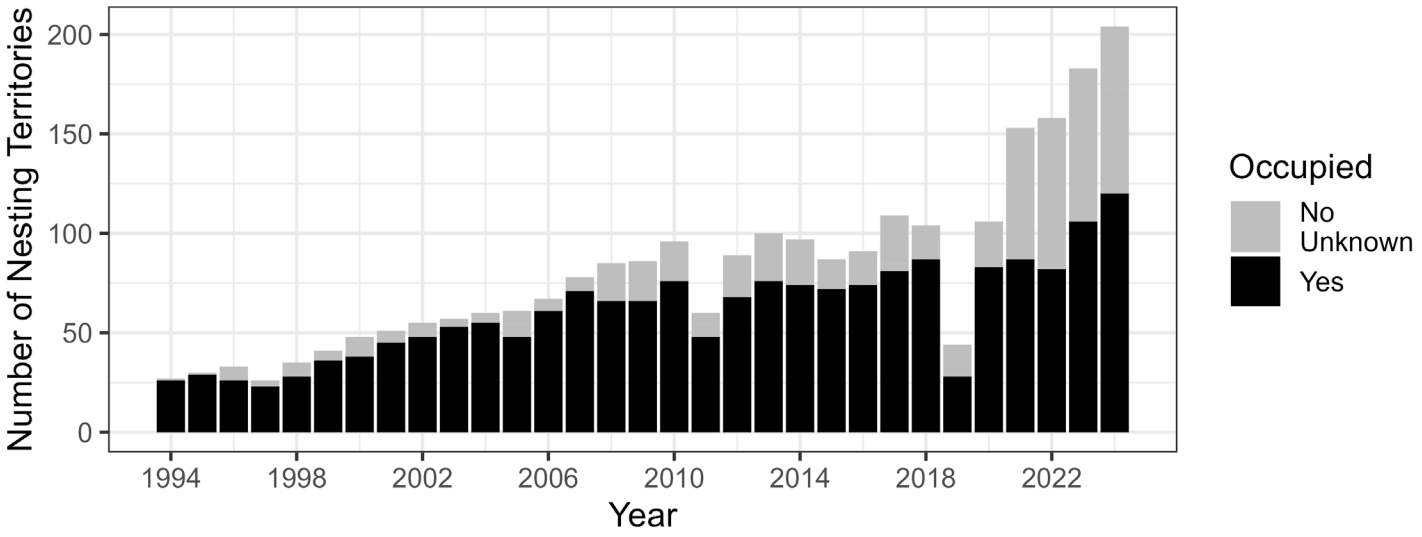
Bald Eagle / Credit: Amy Anderson

Annual fixed-wing aerial surveys are conducted by WGFD and Grand Teton National Park to monitor occupancy and productivity of known Bald Eagle nesting territories in portions of western Wyoming. Additional information on nest locations and status is provided by partners, including Seedskadee National Wildlife Refuge, Teton Raptor Center, and Bridger-Teton National Forest. Survey visits are conducted in late March to early April to document the number of occupied sites (defined as an incubating adult, eggs or young, or a pair perched at the nest site), and again in late May or early June to determine nesting success and count mature young (defined as approximately 80% of fledging age).

In 2024, we surveyed 204 Bald Eagle nesting territories for occupancy and productivity. Occupancy surveys were conducted on April 4 and productivity

surveys on June 1–2. Grand Teton National Park contributed data from surveys on April 16 and June 10. We checked a minimum of 241 nests within 204 territories, including 26 newly located nests, 12 of which were alternative nest locations within known territories, and 14 of which were new or previously unknown territories. Of 204 territories checked, 120 (59%) were occupied and 84 (41%) were unoccupied or had undetermined status. Nesting attempts were initiated by 119 pairs (99%) occupying sites, of which 84 (71%) succeeded to produce at least one mature young, 29 (24%) apparently failed, and 6 (5%) had unknown outcomes. The 119 occupied nests with known outcomes produced a total of 135 young, or 1.13 young per occupied nest and average brood size at fledging of 1.61 young per successful nest.

The size of the population and the number of known occupied nesting territories has grown steadily since the 1980s, including a substantial increase since 2000 in the number of pairs nesting in the Green River Basin and adjacent areas of the Salt River and Bear River drainages. Although variable effort among years limited our ability to compare the proportion of occupied and unoccupied sites, the count of 120 known occupied territories in 2024 was the greatest since the start of monitoring in 1978.

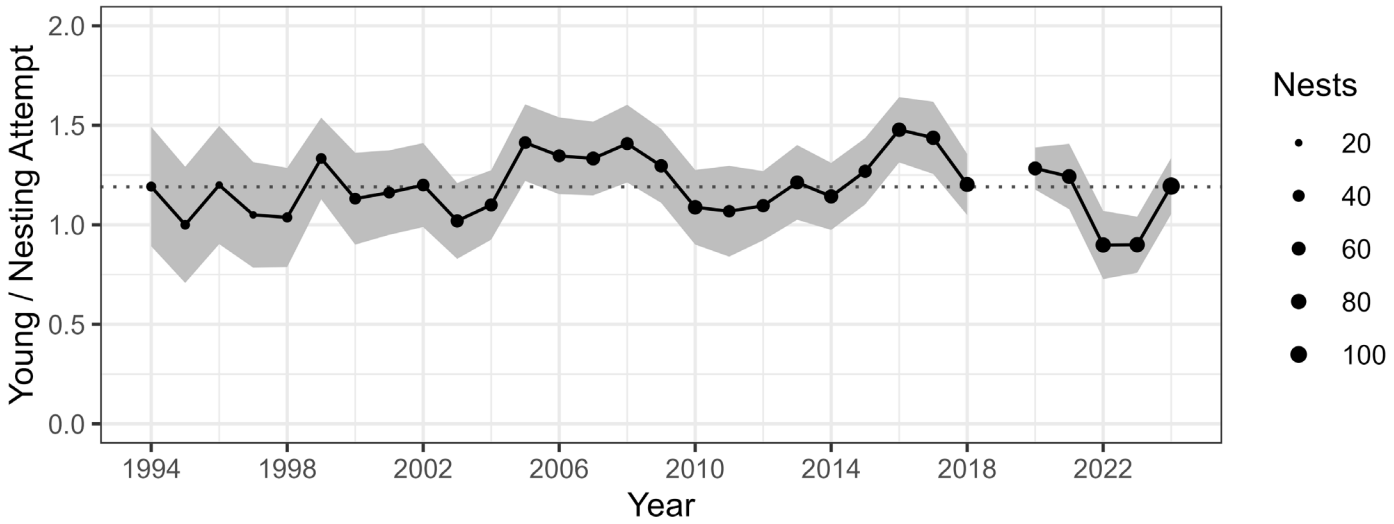


Occupancy of Bald Eagles in western Wyoming, 1994 - 2024. Plot shows annual counts of nests classified as occupied (black bars) and not occupied or unknown status (gray bars).

Productivity in 2024 (1.13 young per nesting pair) rebounded to near the long-term average (1.18 young per nesting pair), following two years of the lowest productivity documented during the last 30 years of monitoring in 2022 and 2023 (0.90 young per nesting pair). The return to average productivity in 2024 supports our previous interpretation that low productivity in 2022–2023 was driven by severe winter and spring weather that led to widespread nest failure.

Despite high detection rates for occupancy, we were unable to locate a nest at approximately 29% of sites surveyed. Based on these results, we suggest efforts to clarify the status and locations of historical nests are needed. Additionally, we recommend analyzing occupancy and productivity relative to long-term patterns in weather, climate, habitat, and human development to inform management of this population and evaluate the need for continued annual monitoring.

Prepared By: Zach Wallace, Nongame Bird Biologist



Productivity of Bald Eagles in western Wyoming, 1994 - 2024. Plot shows the annual average number of mature young produced per nesting attempt with known outcome (points), with 90% confidence intervals (gray shading), point size indicating the number of nesting attempts monitored, and the long-term average (dotted line),

FUNDING SOURCE(S):

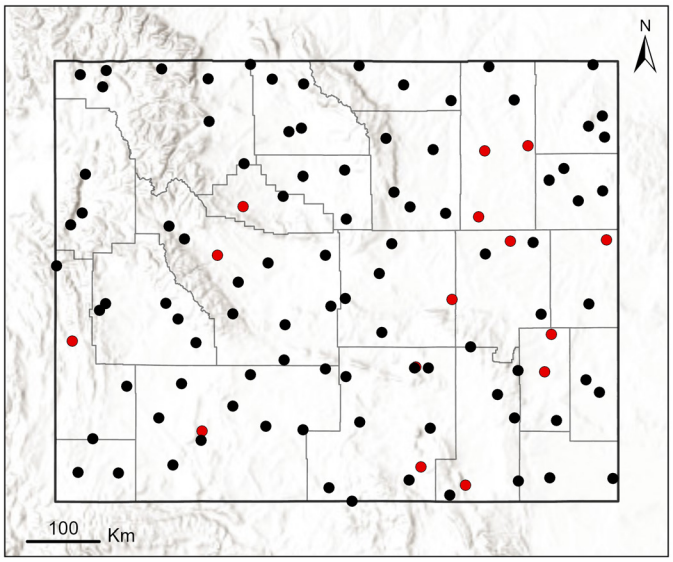
Wyoming Game and Fish Commission Funds
U.S. Army Corps of Engineers Grant

NORTH AMERICAN BREEDING BIRD SURVEY IN WYOMING

Tree Swallow / Credit: Don Jones

The North American Breeding Bird Survey (BBS) is a continental, multi-species avian monitoring program that has provided data on the distribution and status of birds in Wyoming since 1968. The BBS is run jointly by the United States Geological Survey Eastern Ecological Science Center and the Canadian Wildlife Service. The BBS was launched in 1966 with 600 roadside survey routes. Today, there are over 4,600 routes located across the continental U.S. and Canada, including 107 active routes in Wyoming. Routes are randomly located in order to sample habitats that are representative of the region and provide a continent-wide perspective on avian population trends. The Wyoming Game and Fish Department (WGFD) coordinates the implementation of the BBS in Wyoming. Surveys are conducted by trained volunteers, including natural resource agency biologists and members of the public.

For this report, we accessed preliminary results from the BBS Coordinators Database because the final 2024 dataset was not yet available. In 2024, 61 observers surveyed 92 of 107 (86%) active routes in Wyoming. Twelve volunteers surveyed two routes and seven volunteers conducted three or more routes. The number of routes surveyed in 2024 was the highest since the survey began and greater than the average



Locations of North American Breeding Bird Survey (BBS) routes in Wyoming showing 92 of 107 active routes surveyed in 2024.

of 66 routes surveyed from 1990–2023. This increase was the result of a concerted effort by WGFD to recruit observers to join the program.

Available data included 90 of 92 routes due to delayed submittal of two surveys. Observers detected 49,744 individual birds representing 200 species, including

47 designated as Wyoming Species of Greatest Conservation Need. The average of 43 species detected per route in 2024 was slightly higher than the average of 38 species per route from 1990–2023. The preliminary 2024 dataset and the most current final dataset with information for surveys conducted through 2023 are available at the BBS website (https://www.pwrc.usgs.gov/bbs/).

Wilson's Warbler / Credit: Don Jones

As part of our State Wildlife Action Plan revision, WGFD recently used BBS trend analyses in a systematic review of the status of all nongame bird species breeding in Wyoming. The long-term perspective on population trends of Wyoming's birds provided by BBS was essential to the assessment process and complemented the short-to-medium term trend information available from other avian monitoring efforts, including the Integrated Monitoring in Bird Conservation Regions program and eBird. We thank the numerous volunteers who donate their time and expertise to conduct the BBS in Wyoming.

Prepared By: Zach Wallace, Nongame Bird Biologist; Courtney Rudd, Migratory Game Bird and Wetland Biologist

FUNDING SOURCE(S):

Wyoming Game and Fish Commission Funds

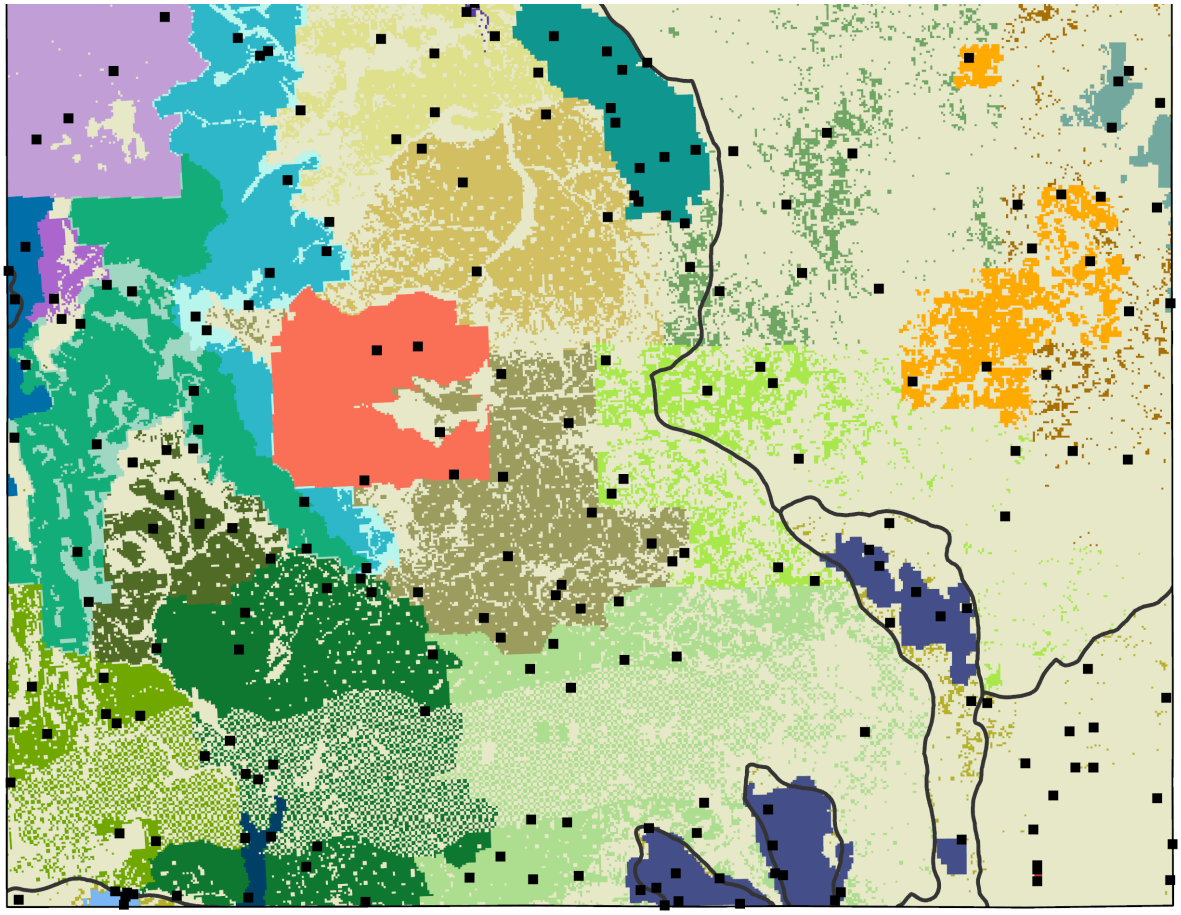
INTEGRATED MONITORING IN BIRD CONSERVATION REGIONS

Grasshopper Swallow / Credit: Don Jones

Population monitoring is an essential component of wildlife management and conservation. Besides improving understanding of species' distributions, monitoring allows us to determine the status of populations by tracking changes over time, identify species that are at risk, and evaluate their responses to management actions and changes in land-use and climate. Long-term populations of many species of North American birds have declined due to human influences, including habitat loss and disturbance. It is a key priority for the Wyoming Game and Fish Department (WGFD) to identify and implement programs to monitor the population status of avian Species of Greatest Conservation Need (SGCN) across the state. While some rare species require their own dedicated monitoring efforts, many of Wyoming's birds can be tracked efficiently and effectively through broad-scale, multi-species surveillance monitoring programs, such as the Integrated Monitoring in Bird Conservation Regions (IMBCR) program.

IMBCR is based on a spatially balanced sampling design that provides information on avian populations at multiple scales, from local management units to states or Bird Conservation Regions (BCRs) to inform conservation decisions from local to national levels. This nested design also provides a consistent and flexible framework for understanding the status of bird populations in local and regional contexts. Collaboration across organizations and spatial scales increases sample sizes and improves population estimates. The robust survey protocol and sampling design of the IMBCR program complements other less structured bird monitoring efforts in Wyoming, including the North American Breeding Bird Survey and eBird. For these reasons, the IMBCR program is well positioned to address conservation and management needs for a wide range of partners, encouraging an interdisciplinary approach to bird conservation that combines monitoring, research, and management. In Wyoming, IMBCR continues to provide information on the distribution and status of bird populations that is essential to implementing the State Wildlife Action Plan.

Virginia's Warbler / Credit: Frank Stetler



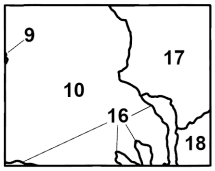
Completed Surveys

Bird Conservation Regions

0 25 50 Miles

0 25 50 Kilometers

BCRs in Wyoming



STRATA

Bureau of Land Management Field Offices

- Buffalo
- Casper
- Cody
- Kemmerer
- Lander
- Newcastle
- Pinedale
- Rawlins
- Rocksprings
- Worland
- All Other BLM

USFS - National Forests

- Ashley
- Bighorn
- Black Hills
- Bridger-Teton
- Bridger-Teton - Roadless
- Caribou-Targhee
- Medicine Bow
- Shoshone
- Shoshone - Roadless
- Wasatch

USFS - National Grasslands

- Thunder Basin

National Park Service

- Bighorn NRA
- Grand Teton NP
- Yellowstone NP

All Other Strata

- Department of Defense
- Tribal Lands - Wind River
- All Other Lands

Integrated Monitoring in Bird Conservation Regions survey locations and strata in Wyoming, 2024. Bird Conservation Regions (BCR) shown are Great Basin (9), Northern Rockies (10), Southern Rockies Colorado Plateau (16), Badlands and Prairies (17), and Shortgrass Prairie (18).

