



Yellowstone Wolf, Cougar, and Elk Project Annual Report

2025

Summary

At the end of December 2025, there were 84 wolves in seven packs (three breeding pairs) and one new group living in Yellowstone National Park (YNP). Pack size ranged from two to 18, averaging 11.7 members. Throughout YNP, a minimum of 36 pups were produced, with several other litters of pups that were born but died before they could be observed. Seventeen pups survived (47%) to the end of the year. All surviving pups were in three northern packs (8 Mile, Rescue Creek and Junction Butte) and none in the interior packs. At the end of 2025, pups comprised 20% of all wolves living in YNP.

Pack and territory changes included the Dunanda Falls pack shifting out of YNP to use areas in Idaho and Wyoming, the Hawk's Rest pack dissolving, and a new group called 1470F group forming in the early summer. The remaining packs, four in northern YNP and three in interior YNP, were stable.

The cougar population in YNP is not censused each year like wolves are, due to inherent challenges of counting the secretive felines; however, radio collars on a subset of the cougar population along with statistical methods that use camera trap detections inform the most recent annual population estimates. From 2021-2024, there were estimated to be 34 to 46 cougars across the northern range study area (all age/sex classes combined; 1.7-2.5 cougars/100km²). Although methods for estimating cougar abundance have varied over the last several decades, most recent population estimates and densities suggest a healthy and stable resident population in northern Yellowstone.

An aerial helicopter elk classification count in April 2025 by MTFWP observed 7,226 elk in the Northern Yellowstone herd (6,124 outside park in MT, 1,102 in YNP), the highest number of elk counted in this herd since 2018. The main objectives of the classification counts are to determine calf:cow and bull:cow ratios, not necessarily to estimate total herd size. However, MTFWP's classification survey effort aims to count as many elk as it can detect and can be considered a minimum estimate of herd size.

Carnivore-Prey Dynamics

Project staff detected 153 kills made by wolves in 2025: 72 elk (47.1%), 41 bison (26.8%), 11 mule deer (7.2%), 7 deer (undetermined if mule deer or white-tailed deer, 4.6%), four moose (2.6%), three white-tailed deer (1.9%), two bighorn sheep (1.3%), two pronghorn (1.3%), one each of raven (<1%), coyote (<1%), wolf (<1%), and eight carcasses where species was not determined (5.2%). The composition of wolf-killed elk was 18% calves, 7% yearlings, 15% adult females, 51% adult males, 3% adults of unknown sex, and 6% with unknown age and sex. The overall proportion of the wolf-killed diet made up of bison was the highest recorded over the last 31 years. The composition of wolf-killed bison was 27% calves, 10% yearlings, 31% adult females, 27% adult males, and 5% adults of unknown sex. In addition to wolf kills, staff also detected wolves scavenging on 49 ungulate carcasses, also dominated by elk and bison.

Project staff detected 62 kills made by cougars in 2025: 20 mule deer (31.7%), 19 elk (30.2%), 12 deer (undetermined if mule deer or white-tailed deer, 19%), two badgers (3.2%), two bighorn sheep (3.2%), and one each (<2% each) of coyote, porcupine, grouse, red fox, undetermined small mammal, undetermined ungulate species, and one white-tailed deer.

Cover: Trail cameras in northern YNP capture the three main study species of the Yellowstone Wolf, Cougar, and Elk Project. Cameras assist many research projects and questions and contribute valuable data to long-term monitoring efforts. (NPS photos)

These totals represent a combination of carcasses detected using intensive, strategic efforts during specific seasons in addition to opportunistic observations of carcasses during the rest of the year. Staff use field observations, collar data, and evidence from necropsy investigations of carcass sites to categorize cause of death as either definite, probable, or possible result of wolf or cougar predation. Wolf and cougar predation was intensively monitored for two months in 2025—Late Winter (March), and Early Winter (mid-November to mid-December). Unlike many previous years, predation was not intensively monitored during summer 2025. This change in seasonal effort caused the lower proportion of documented kills made up of neonate ungulates and therefore a higher proportion made up of adult ungulates, not an actual shift in prey composition.



GPS-collared cougar F210 keeps alert for competitors near her kill site as her kitten glances up at the circling monitoring plane near lower Blacktail Deer Creek. (D. Stahler/NPS Photo)



The Junction Butte pack scavenges on a dead bison that fell into a deep water hole, while skeletal remains of previous victims of this terrain trap lay scattered about. Wolves frequently return to such landscape features to look for easy meals. (M. Metz/NPS photo)

Predation Studies

Late Winter— During the 30-day March 2025 late winter study period, three teams—air, ground, and GPS [Global Positioning System] cluster-search crew—collectively discovered 59 ungulate carcasses fed on by wolves. The air crew was able to fly on 16 of the 30 days and routinely tracked most packs in YNP. The ground crew observed the Rescue Creek pack for 29 of the 30 days and the Junction Butte pack for 25 of 30 days. The GPS cluster-crew hiked or skied a total of 1104 kilometers (686 miles) to investigate 623 GPS clusters—364 clusters for four wolves in the Rescue Creek pack, 147 clusters for two wolves in the Junction Butte pack, and 88 clusters for five cougars. For wolves, a cluster was defined as two or more locations within 100 meters of each other within a three-day span, and for cougars, two locations within 200 meters of each other within a six-day span. In winter, GPS collars were set to take a location fix every hour for wolves and every three hours for cougars.

Of the 59 carcasses fed on by wolves, 50 (85%) were killed by wolves, and included 25 elk, 14 bison, six deer, three moose, one bighorn sheep, and one ungulate of undetermined species. Of the elk, four were calves (16%), one was an adult female (4%), 16 were adult males (64%), and four were yearlings (16%). The wolves also scavenged on six bison and three elk that died of non-wolf-related causes. Between the five cougars, crews discovered 31 kills and one scavenged adult male bison carcass. Kill breakdown was ten mule deer (60% of which were fawns),