IMBCR surveys are conducted at a random sample of 1-km^2 grid cells, each consisting of 16 evenly spaced survey points. Birds are counted by sight and sound at each sampling point during the breeding season. The distance and time period of detection are recorded for each bird group, as well as additional data on habitat and vegetation. Wyoming contains 37 sampling strata and a minimum effort of two grids per stratum is required to estimate population parameters.

Western Tanager / Credit: Don Jones

In 2024, Bird Conservancy of the Rockies (Bird Conservancy), in conjunction with WGFD and its other partners, conducted the 17th consecutive year of landbird monitoring with the IMBCR program. The survey effort covered all or parts of 10 BCRs and 16 states, including all of Wyoming. In Wyoming, field technicians completed 213 of 213 planned surveys (100%), conducting 2,604 point counts between May 18 and July 15. Multiple agency partners provided funding for surveys, with 62 grids (29%) funded by WGFD. A total of 197 bird species were detected, including 46 Wyoming SGCN. Bird Conservancy estimated densities and population sizes for 220 species that were detected in any year during which surveys were conducted, 58 of which were SGCN. The data yielded robust density estimates (CV < 50%) for 89 species. Bird Conservancy estimated the proportion of 1-km^2 grid cells occupied throughout Wyoming for 223 species that were detected in any year during which surveys were conducted, 61 of which were SGCN. The data yielded robust occupancy estimates (CV < 50%) for 111 species.

The complete 2024 IMBCR Field Season Report is available online (https://bird-conservancy-of-the-rockies.github.io/IMBCR_AnnualReport_2024/). Density tables and graphs, maps, and trend information are available from the recently updated Rocky Mountain Avian Data Center 2.0 website (https://apps.birdconservancy.org/rmadc/).

Prepared By: Zach Wallace, Nongame Bird Biologist; Jessie Reese, Matthew McLaren, Jennifer Timmer, Matt Smith, T.C.Walker, Chris White, Quresh Latif, David Pavackly Jr., and Rob Sparks, Bird Conservancy of the Rockies

FUNDING SOURCE(S):

U.S. Fish and Wildlife Service State Wildlife Grant
Wyoming Game and Fish Commission Funds
Wyoming Governor's Big Game License Coalition Grant
Bureau of Land Management Grant
U.S. Forest Service Grant

PEREGRINE FALCON MONITORING IN WYOMING

Peregrine Falcon / Credit: USFWS National Digital Library

The Peregrine Falcon is an uncommon summer resident bird of prey found throughout most of Wyoming. The species nests primarily on steep cliffs and ledges near open areas used for foraging. The Wyoming Game and Fish Department (WGFD) designates Peregrine Falcon as a Species of Greatest Conservation Need with Native Species Status 3 (NSS3) and moderate conservation priority (Tier II) due to limited distribution and ongoing recovery from historical declines.

Juvenile Peregrine Falcon / Credit: Don Jones

Nesting Peregrine Falcons were nearly extirpated from Wyoming in the 1970s, primarily due to negative effects of organochlorine pesticides. Efforts to breed and release Peregrine Falcons throughout North America started in the late 1960s and regional recovery plans were developed after the species was federally listed as Endangered in 1970. Wyoming reported no known nesting pairs from 1978–1983, released 384 captive produced young from 1980–1995, and documented the first new nesting pair in the state in 1984. By 2015, there were at least 121 known nesting territories in Wyoming, primarily in the western and central portions of the state. The species was federally delisted in 1999.

WGFD, Yellowstone National Park, and Grand Teton National Park continued monitoring Peregrine Falcon occupancy and productivity through 2015 using methods based on the U.S. Fish and Wildlife Service (USFWS) post-delisting monitoring protocol. In 2016, WGFD selected a subset of five sites for ongoing annual surveys within each of four historical regional monitoring areas: Central Wyoming, Western Wyoming, Yellowstone National Park, and Grand Teton National Park. A variable number of additional sites in each area are also surveyed annually. Continued effort to monitor Peregrine Falcon nesting success in Wyoming is warranted due to the significant investment for recovery, ongoing public interest,

and risk of disease and other factors impacting populations.

Productivity is calculated as the number of young per occupied territory with known outcome, based on an approximately 4-hour survey visit during mid-June to early-August, when young can reliably be observed. Sites are classified as occupied based on observations of two adults in the area, one adult incubating or delivering prey to a ledge, or observations of eggs or young. Classifying sites as unoccupied typically requires a minimum of 4 hours of survey effort by an experienced observer.

In 2024, WGFD and partners visited a total of 60 Peregrine Falcon nesting sites. Of those, 39 were occupied, 15 were unoccupied, and six had unknown status due to inadequate timing or duration of monitoring. Of 39 occupied sites, 33 sites with known outcomes produced a total of 51 young (1.55 young per occupied territory). Productivity at the regional monitoring sites of 1.75 young per occupied territory was the highest since the monitoring program was initiated in 2016, and significantly higher than the record low of 0.87 young per occupied territory observed in 2023. Seperate from the regional monitoring sites, 21 additional Peregrine Falcon nesting sites with known outcomes produced a total of 28 young. Productivity at the additional sites of 1.43 young per occupied territory was slightly higher than the average of 1.32 young per occupied territory from 2016–2023.

Peregrine Falcon productivity in 2024 at the regional monitoring areas and additional sites was within the range of 1–2 young per occupied territory required to maintain a stable or increasing population trend. High productivity of the regional monitoring sites was driven by the Central and Western Wyoming areas, with productivity in Grand Teton National Park near the long-term average, and Yellowstone National Park at 1.0 young per occupied territory. Productivity in 2024 rebounded from a low point in 2023 that likely resulted from severe winter and spring weather. The potential influence of Highly Pathogenic Avian Influenza (HPAI) on the low productivity observed in 2023 is unknown and warrants further monitoring. Prevalence of HPAI in other avian species has increased during the winter of 2024–2025, which could lead to lower productivity in 2025. Additionally, we note an unknown amount of the variation in occupancy and productivity is likely due to errors in classification. Outcomes for a site can be difficult to determine when a ledge is obscured by distance or visual obstructions, fledged juveniles are not associating strongly with visible areas of the ledge, or when surveys are of insufficient duration or outside the window of optimal juvenile detection. The relatively small number of sites monitored as part of this program make results sensitive to such errors.

Collaborative efforts to minimize recreational disturbance to nesting Peregrine Falcons in central Wyoming continued in 2024. WGFD, U.S. Forest Service (USFS) Shoshone National Forest Wind River District, and the nonprofit climbing organization Wyoclimbers initiated a collaborative management effort in 2021 to maintain rock climbing opportunities at locations in the Southern Wind River Mountains with nesting Peregrine Falcons and Prairie Falcons. Voluntary closures were implemented at two sites in 2024. Closures were lifted after young successfully fledged at one site and it was determined that the nesting attempt at the other site had either failed or not been initiated.

Given recent fluctuations in productivity and unknown effects of HPAI on Peregrine Falcon populations, we recommend continuing annual surveys in the four regional monitoring areas, with surveys of the additional sites, as time permits. Ongoing education of observers on monitoring protocols and improved collection of data on the observation process (e.g., number and duration of visits, breeding status at each visit) will reduce bias in the survey process and analysis. In future years, we will consider replacing some persistently unoccupied sites in the sample, as recommended in the productivity monitoring protocol. We also recommend continuing collaborative efforts to adaptively manage recreational disturbance to nesting Peregrine Falcons in Wyoming.

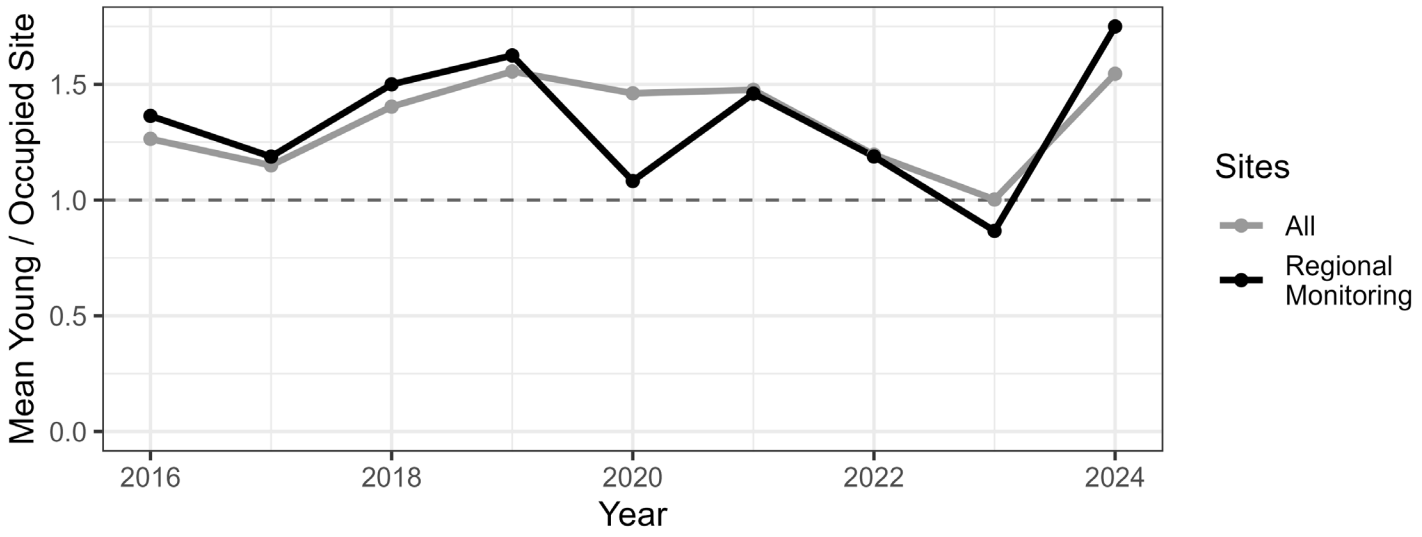
Prepared By: Zach Wallace, Nongame Bird Biologist; Courtney Rudd, Migratory Game Bird and Wetland Biologist

Occupancy and productivity of Peregrine Falcons in Wyoming, 2024.

Survey area	Number of Sites			Total Young	Productivity[a]
	Monitored	Occupied (%)	Outcome Known		
Central Wyoming[b]	5	3 (60%)	3	9	3.00
Western Wyoming[b]	6	3 (50%)	3	5	1.67
Yellowstone National Park[b]	4	3 (75%)	3	3	1.00
Grand Teton National Park[b]	5	3 (60%)	3	4	1.33
Additional Sites[c]	34	27 (79%)	21	30	1.43
Total: Regional Monitoring	**20**	**12 (60%)**	**12**	**21**	**1.75**
Total: All	**54**	**39 (72%)**	**33**	**51**	**1.55**

[a] Mean number of young per occupied territory with known outcome.
[b] Regional monitoring sites.
[c] Additional sites, including territories in Grand Teton and Yellowstone National Parks, federal, tribal, and state lands.

Productivity of Peregrine Falcons in Wyoming 2016 - 2024. Plot shows productivity (average number of young per occupied territory with known outcome) for regional monitoring sites (black line, n=20 in 2024) and all sites (gray line, n=54 in 2024)



FUNDING SOURCE(S):

Wyoming Game and Fish Commission Funds
U.S. Forest Service
Grand Teton National Park
Yellowstone National Park

MOVEMENTS, SPACE USE, AND HABITAT SELECTION OF PINYON JAY IN WYOMING FROM SATELLITE TELEMETRY

First Pinyon Jay in Wyoming to be Fitted with a Satellite Transmitter, Carbon County/ Credit: Chloe Hernandez

Pinyon Jay is an obligate bird of low-elevation coniferous woodlands that has experienced steep population declines since the 1970s. Conservation concern for Pinyon Jays has increased due to population declines, as well as impacts of climate change on the pinyon pine trees that they depend upon for habitat throughout much of their range. Accordingly, Pinyon Jay was proposed for listing under the Endangered Species Act in 2022, and in August 2023 the USFWS completed their 90-day review of this petition and announced that a full 12-month review of the species' status was warranted.

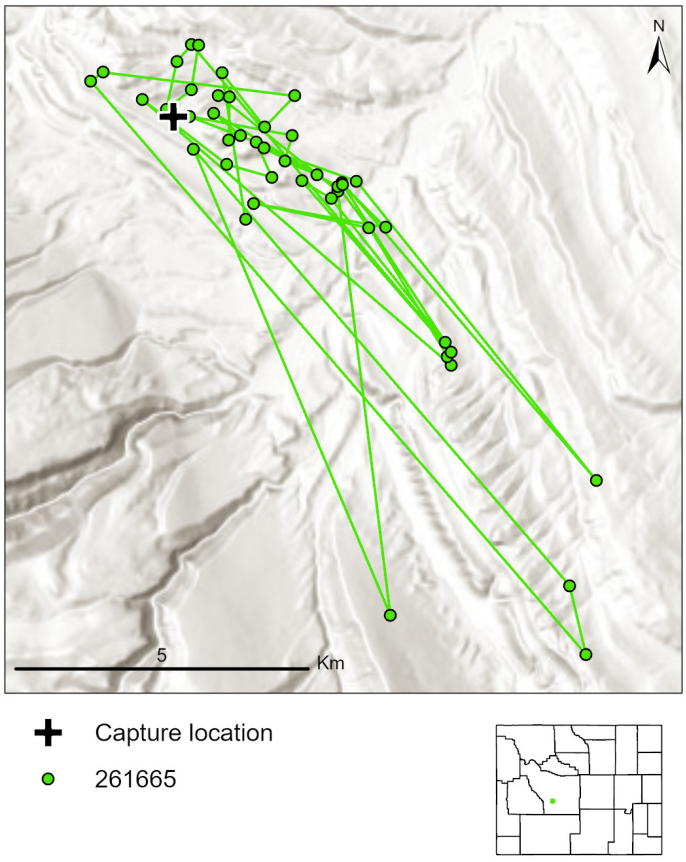
Documentation of breeding locations is crucial for management of Pinyon Jay because of the species' nest-site fidelity. Conservation of nesting habitat would be an important tool to promote Pinyon Jay populations in Wyoming, but information on both colony locations and habitat preferences is currently limited. Further, long-term breeding site monitoring has been suggested as an efficient method to track population trends in this otherwise nomadic species. Thus, identification of nesting sites would also provide the basis to establish a program to monitor Pinyon Jay populations.

Habitats available to Pinyon Jay in Wyoming differ from the core of their range because the state is near the northeastern edge of the species' breeding distribution. Typically, Pinyon Jay nest in pinyon-juniper woodlands, and specifically in areas that produced a large amount of pinyon seeds the previous fall. However, recent nest surveys in Colorado revealed that 75% of nests were found in juniper trees and only 25% in pinyon pines. It is important for managers to understand if Pinyon Jays in Wyoming also nest in juniper woodlands because juniper removal is a common habitat treatment for other species and objectives, including livestock grazing, watershed condition, fuels reduction, and Greater Sage-Grouse habitat restoration. The effects of juniper woodland thinning and removal may be particularly pronounced for Pinyon Jay because of their restriction to low-elevation conifer woodlands, strong site fidelity, and limited dispersal from colony sites.

Our goals for monitoring of Pinyon Jay are to locate additional breeding sites, document habitats selected during the breeding season specific to Wyoming, and identify important areas for habitat conservation and further monitoring. In addition to testing survey protocols from the Pinyon Jay Working Group and evaluating occurrence data, we are testing the

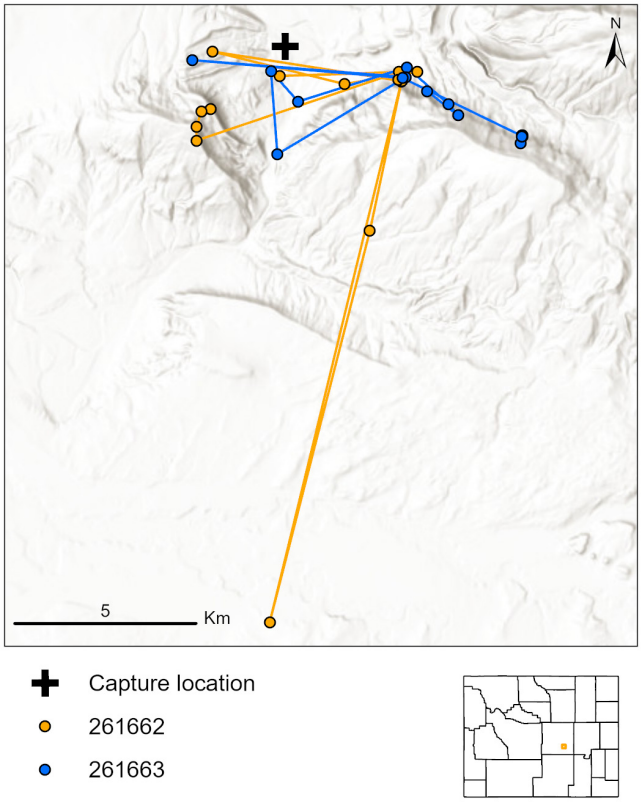
efficacy of GPS transmitters as a method to locate potential colony sites. If effective, GPS tracking could provide data to estimate home range size and habitat preferences.

The 2024 field season began in late April with scouting for potential capture sites to deploy transmitters for the first time on the species in Wyoming. We baited three sites: two located south of Lander and another south of Casper. We deployed four battery-powered transmitters on May 1 and May 31, and began to receive GPS locations within approximately 3 weeks. A total of 12 birds were captured and banded from these efforts. To date, the transmitters have provided a total of 90 GPS locations.



Locations (n = 46) collected by a GPS transmitter placed on a Pinyon Jay in Fremont County, Wyoming, June 2024 - April 2025. The maximum recorded distance from the capture site was 11.6 km.

One transmitter malfunctioned immediately after deployment and did not transmit any locations. While the other three effectively transmitted between 20–46 locations, the low-frequency of the data were not sufficient for our goals of estimating home ranges or habitat preferences. However, we did observe some interesting patterns that may inform future work. We received 11 months of movement data from a bird captured near Lander, which remained within 11.6 km of the capture site through April 2025. No clear clusters of locations were identified, but a majority (78%) of the bird's GPS locations overlapped a recently developed subdivision over an area of approximately 3.8 km^2, possibly suggesting use of bird feeders. The other two birds captured near Casper transmitted data through October 2024. While they also did not transmit clustered locations in the nesting season, both birds returned to points within 35 m from mid-August through the end of data transmission (October 15 or November 14). These locations require further investigation, but may represent cache sites or roosting areas.



Locations (n = 44) collected by GPS transmitters placed on two Pinyon Jays in Carbon County, Wyoming, June - November 2024. The maximum recorded distance from the capture site was 15.8 km

We also tested the Pinyon Jay Working Group landscape level survey protocol in Wyoming, including at three grids used by GPS-tagged birds. This effort resulted in our locating four previously used nests within approximately 3 km of the Casper

capture site, which were to our knowledge the first documented Pinyon Jay nests in Wyoming. At the survey grids near Lander, we encountered birds during two of the visits and in both cases they were briefly perching and then flying over the survey plot.

First known Pinyon Jay nest found in Wyoming. The condition of this nest and other in the area suggested the colony site was not used for breeding in 2024.

Effective management of Pinyon Jay in Wyoming requires clarification of breeding status, documentation of colony locations, understanding of habitat associations specific to Wyoming, and identification of areas important to Pinyon Jay populations that may be negatively impacted by common habitat treatments for other species of concern. Our work in 2024 helped fill knowledge gaps in Wyoming by identifying areas supporting Pinyon Jay during the breeding season and collecting additional evidence of reproduction within the state. Importantly, we were able to practice standardized survey protocols, capture, and transmitter attachment.

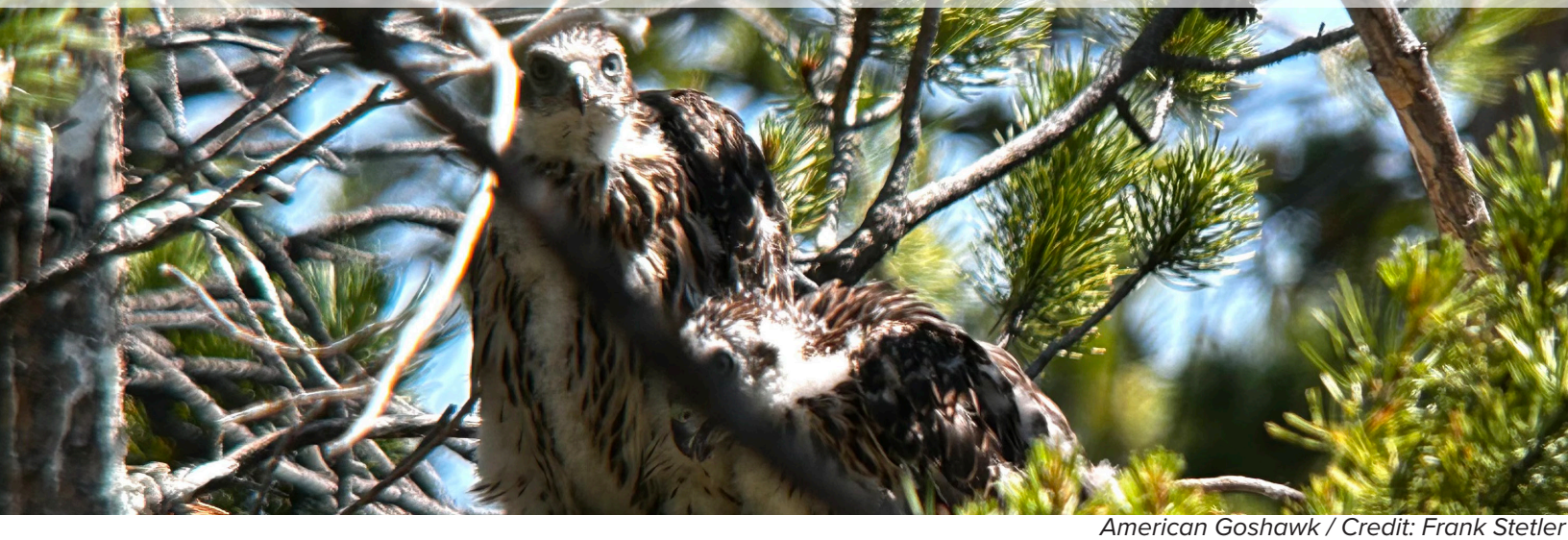
In 2025, we will expand GPS tagging and survey efforts with the goals of locating additional breeding sites and understanding Wyoming-specific Pinyon Jay space-use and habitat requirements. Tagging efforts will involve deploying a new model of transmitter that records higher-resolution data and downloads to a base station, rather than transmitting to satellites. Expanded survey efforts will be conducted by technicians from the Intermountain Bird Observatory, as well as WGFD Nongame Bird Program Staff, targeting 30–50 grid cells across the state.

Prepared By: Frank Stetler, Nongame Biologist; Zach Wallace, Nongame Bird Biologist

FUNDING SOURCE(S):

Wyoming Governor's Big Game License Coalition
Wyoming Game and Fish Commission Funds

MONITORING AMERICAN GOSHAWK RESPONSE TO CHANGES IN FOREST CONDITIONS IN SOUTHEAST WYOMING



American Goshawk / Credit: Frank Stetler

The American Goshawk is a large forest raptor found throughout the Northern and Western United States, Canada, and parts of Mexico, and is an uncommon, year-round resident in Wyoming. The American Goshawk was considered a single species with the Eurasian Goshawk (*A. gentilis*) under the common name Northern Goshawk until the species were split in 2023. The Wyoming Game and Fish Department (WGFD) classifies American Goshawk as Native Species Status Unknown (NSSU, Tier I), one of the highest priority rankings for Species of Greatest Conservation Need (SGCN), due to a lack of information about population trends and the threat of habitat loss. American Goshawks are designated as a "Sensitive Species" in much of the U.S., including all BLM-administered lands in Wyoming and U.S. Forest Service (USFS) Regions 2 and 4. Additionally, the Medicine Bow National Forest and 53 other national forests have designated the Northern Goshawk as a "management indicator species" due to its potential sensitivity to habitat changes.

Despite being considered a forest habitat generalist, American Goshawks require specific vegetation structure for nesting, including mature to old-growth forests composed primarily of large trees with relatively high canopy closure. In recent decades, much of the American Goshawk's habitat has experienced significant changes from both natural and anthropogenic influences. Since the late 1990s, several species of native bark beetle have infested millions of acres of forests in the Western U.S., resulting in widespread mortality of lodgepole pine. The Medicine Bow National Forest in Southeastern Wyoming was one of many western forests severely affected by the bark beetle outbreak, particularly in the early 2010s. Several large fires and timber harvest projects have added to the disturbance caused by the ongoing bark beetle epidemic, resulting in extensive and rapid changes to forest structure and composition in the Medicine Bow National Forest.

The effects of changing forest structure on American Goshawks are still largely unknown. Goshawk habitat preferences are historically incompatible with disturbances that cause large-scale tree mortality and the recent deforestation in the Medicine Bow National Forest may thus impact resident populations negatively. This study aims to identify if extensive tree mortality caused by the Mountain Pine Beetle and other disturbances is having adverse effects on American Goshawks breeding in the area.

American Goshawk nest in typical habitat. Carbon County, Wyoming

We used a grid-based sampling design to monitor occupancy and productivity of known American Goshawk territories in the Medicine Bow National Forest. In cooperation with USFS, we obtained current and historical nesting locations and used a spatially balanced sampling design to select 6-km^2 grid cells that overlaid the nest locations. We prioritized grid cells with more nest locations and recent activity, and ensured that our sample spanned a gradient of habitat quality and disturbance.

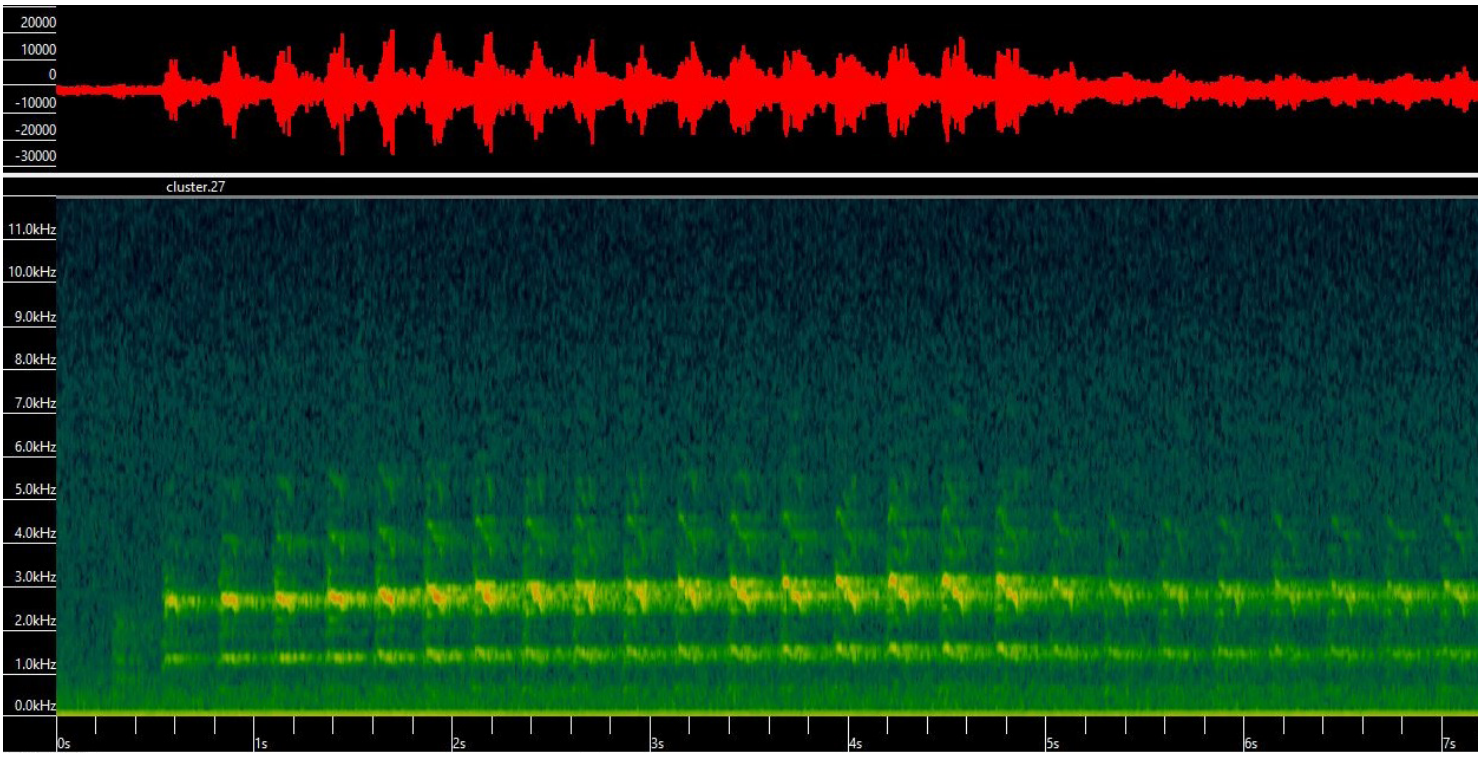
We used a multi-method approach to conduct surveys during the two most vocal stages in the breeding chronology of American Goshawks. For our early-seasons surveys, we deployed autonomous recording units (ARUs) near historical nest locations from mid-March through April, corresponding to the courtship and nest building stage. In the late season, we conducted broadcast acoustical surveys in June and July during the nestling and fledging stage. The protocol for broadcast surveys was based on the "American Goshawk Inventory and Monitoring Technical Guide". Surveys consisted of walking transects placed throughout the grid while searching for signs of nesting (e.g., nest structures, whitewash, prey remains) and periodically stopping to broadcast American Goshawk calls and listen for responses. We searched for nests in areas surrounding detections of American Goshawks from either survey method.

Autonomous Recording Unit (ARU) deployed during early-season surveys to record American Goshawk calls.

During the 2024 field season, we surveyed a total of 32 grids, including 12 in the early season, 20 in the late season, and nine during both periods. The last known year of occupancy for our surveyed grids ranged from 1997 to 2023. We detected American Goshawks on nine of 12 (75%) early-season grids. Most detections were confirmed via audio recordings from the ARUs, with visual confirmation of early-season occupancy in three grids. We detected American Goshawks in only five of 29 (17%) grids surveyed during the late season, three of which were revisited because of detections in the early season. We had visual confirmation of occupancy in four of five late-season grids, including two nests with young, and occupancy was confirmed by ARU in the other grid. Overall, we confirmed American Goshawk occupancy in 11 of 32 grids (34%) surveyed this season.

Field data collection for this study is continuing in spring and summer 2025. The 2025 field season began the second week of March and we are currently on track to complete more surveys than in 2024. Analysis and final reporting are expected to be complete by summer of 2026.

Prepared By: Katie Sauer, Nongame Biologist; Zach Wallace, Nongame Bird Biologist



Waveform (top) and spectrogram (bottom) of an American Goshawk call recorded in Albany County, Wyoming.

FUNDING SOURCE(S):

U.S. Fish and Wildlife Service State Wildlife Grant

RESPONSE OF SAGEBRUSH-OBLIGATE BIRDS AND SMALL MAMMALS TO HABITAT TREATMENTS IN SOUTHWEST WYOMING

Sagebrush Sparrow / Credit: Don Jones

The sagebrush biome covers 175 million acres of the Western U.S. and provides habitat for over 350 wildlife species, including Mule Deer, Pronghorn, and Greater Sage-Grouse. However, sagebrush ecosystems are now among the most threatened in North America due to wildfire, herbivory, changes in land use, and other factors. Wyoming, and particularly the Green River basin in the southwestern portion of the state, contains some of the most intact sagebrush steppe habitat, making the region a refuge for sagebrush-obligate species and a high priority for conservation.

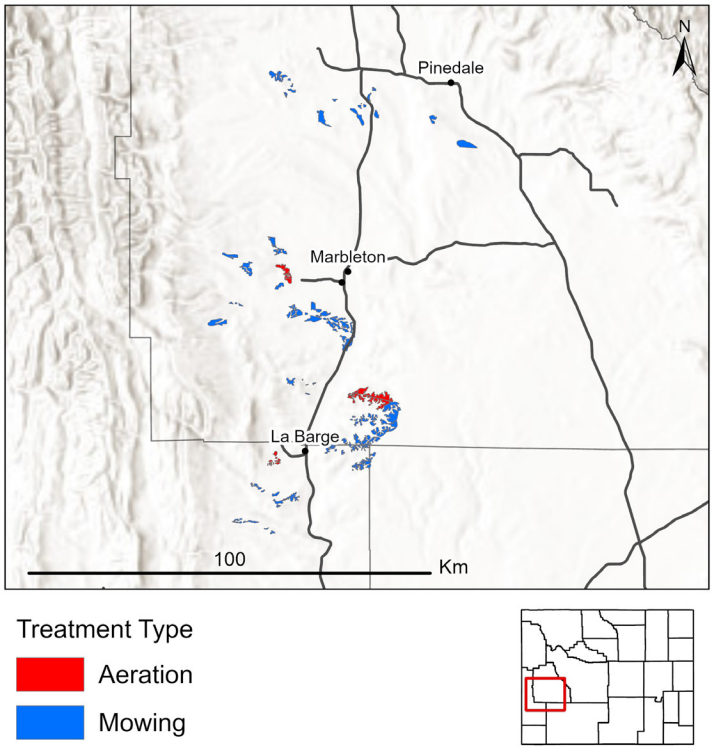
In response to declines in Mule Deer populations, the Wyoming Game and Fish Commission adopted the Wyoming Mule Deer Initiative in 2007 and the Wyoming Range Mule Deer Plan in 2011. A key objective of these management plans was to implement habitat improvement projects in sagebrush communities across the state, including mechanical removal of sagebrush and encroaching conifers by mowing, aerating, chaining, and cutting. The goal of these treatments is to improve forage for Mule Deer by increasing sagebrush vigor and leader growth, and to improve the long-term health of sagebrush vegetation communities by creating openings in older stands.

Photograph showing an example of mechanical treatments to sagebrush. Shrubs were mowed in a mosaic pattern to create an edge effect. / Credit: Kevin Spence

Concomitant with the loss of sagebrush habitat and decreasing Greater Sage-Grouse and Mule Deer populations is the decline of other sagebrush-obligate species. Three songbirds (Brewer's Sparrow, Sage Thrasher, and Sagebrush Sparrow) and two small mammal species (Pygmy Rabbit, and Sagebrush Vole) are Wyoming Species of Greatest Conservation Need (SGCN) that require sagebrush habitat for their survival. The Sage Thrasher, Brewer's Sparrow, Sagebrush Sparrow, and Sagebrush Vole are ranked by the WGFD as Native Species Status (NSS) 4-Tier

II because of vulnerability to habitat loss and, in the case of the avian species, because of documented population declines across their ranges. The Pygmy Rabbit is ranked as NSS3-Tier II due to the risk of habitat loss and fragmentation, as well as uncertainties about the species' abundance in Wyoming.

Alterations of habitat designed to benefit a single species may have unintended effects on non-target species that co-occur in the area. Our objective for this study was to assess how mowing and aeration of sagebrush habitat intended to benefit Mule Deer affected the abundance of sagebrush-obligate songbird and small mammal SGCN.