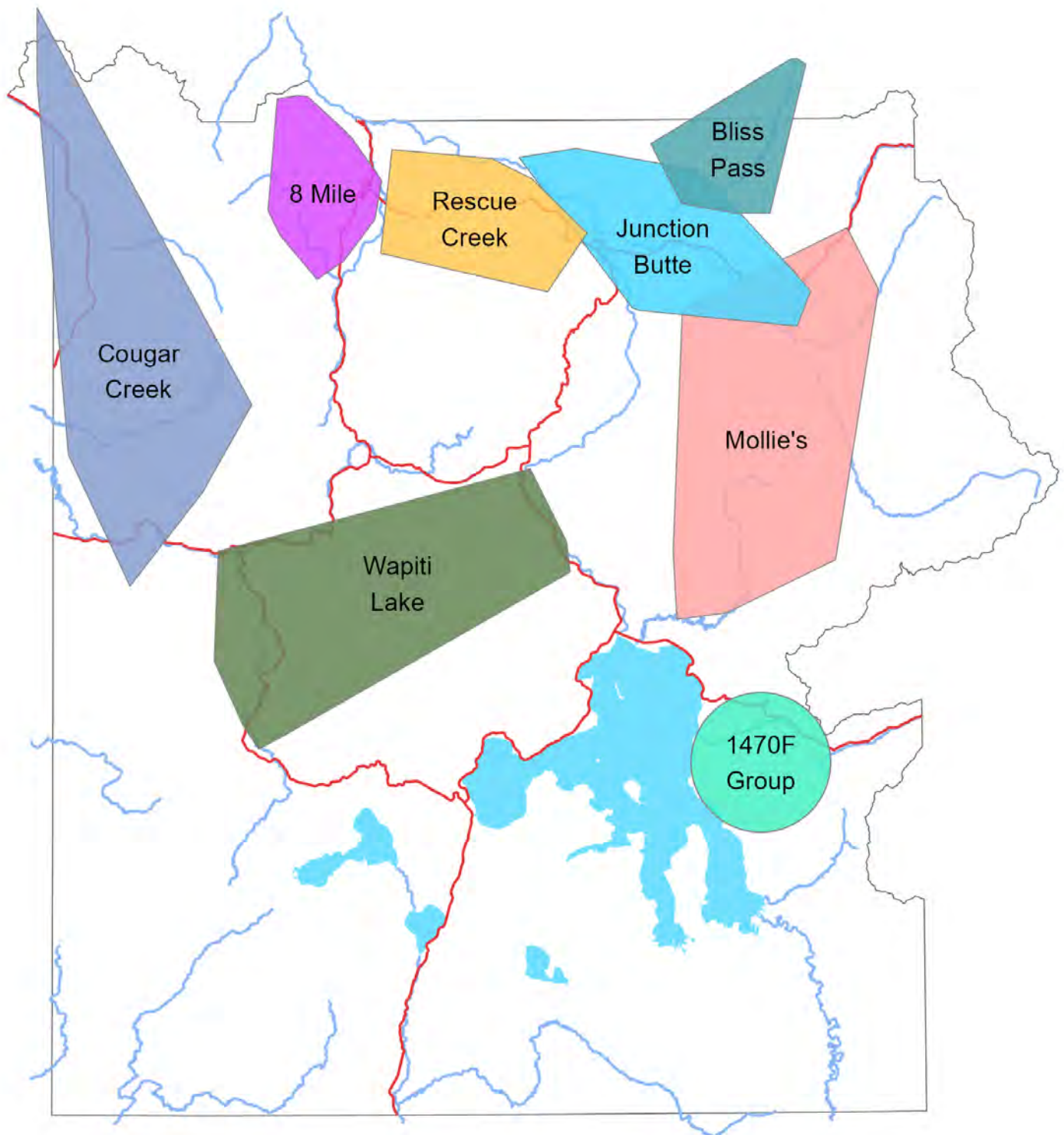
eleven elk (two bull elk, two cow elk, five calves, one adult of unknown sex, and one of unknown sex and age), seven deer (undetermined if mule deer or white-tailed deer), one white-tailed deer yearling, one red fox, and one porcupine.

Early Winter— During the 30-day November-December 2025 early winter study period, the three teams—air, ground, GPS cluster-search crew—collectively discovered 48 ungulate carcasses fed on by wolves. The air crew was able to fly on 16 of the 30 days and routinely tracked most packs in YNP. One ground crew observed the Junction Butte pack for 25 of the 30 days and another crew observed the Rescue Creek pack for 29 of the 30 days. The GPS cluster-search crew hiked or skied over 1129 kilometers (702 miles) to investigate 435 GPS clusters from two Rescue Creek pack wolves (188 clusters) and two 8 Mile pack wolves (144 clusters), and 103 clusters from five cougars.

Of the 48 carcasses fed on by wolves, 44 (92%) were killed by wolves, and included 23 elk, 10 bison, 10 deer, and one bighorn sheep. Of the elk, six were calves (26%), six were adult females (26%), 10 were adult males (44%), and one was an adult of unknown sex (4%). The wolves also scavenged on two bison and two elk that died of non-wolf-related causes. Between the five cougars, crews found 23 kills and no scavenges. Seven of the kills were mule deer, five were deer (but undetermined if mule deer or white-tailed deer), four elk (two cow elk and two bull elk), one bighorn sheep, one undetermined ungulate (deer or elk), two badgers, one coyote, one likely grouse, and one undetermined small mammal species.

2025 Yellowstone Wolf Pack Territories

(95% minimum convex polygons of aerial locations)



Note: Aerial locations are not gathered outside of the park during wolf hunting seasons in the states surrounding YNP. Therefore, some wolf pack territory polygons do not represent all transboundary space use.

Wolf Research

Mortality

Six radio-collared wolves died in 2025. Two were legally killed during the wolf hunting season in Montana—1507F from 8 Mile and 1479F from Junction Butte. Wolf 1331F, a dispersing member of the Wapiti Lake pack, was illegally snared at the southern end of Montana’s Paradise Valley. Of the three non-human-caused mortalities detected, lone wolf 1048M died of age-related organ failure (nearly 10 years old), 1411F of the Mollie’s pack was killed by the Junction Butte pack, and 1495F of the 8 Mile pack was killed by the Rescue Creek pack. In addition to the collared wolves, an uncollared pup likely from the Junction Butte pack was legally killed by a hunter in Montana. Wolf 1478F was poached on December 25th, but was not considered part of the park population at the time of death as she had dispersed from the Junction Butte Pack earlier in the fall and largely occupied Montana north of the park.

Disease

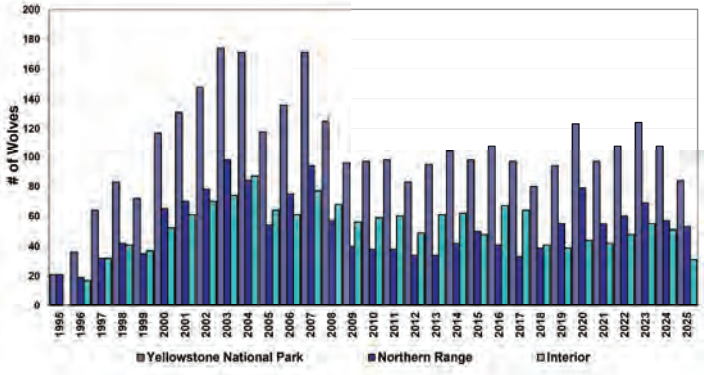
Lack of pup production for some packs (Bliss Pass, Cougar Creek, and Mollie’s) and low pup survival for others (Wapiti Lake and Junction Butte) suggested there could have been some disease-related wolf pup mortalities in 2025. Future disease screening of surviving wolves may help determine if this is true and which disease(s) might be responsible. In past years, canine distemper virus has caused pup mortality during the summer months. This virus is a common, naturally-occurring infection which cycles

through areas with carnivore populations and has been documented in YNP at least five times since 1995.

Reproduction

Prior to the birth of the 2025 litters in the spring, there were approximately 88 adult wolves in YNP. At least 36 pups were then born to five packs. Two packs produced multiple litters: Junction Butte with three litters and Wapiti Lake with at least two. Three packs produced one litter each: 8 Mile, Rescue Creek, and Mollie’s. In addition, three packs had no pups recorded in 2025 although for different reasons: Bliss Pass did not localize and the female was likely not pregnant, Cougar Creek’s lead female was pregnant but if she localized it was only for a very short time before the pups died, and the 1470F group was elusive to observe but likely had pups at least into the fall but none by the end of the year.

Yellowstone wolf population (1995 through 2025).



Yellowstone wolf population as of December 31, 2025.

	Adults	Pups	Total
Northern Range			
<u>8 Mile</u>	9	7	16
<u>Rescue Creek</u>	12	4	16
Bliss Pass	6	0	6
<u>Junction Butte</u>	9	6	15
loners	0	0	0
Northern Range Total	36	17	53
Interior			
Cougar Creek	4	0	4
Mollie's	7	0	7
Wapiti Lake	18	0	18
1470F group	2	0	2
loners	0	0	0
Interior Totals	31	0	31
YNP TOTAL	67	17	84

underline denotes a breeding pair

Wolf mortalities during 2025.