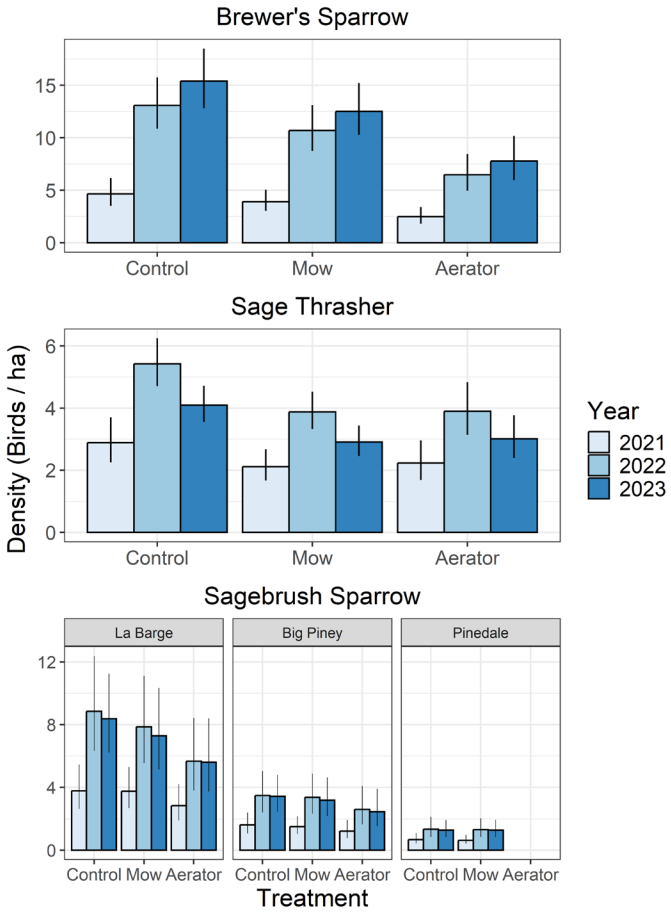
Map of the study area showing areas where sagebrush was treated with aeration (red) or mowing (blue). Inset shows the location of the study area in southwestern Wyoming.

Our study took place from 2021–2023 in sagebrush shrublands on Bureau of Land Management lands in southern Lincoln and Sublette Counties. We worked with WGFD habitat biologists to select survey sites in areas of sagebrush that had undergone treatment by mowing and aeration. Treatments ranged from 30–50% coverage using a mosaic pattern and were conducted from 1–12 years prior to our surveys.

We sampled density and occupancy of sagebrush-obligate songbirds, Pygmy Rabbits, and small mammals in treatment and control sites using field protocols adapted from the Integrated Monitoring in Bird Conservation Regions program and the WGFD Handbook of Biological Techniques. We used distance sampling models to estimate bird densities as a function of treatment type, year, vegetation variables, and predictors related to the observation process.

From mid-May to mid-July, 2021–2023, we conducted a total of 910 point counts (372 in control areas, 387 in mowed areas, and 151 in aerated areas). We observed 7,990 individuals of 81 species. Brewer's Sparrow was the most frequently observed species (n = 2,316), followed by Sagebrush Sparrow (n = 1,306), Vesper Sparrow (n = 1,163), Sage Thrasher (n = 1,132), and Horned Lark (n = 1,077).

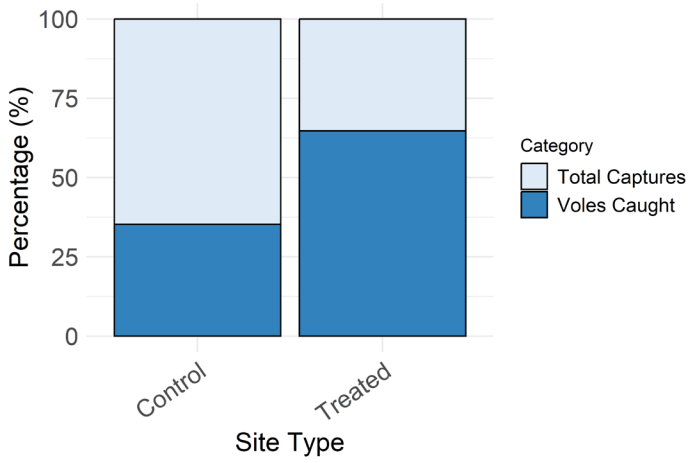
All three sagebrush-obligate songbirds were less abundant in treated areas compared to controls and the negative relationship was statistically significant for Brewer's Sparrow and Sage Thrasher. Average Brewer's Sparrow density across years was approximately two times lower at aerated sites and 1.2 times lower at mowed sites, compared to control sites. Sage Thrasher density was approximately 1.4 times lower at aerated and mowed sites than control sites. Sagebrush Sparrow density was 1.5 times lower at aerated sites and 1.1 times lower at mowed sites compared to control sites, but the difference was not statistically significant. Both generalist grassland species (Horned Lark and Vesper Sparrow) had significant positive responses to sagebrush removal, which likely provided them with more open, grassy areas for nesting. Year-to-year variation had more pronounced effects on density for all bird species than did treatment, but the negative effects of treatment were consistent across years. Similarly, location had a larger influence than treatment on density of Sagebrush Sparrows and Vesper Sparrows, reflecting geographic variation in the species' density across the study area.



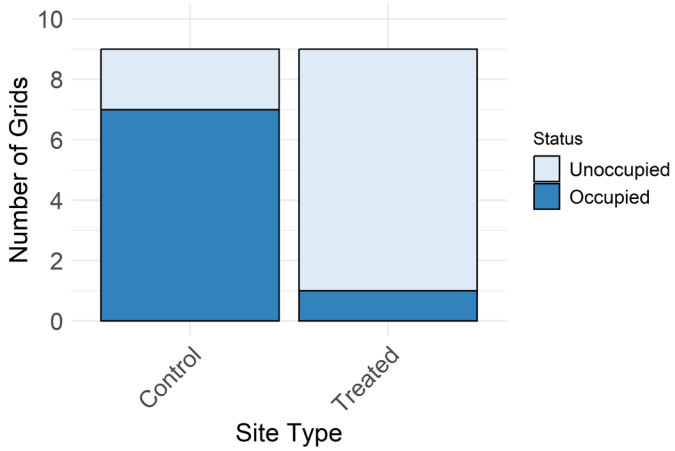
Brewer's Sparrow, Sage Thrasher, and Sagebrush Sparrow density (with 95% confidence intervals) by mechanical treatment type, year, and study area.

We conducted live-trapping surveys for small mammals at 19 sites from July–August, 2021–2023, for a total of 4,267 trap nights. The majority of captures were deer mice (n = 252) and chipmunk species (*Neotamias* spp.; n = 23); however, we also captured Sagebrush Voles (n = 17) and pocket mice (*Perognathus* spp.; n = 3), both of which are SGCN. We caught the majority of Sagebrush Voles in sites that had been mowed (53%; n = 9), followed by control (35%, n = 6), and aerated sites (12%, n = 2). All three *Perognathus spp*. were captured at control sites.

We conducted Pygmy Rabbit surveys at an equal number of treated and untreated sites in 2021 (n = 10) and 2022 (n = 8), and observed signs of occupancy at 8 of 18 sites. Of the 8 occupied sites, 7 (87%) were untreated and only one treated site was occupied. While these results may reflect avoidance of treated areas by Pygmy Rabbits, they should be interpreted with caution due to small sample sizes. Additionally, efforts were made to avoid applying treatments in areas where Pygmy Rabbits were known to occur, which could have contributed to the lower occupancy that we observed for treated sites.



Percentage of Sagebrush Vole captures at treated and untreated sites.



Pygmy Rabbit occupancy of treated and untreated sites.

Our results indicated that mechanically removing sagebrush had negative effects on sagebrush-obligate nongame bird and mammal species. However, it is important to consider the timeframe of this response relative to management goals. The age of the treatments in our study ranged from approximately 1–12 years, which is a relatively short time compared to the decades that it takes sagebrush to regenerate. Sagebrush-removal treatments were motivated by

both short-term gains in forage for Mule Deer and long-term improvements in the health of sagebrush stands resulting from increased age diversity. Despite rangewide declines, sagebrush-obligate songbirds remain abundant in Wyoming. Short-to-medium-term reductions in songbird abundance may be a justifiable trade off if habitat treatments increase the long-term resilience of the sagebrush ecosystems upon which they depend.

We recommend targeting treatments in areas with lower quality habitat for sagebrush-obligate birds and Pygmy Rabbits where possible. Avoiding areas with high densities of Brewer's Sparrow could minimize the medium-term negative impact of treatments because this species had the strongest negative response. We also recommend using mowing treatments, which had less of a negative impact on sagebrush-obligate songbird abundance than aeration.

Prepared By: Katie Sauer, Nongame Biologist; Zach Wallace, Nongame Bird Biologist

Sage Thrasher / Credit: Frank Stetler

FUNDING SOURCE(S):

U.S. Fish and Wildlife Service State Wildlife Grant

MONITORING AND MANAGEMENT OF THE ROCKY MOUNTAIN POPULATION OF TRUMPETER SWANS IN WYOMING

Trumpeter Swans / Credit: Don Jones

Trumpeter Swans have been a priority management species in the Greater Yellowstone area since the establishment of Red Rock Lakes National Wildlife Refuge in Montana in 1932 to conserve what were believed to be the 70 remaining individuals in the world. Trumpeter Swan populations have since recovered as the result of significant conservation efforts, including in Wyoming. Beginning in the late 1980s, the Wyoming Game and Fish Department (WGFD) has worked to expand the population size and distribution of swans through releases of captive-reared cygnets and wetland habitat improvement projects. These efforts succeeded in establishing a new nesting population in the upper Green River Basin. However, even as migratory Trumpeter Swan populations in Alaska, interior Canada, and the midwestern states continue to expand, the non-migratory U.S. Breeding Segment of the Rocky Mountain Population (RMP) remains of concern.

Swans that nest and reside year-round in the Greater Yellowstone area, including western Wyoming, are designated as the Greater Yellowstone Flock (GYF), formerly the Tri-State Area Flock. The management of this swan population is coordinated through the Pacific Flyway Council. The GYF is managed as part of the RMP, which includes swans that nest in interior Canada and migrate south to winter in the Greater Yellowstone area. WGFD is a member of the Greater Yellowstone Trumpeter Swan Working Group, which consists of state and federal agencies, non-governmental organizations, and interested parties that meet annually to discuss population trends and coordinate management actions. WGFD coordinates with the U.S. Fish and Wildlife Service (USFWS) Mountain-Prairie Region Migratory Bird Office, the states of Idaho and Montana, and managers of areas hosting restoration flocks to annually census the number of mature swans and young of the year (cygnets) in the U.S. Breeding Segment of the RMP. Additionally, WGFD collaborates with Grand Teton National Park to conduct annual surveys of swan nesting territory occupancy and productivity in Wyoming outside Yellowstone National Park.

In 2023, the Big Sandy Trumpeter Swan Restoration Project was initiated by WGFD and the Wyoming Wetlands Society (WWS) to address the ongoing limitations of population size, migratory routes, and wintering distribution of swans in western Wyoming. By focusing translocations within the Big Sandy watershed, we intend to fill another largely unoccupied area of Wyoming swan habitat in the Pacific Flyway adjacent to the reintroduced population in the Upper

Green River area and diversify wintering locations to improve the resilience of the population to localized threats.

Yearling Trumpeter Swan with GPS collar released as part of the Big Sandy Trumpeter Swan Resoration Project, 2024 / Credit: Raegin Akhtar

In 2024, we conducted three fixed-wing aerial surveys to monitor nesting territory occupancy, productivity, and population abundance of swans in western Wyoming. All surveys were conducted by pilot Mark Packila (Wildlife Air) in a Scout aircraft with Zach Wallace or Courtney Rudd as observer. We surveyed nesting territory occupancy from June 1–10 and territories with swans received a productivity survey from July 7–14. On September 24–25, we conducted the Wyoming portion of the annual fall population survey, excluding Yellowstone National Park. In addition to the aerial surveys, observations of swan locations and nesting status were provided by federal agencies, non-governmental organizations, and members of the public.

Based on the cumulative results of the three surveys, we found 71 of 152 swan nesting territories occupied by pairs, 49 nesting attempts, 22 successful nests, and 20 broods fledged. Total productivity was 60 cygnets hatched and 52 cygnets fledged, or an average brood size of 2.7 cygnets per successful nesting attempt. During the fall survey, we counted 148 white swans (adults and subadults) and 52 cygnets.

WGFD has traditionally reported population counts separately for the Snake River area and the Green River expansion area. In 2024, we counted 47 white swans in the Snake River area (including 3 in the Salt River area) and 98 white swans in the Green River expansion area. The total fall count in 2024 was higher than 2023, suggesting a stable or increasing trend following declines from the population peak in 2016. Overall, numbers of pairs and cygnets have been relatively stable, with changes in total counts driven primarily by fluctuations in numbers of subadults. The USFWS Migratory Birds and State Programs Mountain-Prairie Region Office produces an annual report summarizing results for the coordinated RMP surveys that includes data collected in Wyoming, which is available from USFWS.

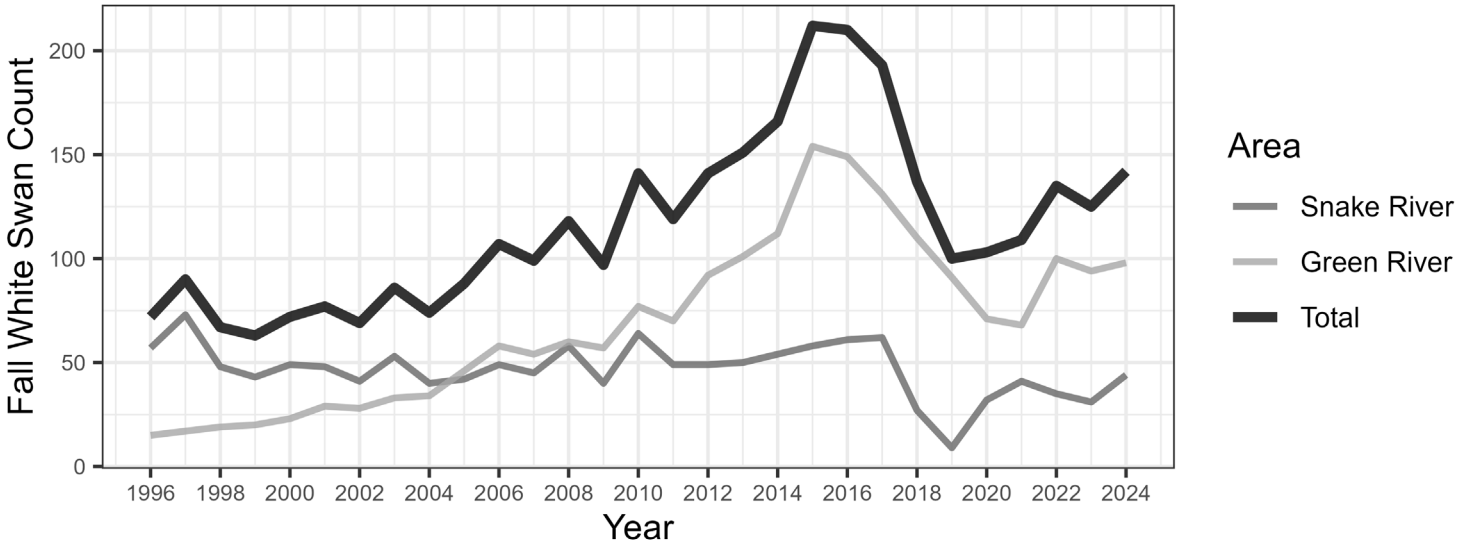
The first release of the Big Sandy Trumpeter Swan Restoration Project took place in June 2024, when WGFD and WWS released five captive-raised yearling swans at a site in the southwestern Wind River Mountains. We monitored the released swans using GPS collars, and ground and aerial surveys. By early November, two birds had been predated at a location approximately 16 km from the release site. Another bird was recovered dead in mid-November, approximately 50 km from the release site. Necropsy results suggested this bird was injured in a collision, possibly with a fence or power line, then killed or scavenged by a mammalian predator. One of the two remaining individuals lost its collar in a collision with a fence and was last seen in mid-November approximately 25 km from the release site. The collar of the final individual has not transmitted since release and its whereabouts are unknown. We will continue efforts to resight the potentially surviving individuals.

In 2024, the Big Sandy project received an allocation of cygnets that we plan to release as yearlings in summer 2025 at a new site. We plan to request allocations of cygnets annually through 2027, when the project will be reviewed by the Pacific Flyway.

At least half of all individuals released will be marked with GPS collars to evaluate success in establishing new wintering and migration areas, and understand the fate of yearlings and cygnets after release.

The status of the resident Wyoming Trumpeter Swan population has improved significantly since restoration efforts began in the 1980s. Both the population size and distribution of swans have increased, as well as the amount of available wetland habitat. However, ongoing and emerging threats still need attention, including effects of climate change and drought on habitat, disease (i.e., highly pathogenic avian influenza), diversity of wintering areas and migratory routes, and human development and disturbance.

Prepared By: Zach Wallace, Nongame Bird Biologist; Courtney Rudd, Migratory Game Bird and Wetland habitat Biologist; Bill Long, Wyoming Wetlands



Trumpeter Swan population trends from the fall count of adult and subadult (i.e., white) swans in Wyoming, 1996 - 2024. Plot shows annual counts for the Snake River core area (dark gray line), Green River expansion area (light gray line), and the total Wyoming population outside Yellowstone National Park (black line).

FUNDING SOURCE(S):

Wyoming Game and Fish Commission Funds

WYOMING BIRD RECORDS COMMITTEE: SUMMARY OF REPORTS REVIEWED IN 2024

Curve-billed Thrasher, Kelly (Town), Teton County / Credit: Mike Cavaroc

The Wyoming Bird Records Committee (WBRC) was established by the Wyoming Game and Fish Department (WGFD) in 1989 to accomplish the following goals:

1) solicit, organize, and maintain records, documentation, photographs, audio recordings, and any other material relative to the birds of Wyoming;

2) review records of new or rare species or species difficult to identify, offer an unbiased opinion of their validity or thoroughness, and use them to develop and maintain an Official State List of Birds in Wyoming; and

3) disseminate useful and pertinent material concerning the field identification of Wyoming birds in order to assist Wyoming birders and ornithologists with increasing their knowledge and skill.