Wolf #/sex	Date of Death	Age	Pack	Cause of Death
1331F	1/16/2025 (est)	adult	Wapiti Lake	Poached in MT
1507F	1/23/25	yearling	8 Mile	Hunter-killed in MT, Region 3
uncollared	1/25/25	pup	Junction Butte	Hunter-killed in MT, Region 3
1048M	2/19/25	old	loner	Age-related organ failure
1411F	7/21/25	adult	Mollie's	Intraspecific
1479F	9/17/25	adult	Junction Butte	Hunter-killed in MT, WMU 316
1495F	12/24/25	adult	8 Mile	Intraspecific



Eight gray pups born to the 8 Mile Pack lounge outside their den. Seven of these pups survived until the year's end, making this pack the most successful contributor to YNP's pup recruitment in 2025. (M. Metz/NPS photo)

Of the minimum 36 pups produced in YNP packs, 17 (47%) survived to the end of the year. This survival percentage is considered a maximum as several litters died before they could be counted (Cougar Creek and 1470F group) or were almost certainly undercounted (1478F's litter in Junction Butte). Seventeen surviving pups is the lowest annual pup recruitment total recorded in YNP since 1996. This is likely natural variation due to a combination

of factors including a possible disease outbreak. screening and pedigree analysis, a whisker for isotopic diet analysis, body and tooth measurements, and weights. A uniquely-identifying pit-tag was inserted under the skin near the wolf's shoulder in the event a collar is dropped or chewed off and the wolf is recaptured in the future.

Three wolves from two packs were captured and collared in February 2025. The low number of captures was due to most of the 2024-2025 winter captures being completed in December 2024 (see 2024 annual report). During the three 2025 wolf captures, one new collar was deployed on a male pup from the Junction Butte pack, 1545M, and older collars were replaced on 1393M of the Rescue Creek pack and 1478F of the Junction Butte pack.

In addition to fitting a radio collar on each captured wolf, staff took blood samples for disease

Wolf captures during 2025.

Wolf #/sex	Date of Capture	Age	Color	Pack	Collar Type
1478F	2/19/25	adult	gray	Junction Butte	GPS
1545M	2/19/25	pup	black	Junction Butte	GPS
1393M	2/19/25	adult	black	Rescue Creek	VHF

selection, movement patterns, prey selection, biomass consumption, and multi-species interactions. GPS collars last for at least two years and are generally programmed to record locations from four to 48 times per day, depending on the season and study objectives. For the first time in winter 2024-2025, some GPS collars were programmed at an intensive ten-minute fix rate for several weeks during the year. This data corresponds to audio data recorded by collar biologgers and also includes orientation and movement data.

Each year's collaring goals are designed to maintain an adequate number of collars on each pack for monitoring and research objectives as well as for academic collaborations and interagency communication. At the end of 2025, there were 26 collars distributed throughout the eight park packs and groups.

Bioacoustics

The bioacoustics monitoring program expanded this year with 48 ARUs (autonomous recording units) across YNP. Approximately half of the units form a grid across northern YNP, with additional units near den or homesites during the summer or in the winter territories of interior

packs. The ARU grid units are spaced six kilometers apart, with fifteen additional units placed three-kilometers from their nearest neighbor to estimate how distance and landscape structure influences howl detection. This data will be used to develop non-invasive monitoring tools, to study spatial and temporal patterns in wolf vocalizations, pack and individual identity, as well as within- and between-pack patterns in communication. In addition, several wolves were given GPS collars with audio recording technology (see Capture section) and this data will be integrated with the ARU grid data.

Wolf Management

Wolf management in YNP included temporary closures around the Junction Butte, Mollie's, and Wapiti Lake den areas to protect young pups from disturbance and allow adult wolves to travel near the den unimpeded. The closures were lifted after several months when the wolf pups were increasingly mobile.

Wolf management also included monitoring for habituated wolf behavior. We recorded several cases of habituated behavior in 2025 from the Junction Butte and Wapiti Lake packs, and staff attempt to correct behavior



Solar-powered ARUs like this one are part of an expanding effort by the Wolf Project to implement non-invasive monitoring tools to study wolves. Data from these units will feed into wolf population and behavioral monitoring studies, as well as provide general Yellowstone soundscape data that can be used in a variety of other studies. (D. Stahler/NPS photo)

through aversive conditioning as soon as possible. Aversive conditioning is performed by trained staff during a teachable moment when the wolf makes the decision to be in close proximity to humans or vehicles. Although this task can be logistically challenging and often requires monitoring the target wolf daily, aversive conditioning has been a successful tool for changing wolf behavior to greater



In relatively rare cases where wolves show bold behaviors, as seen here by 4 Junction Butte pups approaching Wolf Project staff, aversive conditioning and hazing techniques are implemented to stop these unwanted behaviors. Education of both people and wolves have proven to be successful at minimizing habituation in Yellowstone wolves despite millions of visitors each year. (K. Cassidy/NPS photo)

avoidance of people. Most wolves in YNP are extremely wary of humans and, if it were not for long-distance viewing through spotting scopes, would rarely be seen.

For more information on wolf management in Yellowstone, please visit: go.nps.gov/YELLwolfMGMT

Wolf Hunting Seasons Near YNP

Outside of YNP, in the states of Montana, Wyoming, and Idaho, wolves can be hunted and trapped during certain times of the year. Each state has different regulations for season dates, bag limits, and allowances for specific hunting practices such as night-hunting, baiting, and the use of snares. See each state's wolf hunting regulations for specific details.

Wolves from packs monitored by YNP staff occasionally travel outside of YNP borders and are legally killed by hunters and trappers. Most of these mortalities are along the shared boundary between northern YNP and Montana through the Gardiner Basin. This area records most of the human-caused mortalities due to the ease of human-access and the winter-range of Northern Yellowstone ungulates. Prior to the 2025-2026 MT wolf hunting season, the Montana Fish and Game Commission decided to keep two wolf management units (WMU 313 and 316) in place with quotas of

three wolves each. In addition, MT Region 3, which shares over 100 kilometers of border with YNP, was given a quota of 60 wolves.

In 2025, three wolves from YNP packs were killed by hunters in Montana—two in Montana's Region 3 in January, and one in WMU 316 in September. Three wolves were killed in WMU 313 in late 2025. None of those killed in WMU 313 were confirmed to be from a YNP wolf pack, and likely came from a Montana pack with a territory just north of the park. In past years, wolves from YNP packs were also killed in Wyoming and Idaho but none were documented in 2025.

YNP staff use radio collars and intensive, year-round observations to determine which wolves are killed when packs travel outside of YNP. This information, in combination with communication with state agencies, is critical to understanding transboundary wolf management issues.

2025 Pack summaries

8 Mile: 16 wolves (9 adults, 7 pups)

In early 2025, many yearlings from the 8 Mile pack dispersed and while several of them were killed during Montana's wolf hunting season in Region 3, others started a new group with wolf 1407M outside of YNP. Adult female 1389F also dispersed and established a territory with an uncollared male outside of YNP, north of Gardiner, Montana. In the spring, 8 Mile leader 1328F gave birth to the pack's only litter. Seven of the eight pups counted in the summer survived through the end of the year. Lead male 1326M, born in the Wapiti Lake pack, has turned nearly white with age and the rest of the pack members are gray.