The WBRC is comprised of five voting members and the WGFD Nongame Bird Biologist, who serves as a non-voting Secretary. During 2024, members included Bob Hargis, CJ Grimes, Frank Stetler, Diane Thomas, and Hilary Turner. The WBRC operates under bylaws that were approved in 1991 and last updated in 2023.

Currently, the WBRC requests reports for species that are included on two separate lists. The first list is known as "All Sightings" and includes 162 species that are reviewed, regardless of the location observed in Wyoming. When a species is documented for the first time in Wyoming, it is automatically placed on the "All Sightings" list. The second list is known as "First Latilong" and currently includes 63 species. Latilongs are the 28 latitude-longitude degree blocks in Wyoming. When a species on the "First Latilong" list is observed in a block with no previously confirmed WBRC record, we request a report from the observer. In addition, if nesting activity is observed for any species on the "First Latilong" list, the WBRC requests a report for that observation, regardless of whether the species has been previously documented in that block.

During 2024, the WBRC made a continued effort to engage with eBird, a worldwide community science database for avian observations maintained by the Cornell Lab of Ornithology. Four of the five voting WBRC members served as Wyoming eBird reviewers. The WBRC tracked eBird postings to find records of rare and unusual bird sightings for review and also encouraged birders to submit rare bird forms directly

to the WBRC for observations shared through eBird. As of May 1, 2024, the WBRC had reviewed a total of 1,948 reports of rare and unusual birds in Wyoming, of which 1,594 (82%) were accepted and 346 (18%) were not accepted. In 2024, the WBRC reviewed 63 reports, of which 55 were accepted and eight were not accepted or are undergoing further review.

The WBRC review process is also helpful for understanding changes to species' distributions in Wyoming. Of the 63 records reviewed in 2024, 16 resulted in updates to the species' distribution at the degree-block scale. Reports were reviewed for 20 of the 28 degree blocks statewide and represented a diverse array of species including waterfowl, shorebirds, marshbirds, seabirds, gulls, owls, woodpeckers, and numerous passerines. These changes will be incorporated into the next revision of the WGFD Atlas of Birds, Mammals, Amphibians, and Reptiles in Wyoming.

Observations of the following species were notable records for Wyoming in 2024:

Hooded Oriole (*Icterus cucullatus*). Rock Springs (private residence), Sweetwater County. The range for this species typically includes the southwestern United States. Breeding occurs in California, Nevada, extreme southwest Utah, Arizona, New Mexico, and Texas. Range has been expanding since the 1920s in association with residential development and the planting of ornamentals. The observer submitted several photos of an adult male as it visited a feeder throughout the course of the day.

Male Hooded Oriole at Rock Springs residence, Sweetwater Country. First documented record in Wyoming. / Credit: Kenneth Stinchcomb

White Ibis (*Eudocimus albus*). West Laramie and Hutton Lake NWR, Albany County. A primarily coastal species ranging from Virginia to Texas, with some birds occurring more inland. It was first detected May 25 west of Laramie and continued at this location until May 31. The bird was later observed at Hutton Lake NWR June 21 and continued there until August 13. This individual was the third record of White Ibis for Wyoming, with the last record of the species in the state from Goshen County in 1994.

The WBRC database is a dynamic document, typically updated once or twice a year following the review of submitted records. A full report of all sightings submitted through 2024, species for which the WBRC requests documentation, and bylaws are available from the WGFD Nongame Bird Program. The WBRC website continues to provide a variety of information about species of interest for Committee review, WBRC background and history, and an online rare and unusual bird submittal form (https://wybirdrecordscommittee. wordpress.com/).

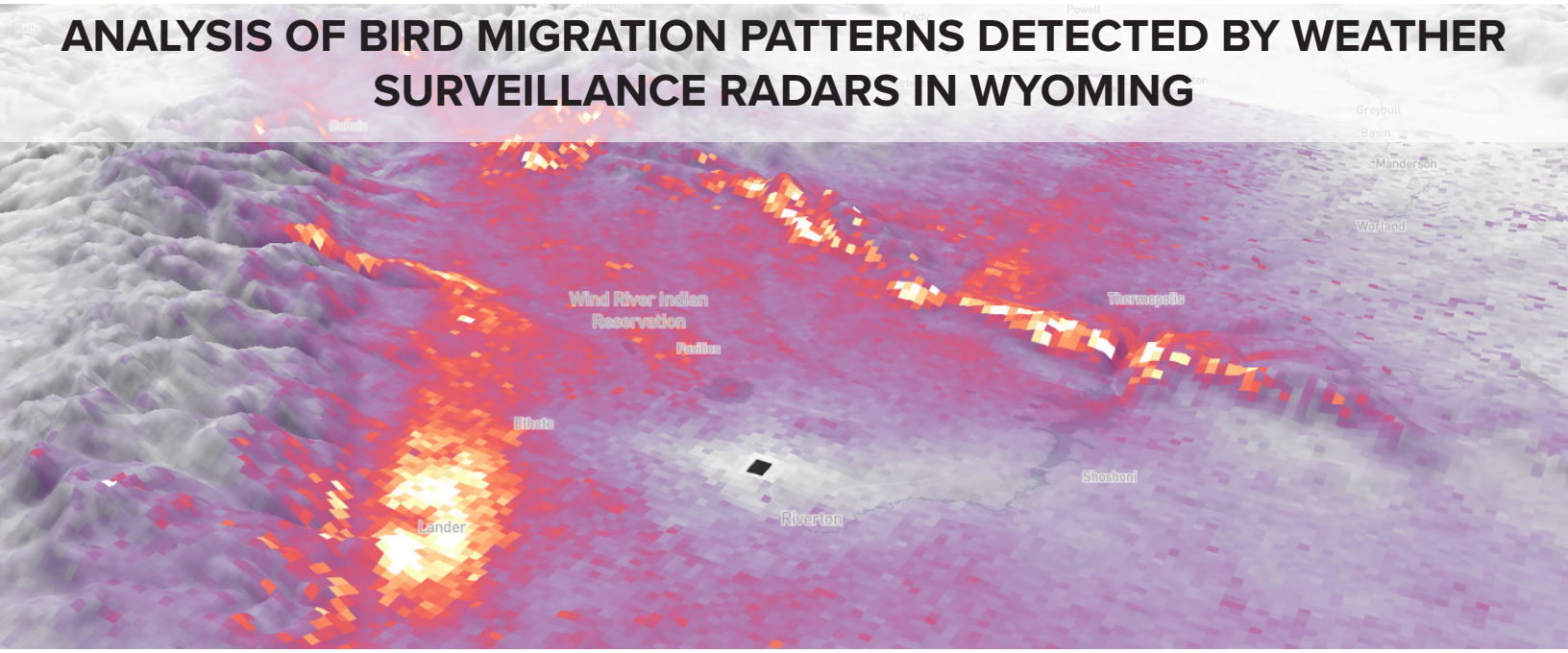
Prepared By: Frank Stetler, Nongame Biologist

White ibis at University of Wyoming experimental farm fields, Albany County. Third documented record in Wyoming. / Credit: Don Jones

FUNDING SOURCE(S):

Wyoming Game and Fish Commission Funds

ANALYSIS OF BIRD MIGRATION PATTERNS DETECTED BY WEATHER SURVEILLANCE RADARS IN WYOMING

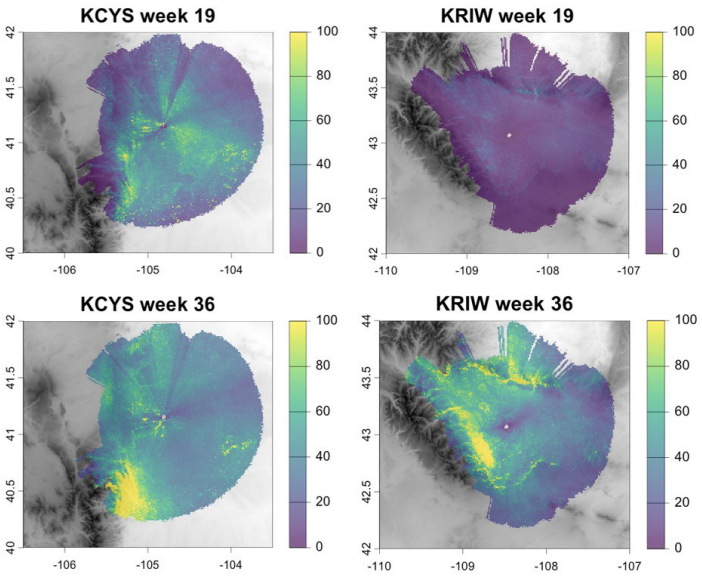


Bird Migration Intensity Detected by Weather Radar in the Wind River Basin During the First Week of September.

Weather surveillance radar is a powerful tool to track bird migration at high spatial and temporal resolution. While the migratory movements of some larger avian species in Wyoming have been studied with telemetry, information on most species is lacking. Improved information on the locations, altitude, and timing of bird migration is necessary to inform habitat conservation, and critically to minimize risk of collision mortality at wind energy developments. To address this need, the Wyoming Game and Fish Department (WGFD) collaborated with the Cornell Lab of Ornithology to investigate the use of weather radar to quantify bird migration in Wyoming.

Two weather surveillance radars were used to quantify the spatial, altitudinal, and temporal movement patterns of nocturnally migrating birds in Wyoming and northern Colorado. Migration was monitored at the city of Cheyenne (radar KCYS) and the city of Riverton (radar KRIW), allowing comparisons of the High Plains and eastern foothills of the Rockies versus interior Wyoming (Wind River Basin).

Bird migration intensities varied strongly by season and spatially. In spring, migration was concentrated in the High Plains, with more limited movements in the interior of the state. Fall migration was more intense overall, with strong movements through both the state's interior and across the eastern plains.



Example of a weekly composite map of bird migration from the Cheyenne (KCYS) and Riverton (KRIW) weather radars in spring (week 19: May 7 - 13) and fall (week 36: September 3 - 9).

Additional high-resolution analysis revealed fine-scale migration pathways in relation to orography within the detection radius of each radar (~100 km radius). For these analyses methodological approaches that account for effects of radar beam and bird geometry

on observations were developed and refined to take into account the state's challenging topography. This included accounting for beam occultation (blockage) by mountains, as well correcting for a strong view angle effect we identified, which causes birds in side view to appear more numerous than in front/tail view.

Migration was strongly associated with the low- to mid-altitude elevations of higher mountain ranges, with orography acting as potential leading lines and funnels that concentrate migratory movements. Strong concentrations of birds were observed along the northeastern slopes of the Wind River Range and the eastern slopes of the Front Range in Colorado.

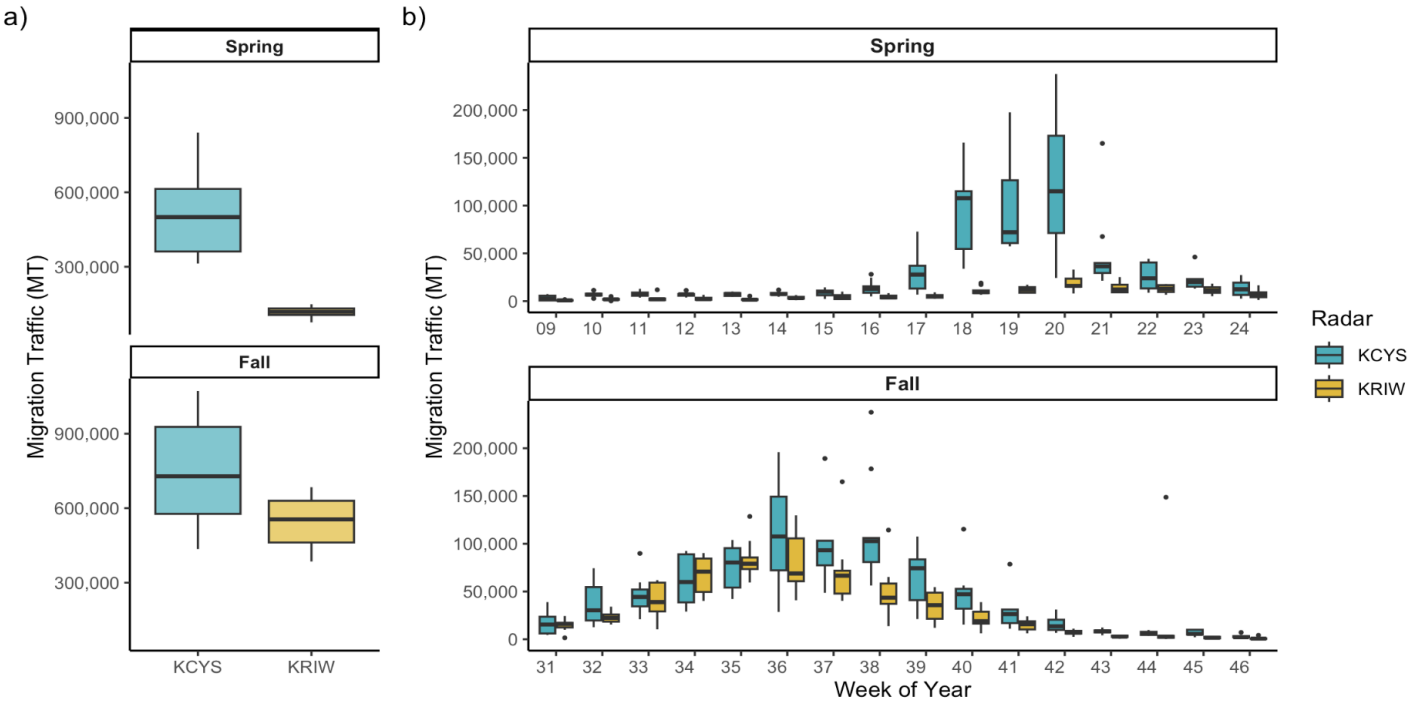
We conclude that the mountainous landscape within Wyoming has a strong structuring effect on the nocturnal migratory pathways of migratory birds, leading to more complex and finer-scale structure in the spatial patterns compared to regions where orography is absent. A state-wide model extrapolation was generated based on the observations for the two radar sites, however the extent to which this model captures all complex funneling of migration by local topography remains unquantified. Increased elevation was identified as a top predictor for higher aerial bird densities, however migration rarely extended above 3,100 m (~10,100 ft) above sea level.

Mean migration flight altitudes were around 500 m above ground level, indicating that nocturnal migration at rotor-swept zones of wind energy facilities was common. On average, half of each season's passage occurred over 6–14 strong migration nights. This concentration of collision risk in a limited number of peak movement nights provides opportunities for dynamic temporal conservation and collision mitigation actions.

This study provided information products with direct applications to project review and planning by WGFD and partners: weekly composite maps of bird migration intensity within radar areas, mapped predictions of migration intensity extrapolated statewide, and information on the timing and altitude of migration. Future extensions could include incorporating radars in neighboring states to improve predictions within Wyoming, validating statewide predictions using available data or field surveys, and generating separate predictions for species. We thank Anika Mahoney for initiating this collaboration.

Prepared By: Shannon R. Curley, Alexander Tedeschi, and Adriaan M. Dokter, Cornell Lab of Ornithology; Zach Wallace, Nongame Bird Biologist

Green-tailed Towhee. / Credit: Frank Stetler



a) Boxplots showing differences in total migration passage (birds/km/year) at Cheyenne (KCYS, blue) and Riverton (KRIW, gold) radars during spring and fall across all study years (2013 - 2021). b) Boxplots of weekly differences in migration passage (birds/km/year) for spring and fall, averaged over the same period.

FUNDING SOURCE(S):

Wyoming Game and Fish Commission Funds

GOLDEN EAGLE POPULATION MONITORING

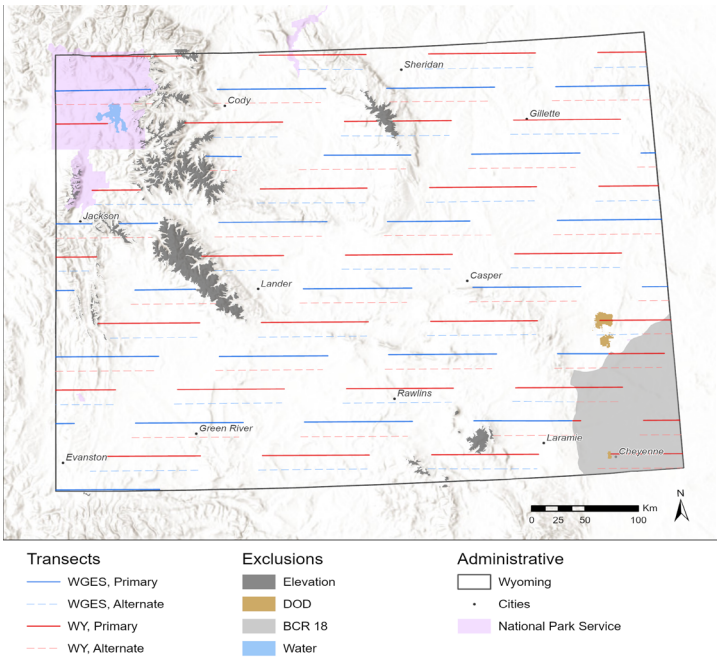
Golden Eagle / Credit: Mark Gocke

Conservation concern for Golden Eagles in North America has increased with the recognition of the negative population-level impacts of human activities, including illegal shooting, electrocution, poisoning, and collisions with vehicles, wind turbines, and other structures. Wyoming has among the highest densities of Golden Eagles in North America, yet there is currently no established long-term monitoring program to track the status of the species at the state level.