One of the more colorful packs in YNP, members of the Wapiti Lake Pack reveal the diversity of wolf coat colors. Ranging from dark black to multiple shades of gray, salt and pepper, silver, and white, coat color is influenced largely by genetics and age. (D. Stahler/NPS photo)



The all-gray colored 8Mile pack, including the nearly white alpha male 1326M (lower right), engages in a group rally. A wide variety of social posturing behaviors are revealed by this photo, as individuals genuflect, raise and tuck tails, and exert other dominant and subordinate behaviors that help maintain group cohesion. (M. Metz/NPS photo)

The pack continues to base their territory on the east side of the southern Gallatin Range.

Rescue Creek: 16 wolves (12 adults, 4 pups)

At the very end of 2024 and beginning of 2025, six young males from the Rescue Creek pack dispersed to join the Junction Butte pack including 1392M, 1484M, 1489M, two uncollared black males, and one uncollared gray male. Over the summer, one of Rescue's yearling males also left and joined his older brothers in Junction Butte. For the fourth year in a row, yet never in the same den twice, 1490F gave birth to a litter of pups and all four lived to the end of the year. The Rescue Creek pack continued to base their territory around Blacktail Plateau.

Junction Butte: 15 wolves (9 adults, 6 pups)

The Junction Butte pack experienced a major reshuffling after the late December 2024 deaths of at least four pack members including both leaders—eleven year-old 907F was killed by the Rescue Creek pack and the nine year-old uncollared black alpha male was poached in Montana. Another adult female and two pups disappeared around the same time, leaving only three adult females (1385F, 1478F, and 1479F) and two pups (1545M and an uncollared black female). Within days of the leaders' deaths, several males from the Rescue Creek pack joined the remnants of Junction Butte, with 1385F and 1392M emerging as the pack's new lead pair. All three adult females gave birth in the spring with 1385F's litter born first, then 1478F's pups at a separate den, then 1479F's pups in a den near 1385F's litter about two weeks later. Counts were difficult

to obtain and probably missed some early mortality but a minimum of 11 pups were observed (six to 1385F, two to 1478F, and three to 1479F). By late summer, 1478F's pups had died and the pack still had a total of six pups—likely five from 1385F's litter and one from 1479F's litter. On the third day of the Montana wolf hunting season, some pack members traveled near the park boundary and 1479F was legally killed in Montana's WMU 316. The pack lost two other members in the fall. After taking several long trips away from the pack throughout the summer, yearling male 1545M dispersed and was legally killed in Wyoming. Wolf 1478F also dispersed in November and traveled out of YNP where she was poached in late December near Jardine, MT. By the end of the year, the pack had nine adults (seven adult males and two adult females) and six pups.

Bliss Pass: 6 wolves (6 adults, 0 pups)

Despite having a small, but seemingly good quality winter territory up Slough Creek, the lead female of Bliss Pass did not den in 2025 and the pack traveled widely through the summer and fall. Three yearlings remain with the three collared adults (1437M, leaders 1477F and 1510M) and the small pack was documented hunting and successfully killing bull bison and adult moose.

Mollie's: 7 wolves (7 adults, 0 pups)

For only the second time in their 30-year history, the Mollie's pack was recorded denning outside of their Pelican Valley territory, using a new site in eastern Lamar Valley at the end of a winter during which the pack often frequented northern YNP. Although they were led by elder 1090F, who

Gray Wolf Survival in and around Yellowstone National Park



SURVIVAL

is the probability an individual will live from one time period to the next, often depicted as annual survival rate between 0.0 and 1.0.

Leading causes of wolf deaths:



Other wolves (territorial fights between packs)



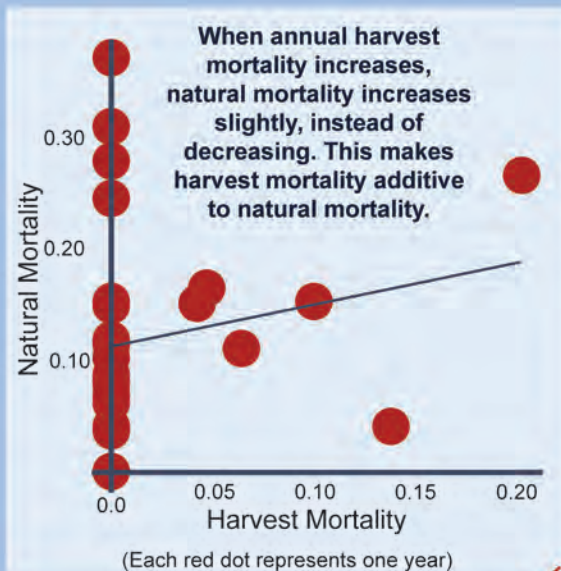
Humans (legal hunting and trapping outside of YNP)



Prey species (while wolves hunt)

Annual Natural Mortality

includes deaths from wolves and other wild species, plus diseases, and natural accidents.



Annual Hunting and Trapping Mortality (legal only)

maximum
>30%

average
12%

minimum
0%

some packs have lost over 50%

maximum
20%

average
6%

minimum
0%



For wolves living mostly in YNP, harvest mortality is additive to natural mortality. This increase in total mortality lowers survival, especially in years and areas with intensive wolf hunting in ID, MT, and WY.

For more information about wolf vital rates, survival and reproduction, check out the dissertation and publications by Dr. Brenna Cassidy.

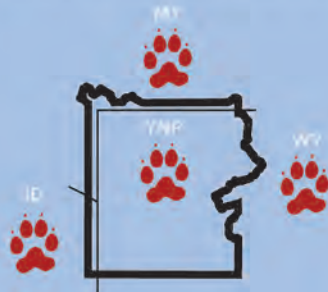


Brenna started working in Yellowstone in 2009, splitting her time collecting wolf data in the winters and bird data in the summers. For nearly a decade, Brenna was a leader and expert in field work and developed many important questions about wolf population dynamics. In 2018, Brenna began a graduate research project and the results shown here represent a small selection from her work. Brenna also examined wolf reproduction, influences on pup survival, and much more.

In April 2025, Brenna completed her PhD at the University of Montana advised by Dr. Mark Hebblewhite. Since 2023, Brenna has been the Wolf Coordinator for Colorado Parks and Wildlife. Congratulations, Brenna!

Survival rates are **HIGHER** when:

 Wolves are Not Hunted



Living in a large pack



Elk Abundance is High

long-term annual survival

0.78

1995-2022

 Wolves are Hunted in ID, MT, and WY (tri-state total >700 killed/year)



Elk Abundance is Low



Living in a small pack

Survival rates are **LOWER** when:

Wolf survival is strongly affected by hunting regulations and management decisions made by humans, as well as prey abundance, and wolf pack size. These factors are intertwined and can change depending on the population structure and stage of recovery.

turned 11 in spring 2025, the pack's only pups were produced by three year-old 1411F. Two pups were observed near the natal den then were moved south in late July immediately after 1411F was killed by the Junction Butte pack in Lamar Valley. An uncollared black female two year-old, who had been separate from the others since the spring, rejoined the pack in late summer. Only one pup was seen with the pack in the fall and by the end of the year, it was missing and presumed dead.

Wapiti Lake: 18 wolves (18 adults, 0 pups)

Starting 2025 as the largest pack in YNP, by the spring, several adults died (1331F), disappeared (the uncollared gray former alpha male), or dispersed (two-year-old 1486M). 1486M's GPS collar showed he traveled around the north end of the Gallatin Range down through the Madison Valley before being legally killed west of Ashton, Idaho in June. Several litters of pups were born in 2025 with a high count of eleven documented but by late June only one remained. Given the timing of the pup mortalities, it is possible the pack experienced an infectious disease outbreak. At a similar time, the alpha female was observed very unstable and uncoordinated, struggling to use her back legs. It is unknown if she also had symptoms from some neurological illness or if she was injured, but by late August she recovered and was traveling normally. By the end of the year, the last pup was missing and the pack consisted of 18 adults, at least nine of which were yearlings.