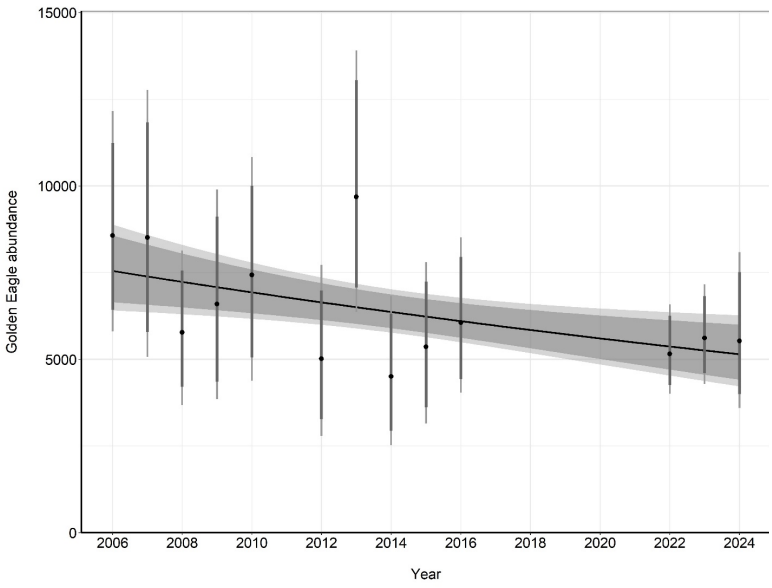
We used simulation-based power analysis to test several potential monitoring approaches. We found that the aerial line-transect methodology of the U.S. Fish and Wildlife Service (USFWS) Western Golden Eagle Survey (WGES) had the highest power in detecting trends of interest with realistic levels of survey effort. Based on these results, the Wyoming Natural Diversity Database at the University of Wyoming received funding from the National Fish and Wildlife Foundation Wyoming Golden Eagle Fund to conduct aerial surveys to supplement the ongoing WGES and estimate population size and trend within Wyoming. WGFD implemented the project beginning in 2023 and provided supplemental funding for aerial surveys in 2024.

The WGES was designed to estimate Golden Eagle population size and trend within Bird Conservation Regions (BCR) that span multiple states. We considered that the WGES might be a viable approach to eagle monitoring in Wyoming because more Golden Eagles were detected there than in any other state in the survey area. The survey protocol entails three observers in a fixed-wing aircraft independently counting individuals and groups of perched and flying eagles along a systematic sample of 100-km line transects. The survey uses a simultaneous double-observer protocol, which is analyzed with distance-sampling methods to estimate densities of eagles corrected for imperfect detection.

During late-summer 2022–2024, we conducted >10,000 km of supplemental aerial surveys within a study area that covered 92% of Wyoming using the WGES protocol. We detected 43 to 70 eagle groups per year and 235 individuals total. We analyzed our data in combination with those from concurrent and historical WGES efforts using the same methods as USFWS.



Map showing study area for Golden Eagle survey in Wyoming, primary and alternate transects from the Western Golden Eagle survey (WGES) clipped to the Wyoming state boundary, and supplemental transects added for the survey in Wyoming, 2022 - 2024. Areas excluded from the surveys consisted of high elevations, Department of Defense (DOD) lands, Bird Conservation Region (BCR) 18, and large water bodies. The state border of Wyoming, cities, and National Park Service lands are shown for reference.



Estimated abundance and trend of Golden Eagles of all ages in the Wyoming study area, 2006 - 2024. Plot shows estimated abundance (points) and trend line (black line) with 80% (light gray bars) and 90% (dark gray bars) confidence intervals.

We estimated between 4,506 (90% CI: 2,525–6,819) and 9,688 (90% CI: 6,368–13,914) Golden Eagles of all ages occurred in our study area annually during late summer, with a significant negative trend from 2006–2024 (*p*-value: 0.065) from a weighted linear regression model. The trend analysis estimated an annual decline of 1.8% (90% CI: 0.24–3.35% decline) during the study period for a cumulative loss of 2,372 Golden Eagles (28% decline) since 2006. Using the same trend estimator as USFWS, which is based on the end points of the time series, yielded a steeper estimated annual decline of 3.3% (90% CI: 1–6% decline). We also found the WGES survey method was ineffective for Ferruginous Hawks.

This study is the first to show a significant, broad-scale decline in Golden Eagle populations within an area of the western U.S. Notably, this decline has occurred within Wyoming, an area known for high Golden Eagle density and habitat quality. Population models developed by USFWS forecasted long-term declines for Golden Eagles under contemporary levels of human-caused mortality, but until now it was unclear whether those declines were occurring because available analyses suggested populations were stable. The most recent analysis of the WGES dataset showed non-significant negative trends from 2006–2016 in the BCRs that cover most of Wyoming and a significant positive trend in BCR 16, which covers a small area of the state. While these previous results suggested the possibility of a decline in Wyoming, our study documented a continued decline over the intervening eight years, which was statistically significant with the inclusion of three more years of data and supplemental survey effort.

The population sampled by our survey included Golden Eagles of all age classes and breeding statuses occurring in Wyoming during late summer: resident adult territory-holders and their fledglings, non-breeding adult “floaters”, and pre-breeding aged individuals using the study area during the sampling period. Changes in the size of this population could thus be influenced by multiple factors acting on survival of any age classes of eagles, the reproductive

success of resident breeders, and movements of sub-adults and adult floaters in and out of the study area. This makes the population size estimates from the WGES sensitive to year-to-year fluctuations in reproductive success and movements of nomadic Golden Eagles; however, we assume this metric provides a meaningful index of population change over longer time periods, such as in this study.

Our study did not assess the cause of the observed declines or the effectiveness of current mitigation measures for wind energy development. Regardless of whether wind energy development has contributed to the decline we observed in Wyoming, the need to offset permitted take at wind energy facilities has spurred considerable research into compensatory mitigation strategies for Golden Eagles. These include retrofitting power poles to prevent electrocutions, distribution of non-lead ammunition to reduce poisoning of eagles feeding on remains of hunter-harvested game animals, moving carcasses of animals away from roads to reduce risk of vehicles striking scavenging eagles, and rehabilitation of injured eagles. Much of this research and mitigation action has occurred within Wyoming, leaving little doubt about its efficacy in the state. Our results could be used in combination with these tools and practices to recover Wyoming's late-summer Golden Eagle population to its 2006 abundance by offsetting the net loss of Golden Eagles identified by this study or to stabilize the declining trend by offsetting the estimated annual loss of Golden Eagles.

We recommend continued efforts to supplement the WGES survey in order to generate state-specific estimates of Golden Eagle population size and trend for Wyoming. Supplemental surveys are necessary to attain full coverage of Wyoming and generate annual state-level estimates, since USFWS decreased their effort to survey only half the BCRs annually on a rotating basis. To continue to produce annual estimates for Wyoming, we could survey those BCRs not covered by USFWS each year. Alternatively, biennial estimates could be obtained by sampling the complementary set of BCRs every other year.

Prepared By: Zach Wallace, Nongame Bird Biologist; Ryan Nielson, Eagle Environmental, Inc.

FUNDING SOURCE(S):

National Fish and Wildlife Foundation Wyoming Golden Eagle Fund Grant
Wyoming Game and Fish Commission Funds

HARLEQUIN DUCK MONITORING

Harlequin Duck Pair. (Female on Left and Male on Right) / Credit: Amy Anderson

The Harlequin Duck is small, boldly patterned sea duck with the unique migratory niche of wintering along ocean coastlines, then moving inland to nest along swiftly flowing mountain streams. The small population in northwestern Wyoming represents the southern extent of the species' breeding range in North America, which extends northward to Alaska. The Harlequin Duck is one of the rarest breeding birds in Wyoming and designated as a Species of Greatest Conservation Need due to small population size, restricted distribution, and uncertainty regarding population status and challenges.

The Wyoming Game and Fish Department (WGFD) initiated monitoring for Harlequin Ducks in 2002 to understand the status of the population, which occurs in some of the most remote areas of the state. Since then, WGFD has conducted aerial surveys every 5–7 years of streams selected to monitor approximately half of the species' distribution in the state, including areas of the Bridger-Teton National Forest, Grand Teton National Park, and Yellowstone National Park. The resulting counts of pairs during the pre-nesting period in May provide an index of the trend of the breeding population.

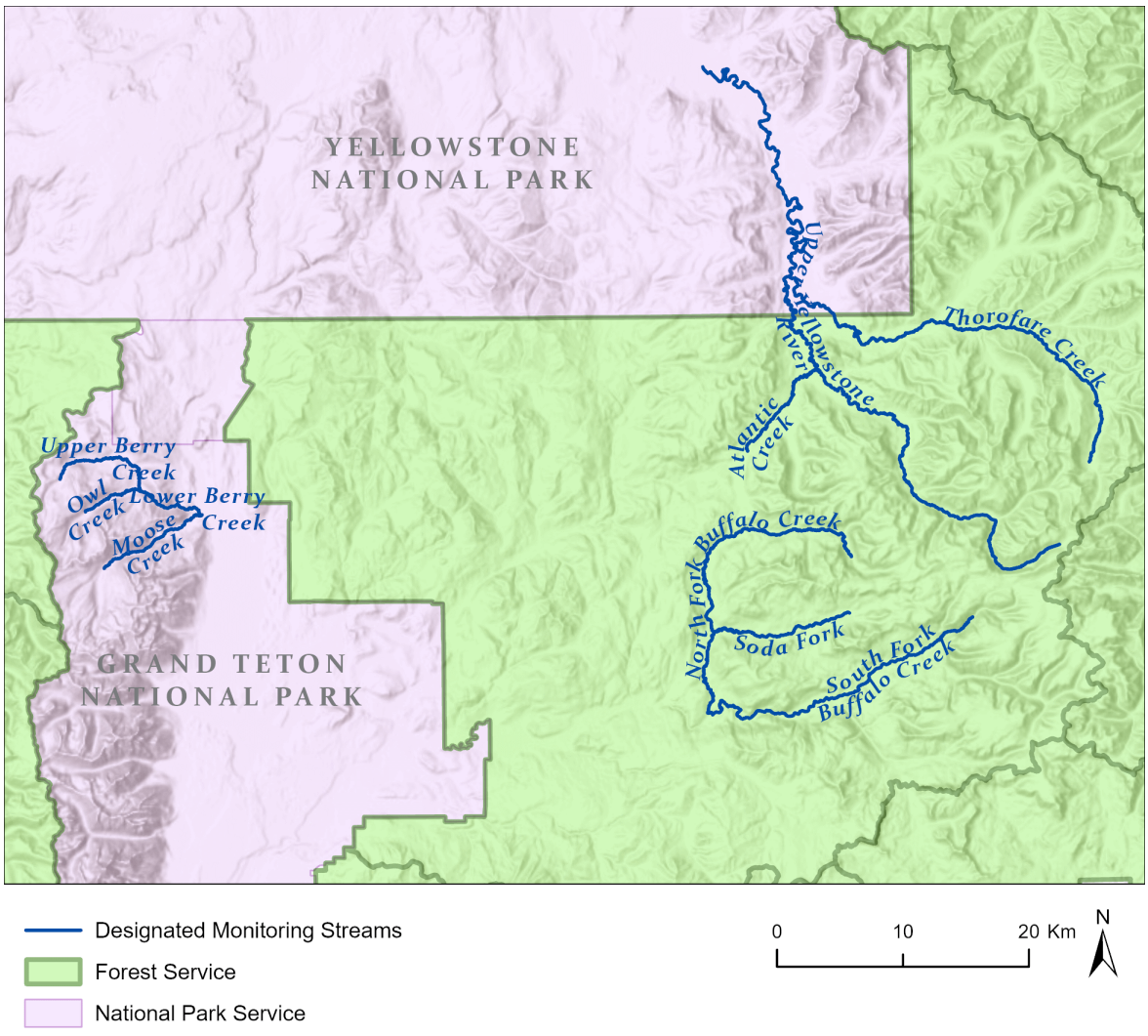
Harlequin Duck Male / Credit: Amy Anderson

The survey consists of two WGFD biologists and a pilot in a helicopter counting individuals and pairs of Harlequin Ducks along designated stream segments. Streams are flown at 55 km/h, 20–50 m (~100 ft) above ground level. Each segment is surveyed twice (up and back) to account for variation in lighting conditions, wind speed, and other factors that may influence detectability of Harlequin Ducks. Surveys are conducted daily after 0800 hrs during mid-to-late May when Harlequin Ducks have arrived at breeding areas, but prior to the initiation of nesting and high water of spring runoff. Data collected include location

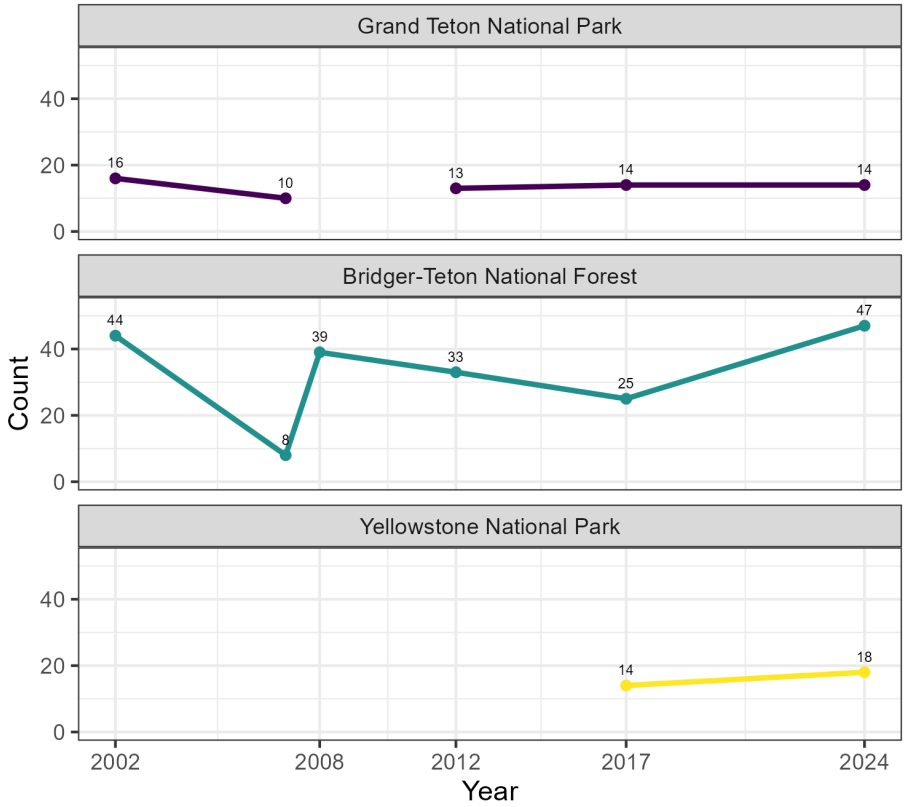
coordinates, number, and sex of Harlequin Ducks observed, behavior and habitat information, and observation of other wildlife species of interest (e.g., Bald Eagles).

In 2024, the survey was conducted on May 20 and 22, from 0820 to 1420 hrs MDT. Conditions ranged from ideal to fair, with overall good visibility, a mix of clear and cloudy skies, calm to light winds, temperature of 35°F, and intermittent snow showers on the second day. Two biologist observers (Zach Wallace and Courtney Rudd, WGFD) and a pilot (Jim Larowe, Yarak Aviation) used a Bell 47 Soloy helicopter to survey the designated stream segments.

We detected 79 unique Harlequin Ducks, including 40 males and 39 females. We minimized double-counting on repeat surveys by noting the location and size of groups. In cases where it was unclear if a group had been previously detected, we assumed detections located within 400 m on repeat passes to be the same group. Using a less conservative threshold of 200 m would have resulted in slightly higher estimate of 83 individuals. Since ducks flushed, flew, and dived in response to the aircraft, it was not reasonable to treat passes as independent occasions to estimate detection probabilities. Additionally, we recorded a total of 25 Bald Eagles, consisting of 17 adults and eight sub-adult individuals.



Stream segments for long-term monitoring of Harlequin Ducks in western Wyoming, 2002 - 2024. Map shows streams (blue lines), lands administered by the U.S. Forest Service (green shading) and National Park Service (purple shading), and topography (gray shading).



Counts of Harlequin Ducks from aerial surveys in western Wyoming, 2002 - 2024. Plots show annual totals by study area.

The total count was the highest since the monitoring program began in 2002 and counts within each study area were similar to previous years, suggesting the population trend was stable. In Grand Teton National Park, the count of 14 Harlequin Ducks was the same as the previous survey in 2017 and slightly lower than the high count of 16 in 2002. In the Bridger-Teton National Forest, the count of 47 was the highest during the monitoring period and substantially higher than the count of 25 observed on the previous survey in 2017. The count of 18 Harlequin Ducks in Yellowstone National Park was slightly higher than the 14 observed in 2017, which was the first year that area was included in the survey. We note that low counts in 2007 likely resulted from Harlequin Ducks delaying or foregoing breeding in response to unusually low water flows in May, with counts returning to typical levels in 2008.

We plan to continue this monitoring effort approximately every five years, as long as funding is available. Ongoing research by partners is addressing other aspects of Harlequin Duck breeding ecology and management, including GPS tagging and investigations of alternative survey methods (eDNA) by Biodiversity Research Institute, and ground-based brood counts by Grand Teton National Park.

Prepared By: Zach Wallace, Nongame Bird Biologist; Courtney Rudd, Migratory Game Bird and Wetland Biologist

FUNDING SOURCE(S):

Wyoming Game and Fish Commission Funds

STATEWIDE BAT MONITORING AND WHITE-NOSE SYNDROME SURVEILLANCE

Transillumiation of a bat's wing shows scarring

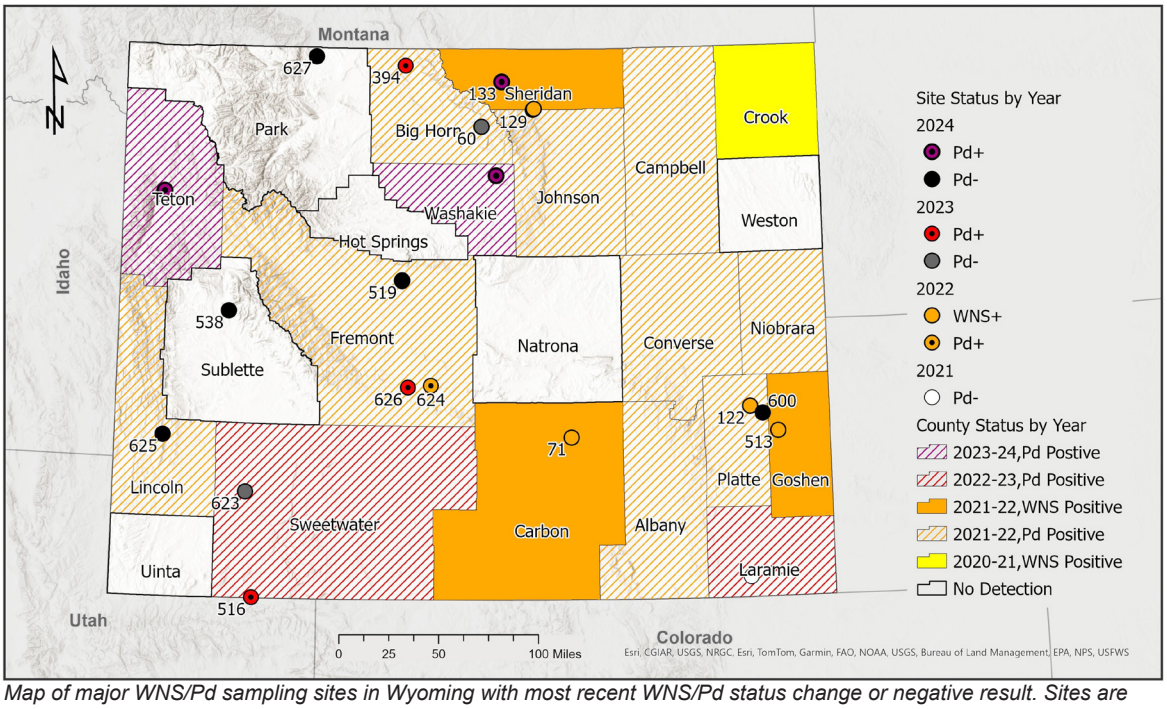
All Wyoming bat species are insectivorous, preying on a wide variety of timber and crop pests, as well as disease vectors (e.g., mosquitos). The majority of bat species found in the state are species of conservation interest to both Game and Fish and federal agencies. Because bats are small, nocturnal, cryptic, and volant, they are difficult to study, and knowledge gaps exist in our understanding of their basic ecology. Gaps include estimates of population size and basic life history, both of which will need to be understood to support populations through various conservation challenges. Bats have a very slow reproductive strategy, with most species having only one pup each year and individuals of several species capable of living into their 30s. Because of these traits, adult survival is the most important driver of bat populations, which are not capable of rapid recovery after any decline.

According to the Western Bat Working Group, the most important conservation challenges facing bats are climate change, habitat loss, persecution, wind energy development, and white-nose syndrome (WNS). These challenges are not evenly distributed across the country, and they affect Wyoming's bats to varying degrees. It is unclear how climate change will affect bat populations in Wyoming, but it has the potential to disrupt important life history events, such as reproduction and hibernation. The effect of habitat loss on Wyoming's bats is difficult to measure as well. We have a basic understanding of habitat use in the state, but population numbers and trends within specific habitats are largely unknown. Persecution in Wyoming has not been studied explicitly, and more information is needed to evaluate this potential threat to Wyoming's bat populations. Training for wildlife professionals and education in handling bat human interactions as wildlife conflict, rather than pest control issues, is likely to improve outcomes for both bats and humans. Wind development, which causes mortality by collision and barotrauma, has the largest impact on migratory bats. Mitigation of this threat is difficult on the landscape scale, as migration routes for bats in North America remain largely unknown. WNS is a fungal disease that causes mortality during hibernation, but these impacts may be difficult to observe directly in Wyoming as WNS-affected bats in the state do not hibernate in easily surveyed colonies. In order to assess the impacts of any of these conservation challenges on Wyoming's bat populations, long-term monitoring of these species is necessary; this is the primary responsibility of the bat program within the Nongame Section of Wyoming Game and Fish (WGFD).

White-nose Syndrome Surveillance

WNS is a disease caused by the introduced fungal pathogen *Pseudogymnoascus destructans* (Pd), which infiltrates the skin of bats when their immune systems are depressed during hibernation, ultimately causing death. Species occurring in Wyoming that are known to be affected by WNS elsewhere in their range include the Northern long-eared myotis, Tri-colored Bat, and Little Brown Myotis. Northern Long-eared Myotis is federally listed as an endangered species, a listing decision is pending for Tri-colored Bat, and the Little Brown Myotis is under review for federal listing. WNS is the major reason for the continuing decline of each of these species nationally. The rest of the *Myotis* genus are expected to be affected to varying extents, though some western species have not yet encountered the fungus. Mortality in hibernacula in the East has been reported as high as 99.9% for many colonies.

Pd surveillance is done by swabbing bats or bat carcasses during or shortly after hibernation, sampling the substrate of winter roosts, or by swabbing active bats in the early spring, often as they return to maternity roosts. Guano samples can also be taken during any of these sampling efforts. All samples are tested for the fungal DNA. Samples directly from bats are preferred, as they have been shown to result in detection of the fungus earlier in the invasion than substrate samples, but the latter allows sampling without disturbing bats during the critical hibernation season or handling them in the early spring, when body condition may be poor following hibernation. Spring capture for Pd surveillance is an important tool in the effort to manage bats in the face of WNS. Spring capture sites are selected for their potential to yield high numbers of *Myotis*, due to their susceptibility to WNS. In addition to these targeted surveillance efforts, Game and Fish coordinates with the USGS National Wildlife Health Center and the University of Wyoming to test bats submitted for WNS after they have been submitted for rabies testing. All bats submitted in this manner for Pd testing must first test negative for rabies. The Nongame Section of Wyoming Game and Fish coordinates Pd/WNS in the state, to maximize geographical coverage of this effort and maintain communication between all parties involved. Results are used to make Pd/WNS determinations on a county wide basis. All results contributing to status changes within the state from February 2024- January 2025 are reported here for simplicity and shown in the map below.



Map of major WNS/Pd sampling sites in Wyoming with most recent WNS/Pd status change or negative result. Sites are labeled with WGFD roost numbers, where applicable.

Nine maternity roosts (394, 516, 519, 538, 623, 624, 625, 626, and 627;) were sampled by WGFD for Pd in the spring of 2024. Bats were swabbed at all maternity roosts except 623, where only guano was taken. Additional guano sampling was conducted at roosts 516 and 625. As Pd becomes widespread in the country, sampling strategies are changing from primarily documenting Pd presence, to fungal prevalence by sampling at previously positive locations, referred to by the National Wildlife Health Center (NWHC) as Surveillance 4.0. Roosts 394, 516, 624, and 626 were sampled for Surveillance 4.0; the most recent status change is shown in the map below. All samples were sent to the NWHC and results were reported directly to USFWS. Pd/WNS status from all sampling efforts was continuously updated on the national WNS spread map in collaboration with USFWS. The most recent result is shown in the map above.

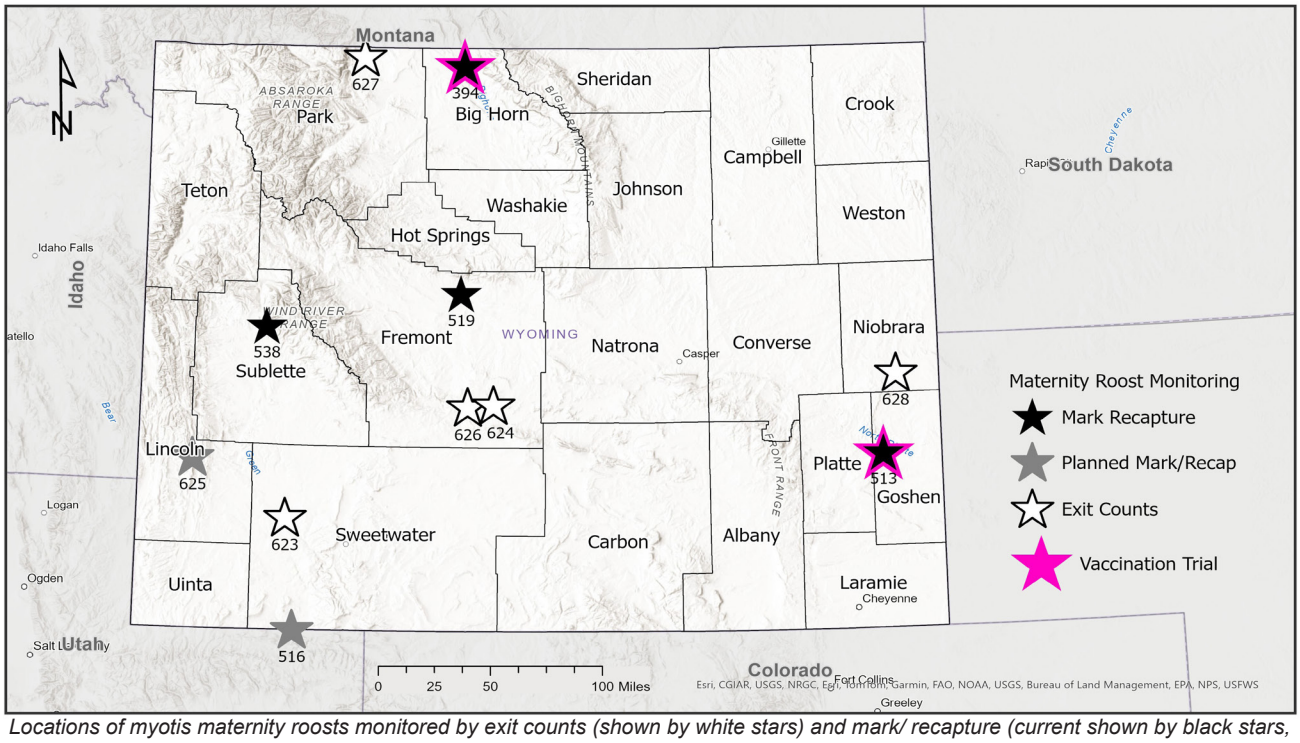
These mixed results among roosts in similar geographic areas demonstrate early infection in the area as well as the difficulty in detecting Pd after hibernation, when bats begin to clear the infection. With incomplete exposure to the fungus among individuals concentrating in large summer colonies, the status of multiple winter roosts are likely represented and detection decreases as time after emergence from hibernation increases. Prevalence in colonies on the eastern side of the state, where Pd invasion first occurred, remains high.

Myotis Maternity Roosts Monitoring And WNS Vaccination Trials

Mortality due to WNS in the West will be extremely difficult to assess. In order to understand population trends as well as impact from WNS, it is necessary to monitor populations at maternity colonies in Wyoming. This monitoring is done using exit counts as well as Passive Intergrated Transponder (PIT) tag mark/recapture techniques at a subset of sites. The majority of roosts currently monitored are that of little brown myotis, as they are of conservation importance as well as the most likely species to be observed by humans. Population trends from these projects will inform species assessment and, if necessary, recovery planning in the future.

Population monitoring using exit counts and mark recapture studies will improve our knowledge of population trends for bats in Wyoming. Exit counts were conducted at 10 maternity roosts in 2024 (394, 516, 519, 538, 623, 624, 625, 626, 627, and 628; mapped below). Four roosts were successfully surveyed during both the pre- and post-volancy periods, four roosts were surveyed during the pre-volancy period only, and two were surveyed during the post-volancy period only. A high-speed thermal camera was used at larger roosts to improve visibility during exit counts, which resulted in increased confidence in these counts over 2023 efforts. A mark recapture study is taking place at four roosts in Wyoming, with two additional sites in the state planned for 2025, which will help elucidate the effects of Pd on western populations of *Myotis*. This project is spearheaded by the Colorado Natural Heritage Program and assisted by WGFD (roosts 384, 519, and 538) and NPS (roost 513). At two locations (394 and 513) a vaccine for WNS, developed by NWHC, is undergoing placebo trials. Population estimates from the mark recapture project will assist in estimating detection probabilities during exit counts using various methods, including visual counts, low resolution thermal cameras, and high resolution thermal cameras. Exit count methods continue to undergo refinement, both in Wyoming and nationally. Our observations

Bat technician Adam Nash examines a bat wing for WNS damage



Locations of myotis maternity roosts monitored by exit counts (shown by white stars) and mark/ recapture (current shown by black stars, planned shown by gray stars), and vaccination trial sites (shown by pink stars). All roosts except 513 are monitored by WGFD, PIT tagging is completed with assistance from the Colorado Natural Heritage program.

indicate that even low resolution thermal cameras improve counts substantially, though at larger roosts higher quality videos are needed for high count confidence.

The North American Bat Monitoring Program in Wyoming

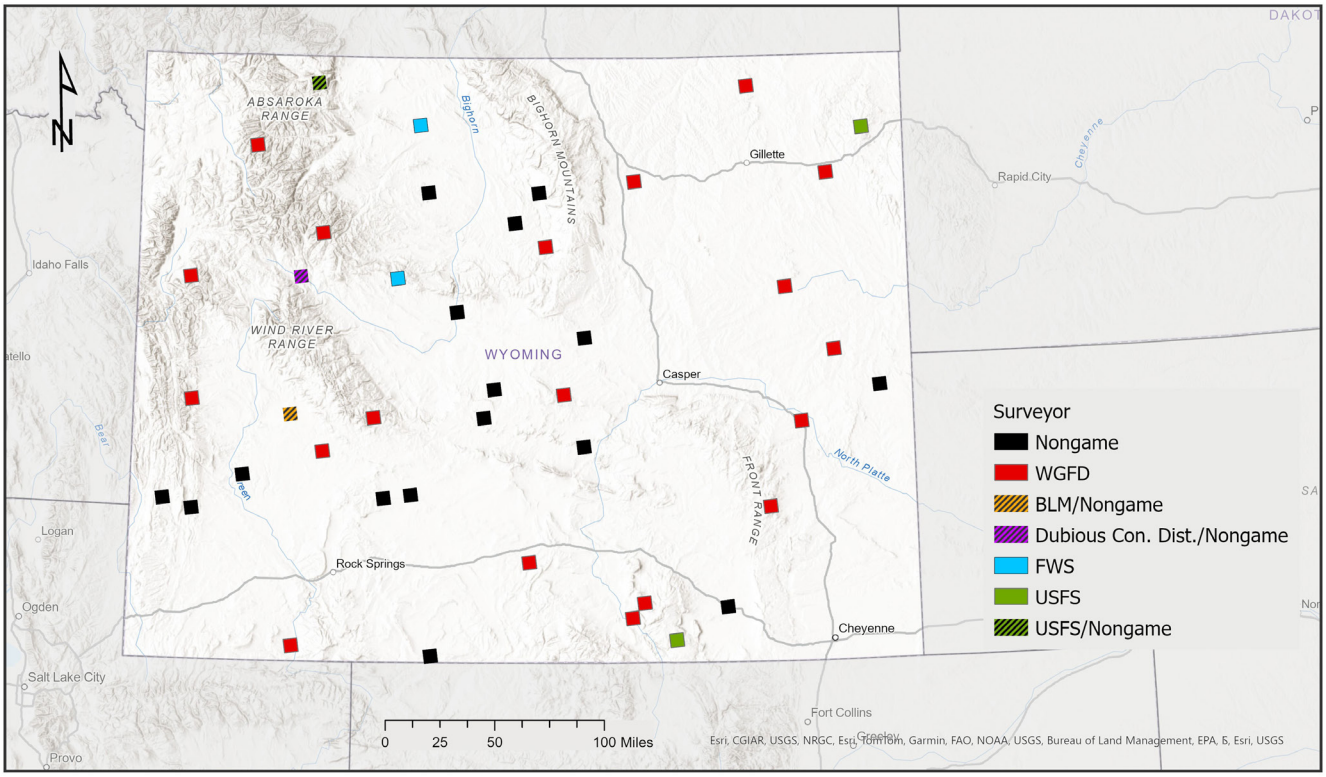
The North American Bat Monitoring Program (NABat) is an international, multiagency program that uses four monitoring approaches to gather data to assess changes in bat distributions and abundance: hibernaculum counts, maternity colony counts, mobile acoustic surveys, and acoustic surveys at stationary points. Previous capture and roost inventories have laid the groundwork for bat monitoring in Wyoming by establishing species distribution and locating many important roosts. The stationary acoustic portion of the NABat Protocol gathers bat occupancy data using acoustic techniques.

During the summer of 2018, Game and Fish implemented the stationary acoustic survey portion of the NABat Protocol on a statewide basis. Equipment has been deployed at the same sites in each subsequent year, with additional cells added yearly. Development of the monitoring effort has continued toward the goal of consistently monitoring a representative subset of 2% of cells in the state. In 2024, detectors were deployed in 43 cells across the state. Nongame technicians surveyed 17 of those cells and assisted the primary surveyor on an additional three cells. Regional

Game Warden Jon Desonier deploys detectors for NABat Stationary Acoustic Surveys

WGFD personal deployed 19 cells. Starting in 2024, the Bighorn National Forest began monitoring as part of their own NABat project, transferring two existing cells and adding an additional cell to that project, so while the number of cells monitored under the WGFD NABat Stationary Acoustics Project decreased from 45 in 2023 to 43 in 2024, overall monitoring in the state increased. Repeated yearly stationary acoustic monitoring will allow Game and Fish, in partnership with the NABat Program, to document changes in bat distribution and activity though time. In February of 2025 data from the previous year's stationary acoustic monitoring was uploaded into the NABat database for use in national and regional analysis by USGS and collaborators. In the spring of 2024, Wyoming committed to participation in the Rocky Mountain NABat Cooperative, and in the fall of 2024 coordination of stationary acoustics in Wyoming transferred to the University of Wyoming. WGFD continues to provide considerable in kind support through the loan of detectors and the contributions of technicians and regional personnel to fieldwork for the project, and maintains access to data to facilitate bat management.

Prepared By: Laura Beard, Nongame Bat Biologist



NABat cells monitored with Stationary Acoustics by the WGFD statewide project in 2024. Cells monitored by technicians funded through the WNS grants are shown in black.