Cougar Creek: 4 wolves (4 wolves, 0 pups)

Although she appeared pregnant in mid-April, 8-year-old lead female 1480F (with a nonworking collar) seemed

to have miscarried late-term or the pups died within a few days of birth. The last sighting of 1480F was in mid-June and thereafter the pack was only seen with four members after her presumed death of natural causes. Lead male 1342M turned nine years old in 2025 and is likely the father to the other three Cougar Creek wolves.

1470F group: 2 wolves (2 adults, 0 pups)

Wolf 1470F dispersed from the Hawk's Rest pack in March and traveled alone for several months. In June her GPS collar movements indicated she was attending a homesite east of Yellowstone Lake. As this was too late to be for her own offspring, she likely met up with an uncollared female and helped her (and possibly others) provision their pups. By the end of the year, 1470F was using the same area and seen with only one other adult.

Dunanda Falls (shifted to non-YNP pack)

The Dunanda Falls pack shifted their territory southwest outside of YNP in 2025.

Hawk's Rest (0 wolves)

After the Hawk's Rest pack did not den in 2025, the remaining five pack members split up and only occasionally used YNP. Of the four radio-collared wolves, one disappeared, one was killed by a hunter, one was killed by another pack, and the last roamed the South Fork of the Shoshone River areas alone.

Lone wolves (0 wolves)

In early 2025, lone wolf 1048M died of age-related organ failure. Two other lone wolves, 1410F and 1482M, both had

Taking advantage of a thermally-heated napping spot, the Wapiti Lake Pack soaks up the March sun in one of the many geyser basins that dot their territory. Wolves tend to gravitate toward these areas in winter for both relief from the cold and hunting opportunities on congregating bison.

(M. Metz/NPS photo)



nonworking GPS collars and their last sightings were in early summer.

Other packs and wolves:

The Willow Creek, Pahaska, and Two Ocean packs spent time in eastern and southern YNP but are considered predominantly Wyoming packs and are monitored by Wyoming Game and Fish Department.

Previously from the Junction Butte pack, wolf 1478F dispersed in early November 2025 and a few weeks later was observed with five other gray wolves. This was possibly the 1384F group which we lost track of in 2024 with no radio

collars. Her GPS collar showed movements that ranged from Junction Butte territory and then northwest of YNP toward the southern end of Paradise Valley. On December 26th, 1478F's collar sent a mortality signal above Jardine,



The oldest living wolf in YNP in 2025, 1090F of the Mollie's pack (left) travels with a pack mate. Although she has not produced pups in the last two years, 1090F remains the lead female of the pack with male 1339M. (J. SunderRaj/NPS photo).

MT, less than two kilometers from the YNP border. Her collar had been cut and tossed into a tree by a poacher. Anyone with information about this illegal killing should call MTFWP's tip hotline.

Cougar Research

Summary

During 2025, five adult cougars were monitored using GPS collars. To support several project monitoring objectives, project staff capture and collar cougars each winter using houndsmen and their dogs. During 2025, three new cougars were captured and collared: F231, M233, and F234. These three new individuals joined collared cougars F210 and F223 who were collared in previous years (see individual narratives below). These collared individuals provide critical data which are integrated with other monitoring tools like remote cameras to help estimate population size and evaluate patterns of reproduction, survival, predation, habitat use, and multi-species interactions.

Cougar Population

Cougar abundance estimates come from three distinct phases of monitoring efforts in northern Yellowstone National Park. Phases I (1987-1994) and II (1998-2006) monitoring included intensive collaring efforts to estimate abundance – with biologists collaring up to 80% of adult individuals in the population in some years. During the current Phase III (ongoing since 2014) monitoring included two different, non-invasive methods. Snow tracking surveys were conducted from 2014-2017 and relied on DNA samples collected from hair, scat, and blood to estimate

cougar abundance using spatial capture-recapture models. From 2021-2024, a camera trapping grid was established across the northern range that was designed to estimate abundance by leveraging the detection rates and movements of GPS-collared individuals which could then be applied to detections of uncollared individuals using spatial mark-resight models. Note that estimates from each phase and method were derived from slightly different spatial extents of the northern range study area, which includes areas north of the park. Further, abundance estimates from the camera trapping grid were based on adult individuals only, and estimates of total abundance reported here were calculated by adding the mean proportion of juveniles in the population from Phases I and II (41.9%).

For Phase I, total cougar abundance ranged between 15-30 cougars (all age/sex classes combined; 0.7-1.4 cougars/100km²). Importantly, the Phase I cougar population represents a recolonizing population that likely began during the early 1980s after population eradication that occurred by 1930, simultaneous to wolf eradication. During Phase II, which began shortly after the wolf reintroduction years, the cougar population continued to expand with total cougar abundance estimates ranging from 26 to 42 cougars (all age/sex classes combined; 1.5-2.5 cougars/100km²). In Phase III, the non-invasive snow tracking surveys using DNA samples yielded estimates of 34 to 42 cougars (all age/sex classes combined; 1.9-2.3 cougars/100km²). Most

recently, the 2021-2024 remote camera trap method has produced preliminary estimates of 34 to 46 cougars across the northern range study area (all age/sex classes combined; 1.7-2.5 cougars/100km²). Although methods for estimating cougar abundance have varied over the last several decades, most recent population estimates and densities suggest a stable population in northern Yellowstone. The northern range is home to Yellowstone's year-round resident cougar population. While other cougars occupy the interior of the park in spring, summer, and fall seasons, these individuals likely leave the interior of the park in winter when their main prey, deer and elk, migrate out of the interior's winter habitats. No studies have yet attempted to estimate the interior's seasonal cougar abundances.

Collared Cougar Summaries

Cougar F210

Female cougar F210 was born in the summer of 2016 and was first collared in 2018 as a yearling while she was still with her GPS-collared mother, F209. Young cougars typically stay with their mothers for the first 12 to 18 months of their lives before gaining independence. Monitoring allowed us to document when F210 set out on her own and established an overlapping home range with her mother F209, whose collar was eventually remotely released.

Long-term monitoring of F210 has allowed the project to document her growth and success as a mother. She gave birth to her most recent litter of three kittens in late October

of 2025 at the age of nine—her sixth documented litter. Litter sizes of two to four kittens are common for cougars, with typically only half surviving until independence. Although we do not know how many of her offspring have survived to independence, F210 likely has a rich genetic legacy in the Yellowstone ecosystem.

While cougar sightings are rare in the park, F210 is periodically observed by researchers and park visitors when she is discovered on kills along the steep terrain of Mt. Everts outside of Mammoth Hot Springs. Her home range includes Mt. Everts, to Rattlesnake Butte and Turkey Pen, as well as through the Black Canyon of the Yellowstone River to the northern part of Blacktail Deer Plateau. F210 has weighed between 100 and 110 pounds over her multiple captures across the years – typical weight for an adult Yellowstone female cougar.

Cougar F223

Female cougar F223 was born in 2016 and first captured and collared near Hellroaring Creek in January of 2020 when she was approximately four years old. Age estimation of adult cougars is commonly done during capture by measuring gum recession of the upper canines. At the time of her 2020 capture, F223 was raising a litter of two kittens, believed to be her first litter.

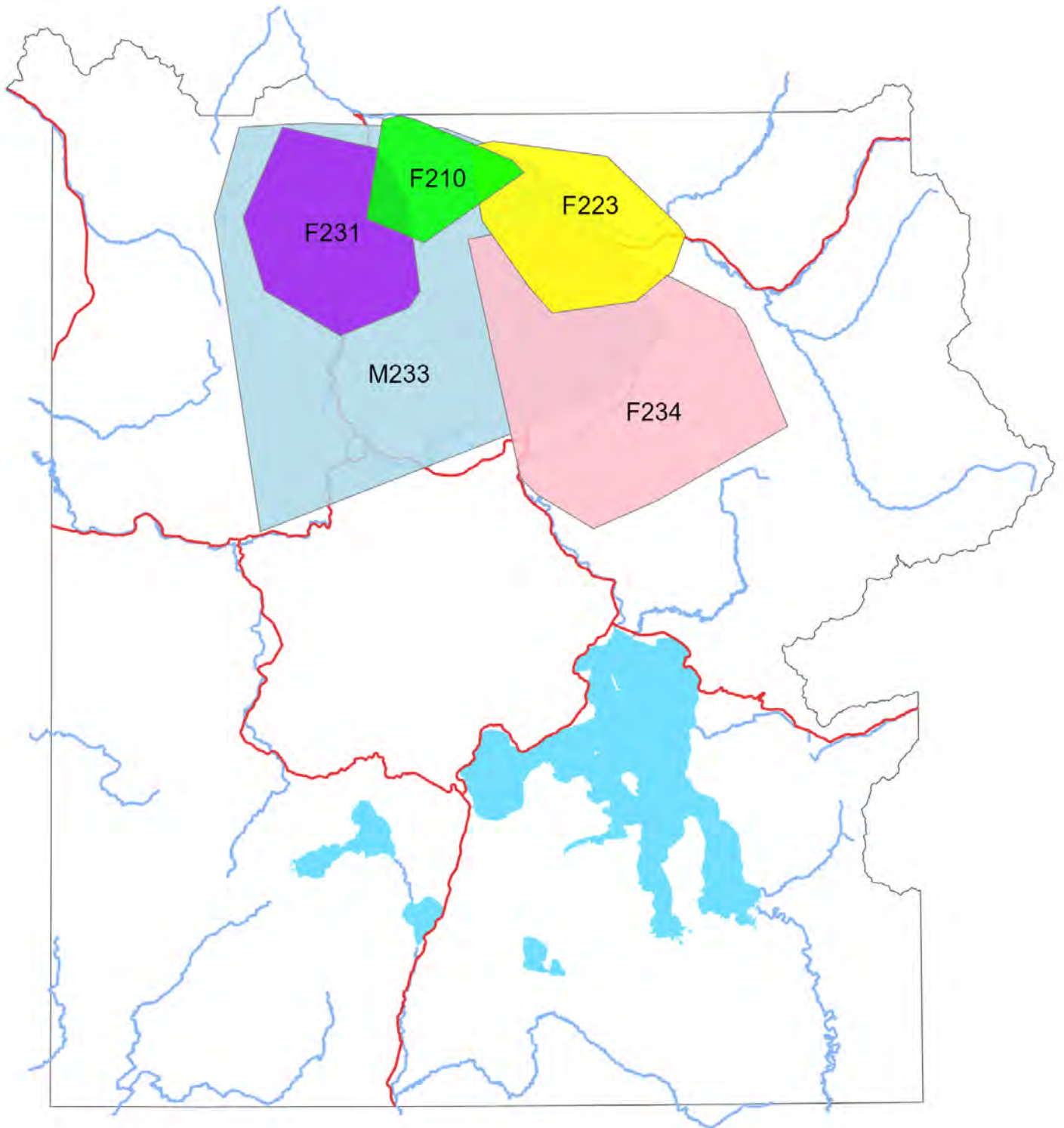
Similar to F210, F223 has been collared multiple times, providing rich data on her life history and predation patterns over the years. Collar data has also allowed us to document cougars' perseverance through adversities. On September



F223 travels across an open meadow on Blacktail Deer Plateau with her two kittens in tow. Sightings of cougars are challenging to get, even for biologists tracking their collars from the ground and air. But sightings like this yield valuable data on female reproductive success by documenting the presence and number of kittens over time. (D. Stahler/NPS photo)

2025 Yellowstone Collared Cougar Territories

(95% minimum convex polygons of weekly GPS locations)



Note: Map depicts collared cougars only. Collaring efforts are restricted to northern Yellowstone low elevation terrain.

2nd, 2023, F223 was struck by a vehicle while attempting to cross the road near Floating Island Lake. Despite what appeared to be potentially fatal injuries, project staff monitored her in subsequent weeks from her GPS data and aerial observations and documented her making a full recovery. She went on to successfully raise at least one of her two kittens to dispersal age that year.

F223 spent most of 2025 raising her most recent litter of four kittens (born in August of 2024) and was observed traveling alone again on remote cameras by late fall. Near the end of 2025, GPS data showed that F223 spent several days with collared male cougar M233 near the middle of her home range. When project staff searched the area a few weeks later, they found several bed sites and evidence of scent marking, but no kill—indicating that the two cougars were likely associating for courtship and breeding. F223's home range includes the Black Canyon of the Yellowstone River, stretching east almost to Slough Creek and south to lower Tower Creek. F223 is on the larger size for an adult female cougar, weighing 121 pounds during one of her captures.

Cougar F231

On January 10th, 2025, Yellowstone Cougar Project staff captured and collared 3-year-old F231 on the slopes of Mount Everts. Born in 2021, F231 gave birth to her first documented litter of kittens in September 2024. On March 6th, 2025, project staff responded to a visitor report of a dead mountain lion near the Lava Creek trail and performed a necropsy on a six-month-old female kitten believed to be one of F231's. Samples taken during the necropsy yielded a positive result via PCR test for *Mycoplasma felis*, a bacterium that causes upper respiratory infections in cats. F231's other kitten, a male, was seen on remote cameras

This series of photos are what biologists officially refer to as a "kitten cuddle puddle". Here we see F231 with her three kittens at a deer kill, demonstrating the maternal care that contributes to offspring survival. As part of the Cougar Project's study on cougar-scavenger dynamics, remote cameras are sometimes set at fresh cougar kills to document scavenger diversity, abundance, and feeding rates. But images also yield intimate glimpses into the social world of cougars. (NPS photos)



with F231 until he reached dispersal age and presumably struck out on his own.

F231 gave birth to her current litter of three kittens in late July south of Bunsen Peak, and the family of four were documented repeatedly on remote cameras and from aerial monitoring through the remainder of 2025. As part of a study on cougar impacts on the scavenger community, remote cameras are sometimes deployed at fresh kills made by collared cougars yielding rarely-observed cougar behaviors. A camera set on one of F231's mule deer kills in late November near Antler Peak recorded her three kittens alternating between eating meat and nursing over several days. The fact that the kittens nursed for several hours on multiple occasions at four months old indicated that F231 was in excellent condition. F231's home range includes the greater Mammoth and Mt. Everts area, and the drainages west of Gardner's Hole. When captured, F231 weighed 102 pounds.



M233 triggers a remote camera while scent marking. Using their hind legs, cougars dig, then urinate in a shallow hole, similar to a cat using a litter box. These "scrapes" are visual and olfactory communication posts for both competitors and potential mates. (NPS photo)

Cougar M233

Male cougar M233 was first captured as a three-year-old on January 24th, 2025, coincidentally just a few feet from where F231 had been captured two weeks earlier. Cougar project staff had attempted to capture a young tom who was believed to be M233 during the winter of 2024, but were unsuccessful.