FUNDING SOURCE(S):

Wyoming Game and Fish Commission Funds
White-nose Syndrome Capacity Grant Funds
U.S. Fish and Wildlife Service State Wildlife Grant
Wyoming Governor's Big Game License Coalition Grant

FERRET MANAGEMENT ACTIVITIES AT THE SHIRLEY BASIN AND MEETEETSE REINTRODUCTION AREAS

Black-footed Ferret / Credit: Mark Gocke

The Black-footed Ferret (ferret) is a fossorial, nocturnal, and critically endangered mammal that relies exclusively on prairie dogs for food and shelter. Prairie dogs and ferrets both once ranged over 100 million acres of North American prairie. Since 1900, due primarily to the conversion of native grassland to cropland and intense extermination campaigns, prairie dogs have been eradicated in some areas; approximately 2 million acres of colony exist today. As populations of prairie dogs decreased, so did those of ferrets, and they were listed as endangered in 1967. By 1979, ferrets were considered extinct.

In 1981, a ranch dog near Meeteetse caught and killed a ferret, proving a population still existed. Biologists from WY Game & Fish Department (WGFD) and the US Fish & Wildlife Service (USFWS) began intensely studying the colony. When an outbreak of canine distemper virus struck, biologists decided to capture as many ferrets as possible to ensure the continued survival of the species. Eighteen ferrets were captured, and WGFD led the effort to establish a captive breeding program. Seven of those animals reproduced in captivity, and they are the ancestors of every ferret known to exist in the wild today.

The first ferret reintroduction site was established in the Shirley Basin, WY, in 1991. Its success and resiliency spurred the creation of more reintroduction sites; to date there are 31 in North America. In addition to the Shirley Basin Reintroduction Area (SBRA), Wyoming also hosts the Meeteetse Reintroduction Area (MRA), established in 2016 on the same lands where ferrets were first rediscovered. In conjunction with US Fish & Wildlife Service, Bureau of Land Management (BLM), USDA APHIS Wildlife Services (USDA-WS), and local landowners, WGFD's Nongame Section manages ferrets and prairie dogs at both sites. These efforts are essential for assessing progress towards recovering the ferret within Wyoming and across the continent.

A black-footed ferret surveys near a burrow at the Shirley Basin Reintroduction Area.

Shirley Basin Reintroduction Area (SBRA)

The SBRA is the largest reintroduction site in existence, spanning 55 linear miles and containing approximately 180,000 acres of active prairie dog colony. It is a mix of private, BLM, WY State Trust, and WGFD lands. Since its creation in 1991, ferrets have persisted and dispersed across the landscape, largely with a hands-off management approach.

In 2024, we performed annual monitoring of prairie dogs at the Main Area—a central location supporting a self-sufficient population of ferrets. We also updated maps of prairie dog colony at the Main Area and Chalk Mountain. Additionally, we performed nocturnal spotlight surveys near Muddy Creek (where ferrets were first released in 1991), Chalk Mountain, and Bone Creek; the latter two were discovered to support ferrets in 2021.

Prairie dog monitoring

As an annual census of prairie dog populations is not feasible, we have established 10-acre (200m x 200m) plots at randomly selected locations thought to contain a moderate to high density of prairie dogs in order to best represent quality habitat in the area. On three consecutive mornings in June between 0700 and 1200, Nongame Section personnel visited plots and scanned them with binoculars, counting each prairie dog. Personnel then quietly waited 10 minutes to allow the prairie dogs to resume normal behavior and repeated the count. The highest count over the three-day survey window, when adjusted by a detection index accounting for animals underground, acts as a time efficient estimate of the minimum density of prairie dogs within the plot.

Additionally, we performed burrow activity checks at 664 randomly selected prairie dog burrows. Personnel determined if each was "Active," "Likely Active," "Likely Inactive," or "Inactive." Surveyors evaluated burrows based on visual/aural detection of prairie dogs, presence/absence of fresh scat or digging, and the presence/absence of spider webs, vegetation, or soil blocking the burrow entrance. Using the ratio of Active:Inactive burrows, we obtained time-efficient estimates of prairie dog occupancy across large acreages.

In 2024, our prairie dog monitoring indicated the overall density of prairie dogs increased slightly. Density ranged from 1.61 – 9.09 per acre, with an average of 4.24 per acre as compared to an average of 4.04 in 2023. Accordingly, our evaluations of randomly selected burrows indicated slightly lower rates of inactive burrows: 14% in 2024 compared to 15% in 2023. When we include burrows considered "Likely Active" and "Likely Inactive," the percentage of active burrows increases to 75%—the highest rate since burrow evaluations began in 2020.

We did not locate any mammal carcasses able to be tested for sylvatic plague, and none of our landowner partners indicated signs of an epizootic. We are confident the prairie dogs at the Shirley Basin Reintroduction Area will continue to thrive, though we will continue to monitor annually.

Colony mapping

Accurate maps of prairie dog colonies are essential for targeting annual monitoring surveys and plague treatments as well as fulfilling federal reporting mandates. While colony borders constantly fluctuate due to normal cycles of abundance, disease outbreaks can greatly increase the rate of change.

There are multiple methods used for mapping colonies, and we use a combination of two. First, Nongame Section personnel estimated colony borders remotely. Using the most recent freely available imagery (August 2020 via Google Earth), personnel circumscribed visible burrows. However, as burrows can remain visible even when vacant, field validation was necessary.

Personnel travelled along 30-meter transects to locate the first active burrow on the edge of a colony. Then, they located the next active burrow within 30 meters,

and continued until the colony was circumscribed. Personnel later processed locations of the burrows into spatial polygons. In total, we mapped 10,621 acres of active colony at the Main Area in 2024, representing a negligible change. We also mapped 6,532 acres in the eastern portion of Chalk Mountain, including 2,430 new acres.

Spotlight surveys

As in every year, we performed nocturnal spotlight surveys to quantify abundance of ferrets and number of litters produced. We spotlighted in August through September, when kits are leaving their mothers and are most active above ground. Each surveyor searched a plot of 500 – 800 acres (dependent on the number of fencelines or other obstacles). Between 2200 and dawn over three consecutive nights, surveyors used powerful spotlights to locate the emerald green eyeshine characteristic of ferrets.

Each ferret we observed was recorded and a trap was deployed. We then checked deployed traps hourly until ferrets were captured or until dawn, whereupon we removed traps.

Since 2020, due to concerns about ferrets' susceptibility to COVID-19, WGFD suspended full workups (e.g., anesthesia in an enclosed space, Passive Intergrated Transponder (PIT) tag implantation). Additionally, we asked prospective surveyors who tested positive for COVID-19 or felt ill not to attend the effort, and each person on hand wore N95 masks and nitrile gloves to minimize the potential for disease transfer from human to ferret. To minimize transfer of disease between ferrets, we sanitized all equipment (e.g., traps) with chlorhexidine between animals.

When we captured a ferret, we performed a minimal workup at the site of capture with the ferret remaining conscious and in its trap. After inspecting the ferret for injury, illness, and general body condition, we noted the sex and age. Second, we scanned for a PIT tag to indicate origin and year of birth, then vaccinated the ferret against sylvatic plague and canine distemper. We then marked each ferret with unique symbol using a non-toxic animal marker to enable easy subsequent identification. Finally, we applied two sprays of topical Frontline (0.29% fipronil), which granted protection from fleas and ticks for one to two months. We then released the ferret into the burrow from which it was captured.

In 2024, we surveyed in newly discovered areas or locations we have not visited in several years. In total, we expended 825.5 hours of effort across 11,871 acres. We located at least 21 ferrets and four to five litters. Of these, we captured and vaccinated 11. We located more ferrets at Chalk Mountain compared to previous years, likely due to our efforts to establish the area as a self-sufficient source of ferrets with supplemental releases. At Bone Creek, where we have also released ferrets recently, we located a single wild born male. Bone Creek contains quality habitat and predator densities comparable to the rest of Shirley Basin. It is unknown why ferrets are not remaining in the area in functional numbers, and we will continue to evaluate moving forward.

Ferret releases

To help establish Chalk Mountain and Bone Creek as population sources, USFWS allocated 20 captive-bred ferrets to our recovery efforts in 2024. We released the animals shortly after spotlight surveys, which allowed the newly released ferrets to become familiar with their surroundings and to begin establishing home ranges of their own before the onset of winter.

We released 10 ferrets (6 male:4 female) near Chalk Mountain and 10 (5 male:5 female) near Bone Creek. The precise location of each release depended on several factors. We released ferrets in high quality habitat close enough to allow interaction, but distant enough to prevent immediate territorial disputes, which can result in mortalities. Additionally, we selected release locations to maximize reproductive opportunities. For example, if we located a lone female which did not reproduce and no males during spotlight surveys, we could release one or more male kits in the vicinity.

The Shirley Basin Reintroduction Area appears stable, and ferrets are increasing in number near Chalk Mountain. In the coming years, we intend to continue updating maps of prairie dog colonies and to continue evaluating methods to increase distribution of ferrets in the basin. The Nongame Section will also continue monitoring prairie dogs and ferrets to enable fast response to potential population crashes, particularly as plague mitigation resources free up from elsewhere in the state. We are confident Shirley Basin will continue to support ferrets for the foreseeable future.

A litter of Black-footed Ferrets at the Meeteetse Reintroduction Area

Meeteetse Reintroduction Area (MRA)

The MRA was established in 2016 and brought ferrets back to the same lands where the species was rediscovered in 1981. It is primarily private but interspersed with some BLM and WY State Trust lands.

Plague mitigation

At its inception in 2016, when ferrets were reintroduced, 6,256 acres of the MRA was active White-tailed Prairie Dog colony. Nongame Section personnel documented wild breeding each year from 2016-2018. However, a sylvatic plague epizootic was detected in 2018. Hundreds of acres of prairie dog colony were subsequently lost, the abundance of ferrets dropped, and only a single ferret was detected during annual monitoring in 2020.

It is through the combined efforts of WGFD, BLM, USDA-WS, USFWS, and the Smithsonian Institution that ferrets and prairie dogs continue to persist on the MRA. Each year since 2016, the interagency group has collaborated to apply Deltamethrin dust and Fipronil coated grain to prairie dog burrows. These pulicides suppress of invertebrate ectoparasites like fleas and ticks, which transfer sylvatic plague between animals, and inhibit the disease's ability to spread.

We completed the largest plague treatment to date at the MRA in 2024, treating 5,669 acres. We focused on the central regions, where most prairie dogs and ferrets remain. In total, we deployed 355 pounds of Deltamethrin and 15,300 pounds of Fipronil coated grain. We are confident this interagency effort has averted a catastrophic loss of prairie dog populations, and will continually assess the need for treatments in future years.

Prairie dog monitoring

Since 2021, we have documented a cumulative increase in the prairie dog population, indicating it may be recovering from the sylvatic plague epizootic. We repeated the surveys in 2024, using the same methods as in Shirley Basin, and noted a decrease in abundance.

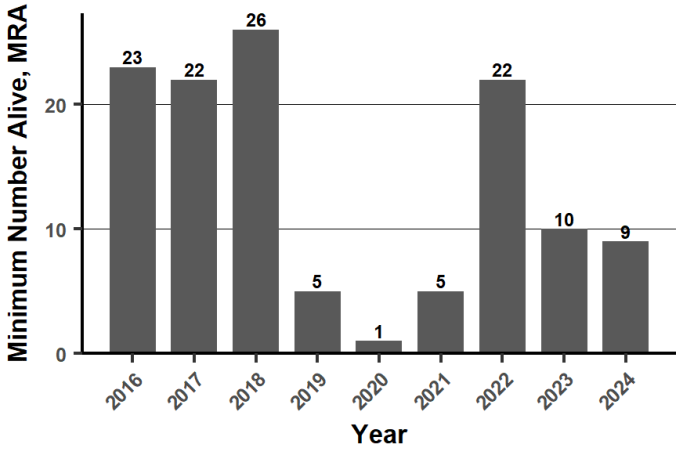
Across 15 monitoring plots, density of prairie dogs ranged from 0.0 to 8.69 prairie dogs per acre, with an average of 2.32 per acre. Accordingly, the percentage of Active:Inactive burrows across 1,465 randomly selected burrows was 40%—an increase from 32% in 2023.

In areas where prairie dogs weathered the epizootic, they appear to be recovering. Areas where they were functionally extirpated, however, show little sign of natural recolonization. As we are seven years removed from the onset of the outbreak, burrows in these areas are beginning to collapse without maintenance by prairie dogs. In the near future, we intend to explore methods of aiding natural recolonization with the goal of reestablishing portions of the lost colony.

We observed no signs of continued disease outbreak, and the single testable carcass we located was negative for plague.

Spotlight surveys

Personnel expended 162 hours surveying 5,677 acres at the MRA. This acreage is larger than the amount of colony present, but as ferrets must traverse areas lacking prairie dog burrows, we also surveyed these areas. Using the same protocols as in Shirley Basin, we observed nine unique ferrets, three of which were captured and vaccinated. Additionally, we located a litter of wild born ferret kits, though did not capture any. All told, we can account for a minimum of nine ferrets at the MRA in 2024.



Minimum number of ferrets alive at the Meeteetse Reintroduction area determined by annual spotlighting surveys.

Ferret abundance and distribution in 2024 was remarkably similar compared to 2023. The spring and summers of both years saw more precipitation than normal, resulting in exceptionally thick and lush vegetation. While very good for prairie dog productivity, the vegetation obscured ferrets during surveys. Additionally, while capture rates were lower than normal, we continue to capture only wild born ferrets. While this indicates continued wild reproduction, a definite positive, we are also puzzled as to the status of captive born kits we release. Releases are targeted at high quality habitat which can support ferrets but are currently vacant. It is possible they are succumbing to disease or starvation, being predated on, or simply dispersing to areas without our knowledge.

In 2025, we will continue to monitor ferret habitat and population status in both reintroduction areas. In Meeteetse, we will continue to treat and monitor the sylvatic plague epizootic, as well as release captive-bred kits to support the area's continued recovery. In Shirley Basin, we will update or create maps of prairie dog colonies in west Chalk Mountain as well as evaluate the efficacy of unmanned aerial drones and artificial intelligence analysis. Depending on the number of captive-bred ferrets allocated to WGFD by USFWS, we will continue to support the establishment of Chalk Mountain and Bone Creek as population sources.

Prepared By: Andrew Gygli, Small Carnivore Biologist

FUNDING SOURCE(S):

U.S. Fish and Wildlife Service State Wildlife Grant
U.S. Fish and Wildlife Service Section 6 Grant
Bureau of Land Management Grant
Wyoming Governor's Big Game License Coalition Grant
Smithsonian Institution Funds
Wyoming Game and Fish Commission Funds

CANADA LYNX MONITORING 2023 - 2024

Canada Lynx / Credit: Michael Zahra

The Canada Lynx is a cold- and snow-adapted feline which relies almost exclusively on snowshoe hare as a food source. Consequently, lynx abundance closely mirrors the hares' cyclical population cycles. In times of low hare abundance, this manifests as lynx dispersing long distances in search of prey, potentially into areas which do not support consistent populations. This is especially evident in the contiguous United States, which is the southern periphery of the species' range.

As hare populations in Wyoming are lower than those in core lynx habitat (e.g., northern Canada), the state is considered corridor habitat between populations in Montana and Colorado. The most recent confirmed lynx observation in Wyoming was of an individual released in Colorado which dispersed north in 2012. In 2022, a lynx was purportedly photographed in the Gros Ventre, but the record remains only in the press and was never submitted to WGFD for verification.

Canada Lynx in the contiguous U.S. are listed as Threatened under the Endangered Species Act, and portions of Wyoming's western mountains are modelled as high quality lynx habitat. As part of conservation efforts, we deployed 23 camera traps in these areas over the winter of 2023 – 2024, concurrent with similar efforts in Idaho and Montana. Over 6,349 trap nights, we captured 39,613 photographs. Canada lynx were not detected at any site. We detected 17 other species, including Wolverine. The Wyoming Natural Diversity Database was contracted to complete this effort, and the final report is available here.

We intend to perform the next round of lynx monitoring in the winter of 2027 – 2028 concurrently with Idaho, Montana, and Colorado.

Prepared By: Katrina Cook, Zoology Project Manager, Wyoming Natural Diversity Database; Andrew Gygli, Small Carnivore Biologist

FUNDING SOURCE(S):

Wyoming Game and Fish Commission Funds

THE ROLE OF NATIVE AND REINTRODUCED POPULATIONS IN THE RECOVERY OF RIVER OTTERS IN WYOMING

Northern River Otters

Due to uncertainties regarding current Northern River Otter status, a project was funded to examine otter poulations and gentics. The Wyoming Game and Fish Department funded a Master's thesis which was completed at the University of Wyoming. Presented here is the citation and abstract; the full document is available here.

McDonald, William, B., *The Role of Native and Reintroduced Populations in the Recovery of River Otters in Wyoming.* Master of Science, Zoology and Physiology Department, April 2024.

By the early 1900s, Northern River Otter populations had severely declined in North America. A small remnant population survived in northwestern Wyoming. Unlike neighboring states, river otters were never reintroduced to Wyoming due to the existence of this remnant population. To assess the status and evaluate the role of native populations in the recovery of otters, we surveyed waterways across Wyoming to document otter presence and collect non-invasive genetic samples. We also included tissue samples from three surrounding states that reintroduced river otters. We found three distinct genetic clusters across Colorado, Nebraska, Utah, and Wyoming which revealed the expansion of reintroduced otter populations into Wyoming from surrounding states. Least-cost path modeling corroborated previous understanding of the importance of riverine networks as pathways for connectivity. Nonetheless, we also documented the importance of overland dispersal and found low genetic distance between native populations in northwest Wyoming. We found a surprising paucity of river otters along the North Platte River, which given our findings on the dispersal capabilities of otters, raises questions about the factors that could prevent otters upstream, downstream, or those in the northwest Wyoming, from establishing in greater numbers along the North Platte in Wyoming. Our finding suggest otters should be able to naturally colonize the North Platte and other waterways in eastern Wyoming, contingent on the resolution of possible issues related to habitat suitability and movement barriers.

Prepared By: Will McDonald, Graduate Research Assistant, University of Wyoming

FUNDING SOURCE(S):

U.S. Fish and Wildlife Service State Wildlife Grant