M233 spent time with all four of the collared female cougars in the park during 2025, likely in courtship and breeding. He is believed to be the father of F231's current litter of kittens, as he spent time with her for several days 91 days before those kittens were born (91 days is the average gestation period in cougars). Future analysis of collected DNA samples will provide additional insight into M233's contribution to the gene pool of cougars in Yellowstone's northern range.

Male cougars tend to have much larger territories than the home ranges of female cougars and will defend those territories from competing males—M233 is no exception. His territory spans most of the northern range, extending south of Norris Geyser Basin in the summer nearly to

Madison Junction. While his territory overlaps with all four of the female cougars currently collared in the park, M233 overlaps the most with F210 and F231. At the time of his initial capture in January, M233 weighed 151 pounds with some deer meat in his belly. Despite his young age, he was believed to be the primary breeding male in the central portion of the northern YNP.

Cougar F234

Female cougar F234 was first captured on January 29th, 2025, near Lost Lake, as the result of skilled snow tracking by biologists who responded to reports of tracks in the area the previous days. Born in 2021, F234 was a smaller adult weighing only 82 pounds, but was in great condition. Despite her small size, F234 is an adept hunter having successfully killed an adult cow elk roughly six times her size during the March predation study.

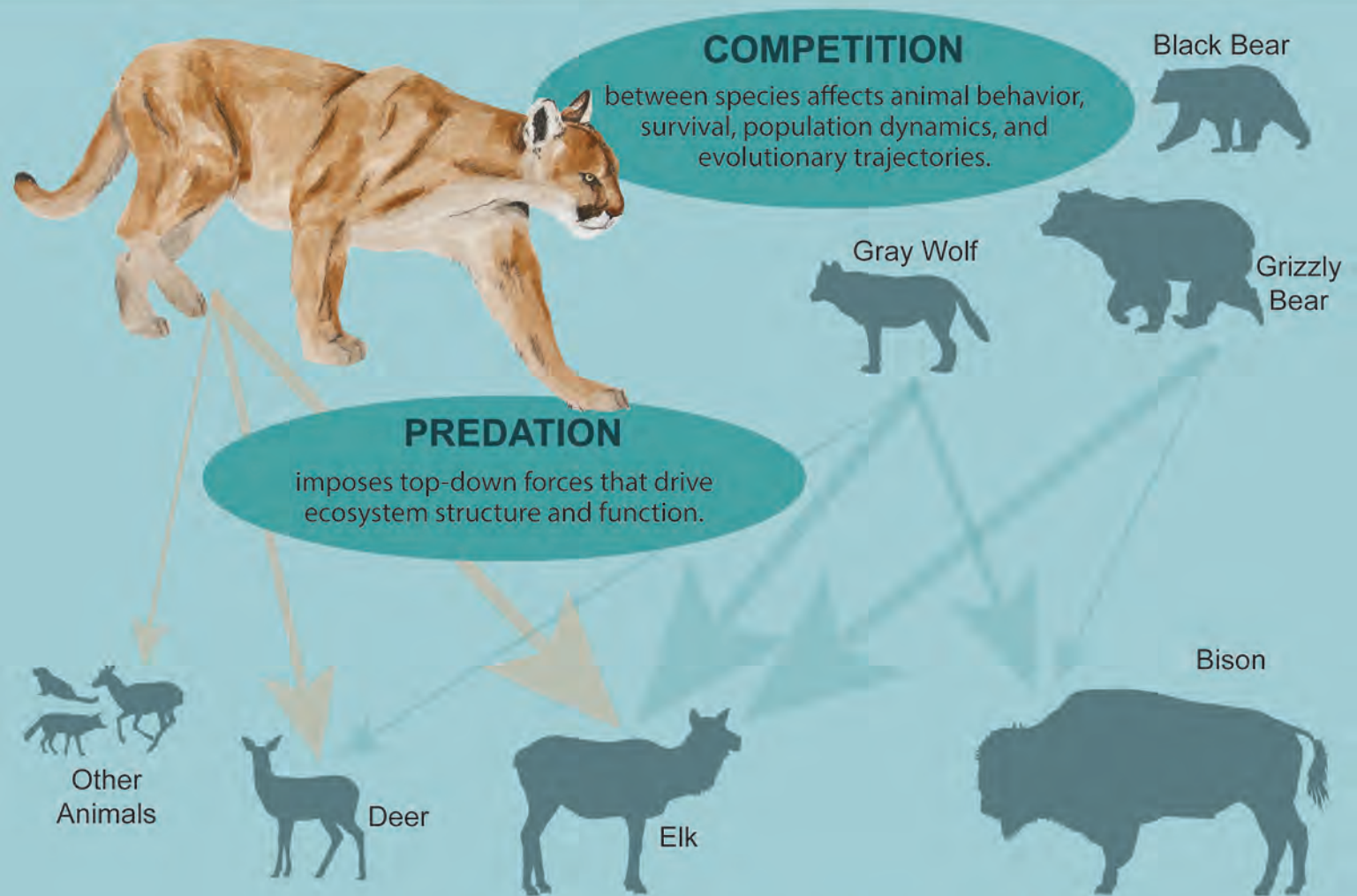
F234 presumably gave birth to her first litter of kittens in early September 2025 south of Agate Creek based on collar data. It is unlikely M233 fathered F234's litter based on their lack of association observed from GPS collar data around 90 days prior to birth of kittens. On October 15th, M233 traveled into F234's den area while she was away on a hunt. He remained at the den site, where F234's kittens were believed to be, for several days. F234 returned to the den site and overlapped in time with M233, but she then abandoned the den. Her subsequent movements indicated she no longer was caring for kittens, likely due to M233 discovering and killing the kittens. Infanticide is an evolved reproductive strategy in male cougars driven by competition with other males. It can reduce competition with non-kin, induce estrous in females for quicker breeding opportunities, and increase reproductive success. Some weeks later, F234 spent time with M233. While the pair may have mated, this second encounter did not appear to result in off spring.

F234's home range extends further south into the park's interior than previous collared cougars. She roams from Blacktail Deer Plateau to Specimen Ridge, and along the Yellowstone River corridor from Tower south into Canyon and even Hayden Valley.



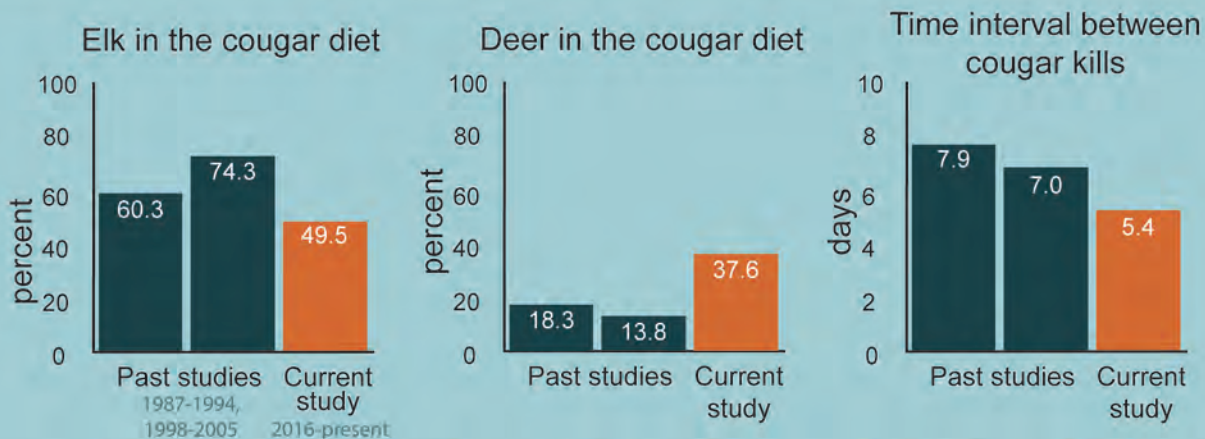
F234 triggers a remote camera, providing a key data point on individual detection that feeds into the camera trapping/spatial mark-resight models for estimating cougar abundance. (NPS photo)

Large Carnivore Competition and Predation Dynamics in Northern Yellowstone



Cougars' main competitors are wolves and bears, and main prey are elk, deer, and other small animals.

How have cougar predation patterns changed over time?



Cougars now kill fewer elk and more deer. The shift to smaller prey causes cougars to make kills more often.

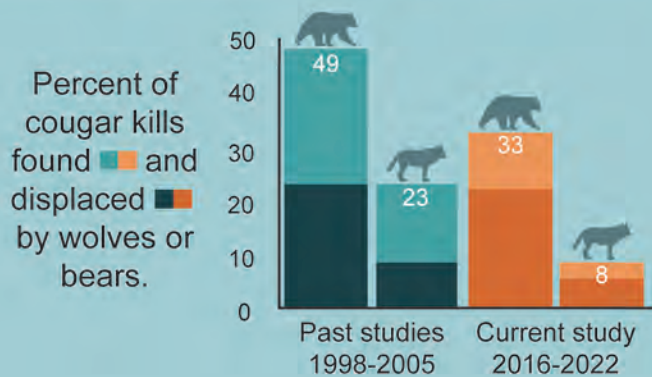
For more information about competition between carnivores and cougar predation patterns check out the dissertation and publications from Dr. Jack Rabe.



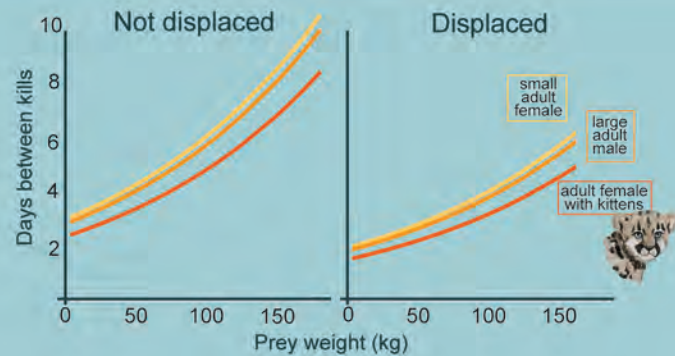
Jack started working in Yellowstone in 2017, and quickly became instrumental to successful data collection on wolves, cougars, and their predation patterns. In 2020, Jack began a graduate research project and the results depicted here represent a small selection from that work. Jack also examined how we can predict carnivore kills from GPS data, how apex carnivores alter mesocarnivore movements, and much more.

In April 2025, Jack completed his PhD at the University of Minnesota advised by Dr. Joseph Bump and Dr. Dave Mech. Congratulations, Jack!

How often do wolves or bears displace cougars from their kills?



What influences a cougar's kill interval?



Cougars make kills more often when prey is small, if displaced by competitors, and when they need more calories, such as a mother with kittens.

The probability a cougar is displaced from its kill is:



HIGH (41%) in areas with flat ground, high competitor density, and when the prey is large.



LOW (2%) in areas with steep, rugged terrain, low competitor density, and when the prey is small.

Cougar prey choices reduce competition from wolves and bears. The diverse prey community that enables these adjustments increases coexistence in the predator-rich Yellowstone National Park.



Elk Research

Summary

Elk research in YNP continued with monitoring collared adult female elk, tracking seasonal movements, investigating mortalities, and determining causes of death. In early April 2025, MTFWP conducted an elk classification count via helicopter and observed 7,226 elk in the Northern Yellowstone elk herd. This is 24.5% higher than the March 2024 count and the highest elk count since 2018 (7,579). All elk counts are underestimates of the true elk herd size as some portion of the herd is not found on any given survey. This count indicates the elk herd is stable and continues to remain above the population objective of 3,000-5,000 elk for the Montana portion of the Northern herd's winter range.

At the beginning of 2025, there were 51 radio-collared adult female elk in Yellowstone's northern herd. Six of them died in 2025—two by wolves, one by a cougar, one by malnutrition, and two to unknown natural causes. Of these mortalities, the average age at death was 14.9 and ranged from 8.8 to 19.6 years.

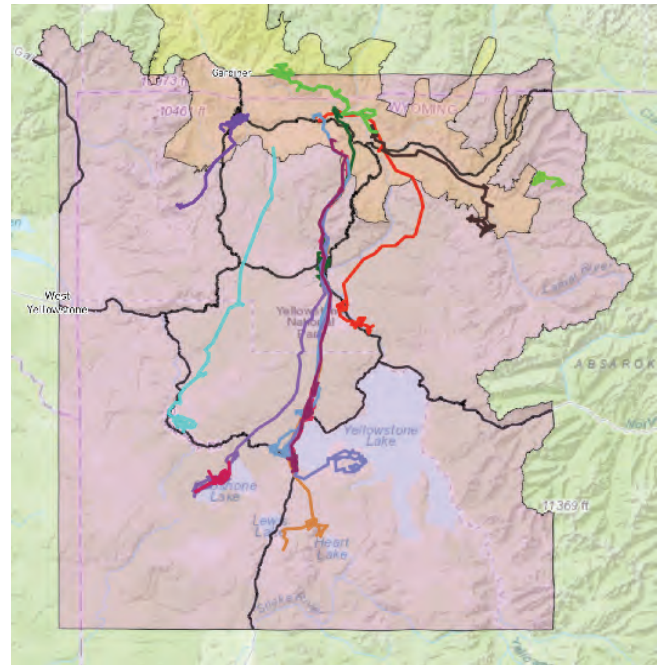
At the end of 2025, there were 45 radio-collared adult female elk in the northern herd, with an average age of 11.6 years. The oldest collared elk in YNP at the end of 2025 was 19.5 years old. The annual elk collaring operation (usually ~20 elk per year) in late 2025 was postponed to early 2026 due to weather.

Most radio-collared elk in the northern herd move to high elevation areas of central YNP during the summer and fall. Many travel as far as southern YNP near Shoshone and

Lewis Lakes and others use the west side of Yellowstone Lake and the Sylvan Pass areas. Around late October, the elk migrate toward lower elevations, navigating mountain passes in the Absaroka and Washburn Ranges.

In 2024, YNP biologists and colleagues published *Northern Yellowstone: Elk Resilience and Adaptation to Changes in Management Policies and the Ecosystem*. The book is available as a free download at YNP's website.

Examples of migration routes from summer range in the park's interior to northern winter range for a select handful of adult female elk from October 4 to 25, 2025.



A glimpse of what's to come dots the mountain tops in a snowy veil on a late September day. Many elk enter the fall season in excellent condition from a typical summer and fall of building fat reserves. This influences everything from reproductive success, to minimizing predation risk, to surviving winter's severity. (D. Stahler photo)



Graduate Research Projects

In addition to National Park Service (NPS) and Yellowstone Forever staff research, monitoring, and management projects, the Yellowstone Wolf, Cougar, and Elk Project supports several graduate student collaborations. In 2025, there were four graduate students.

Brenna Cassidy, PhD, completed her doctoral thesis at the University of Montana, advised by Dr. Mark Hebblewhite. Her thesis focused on gray wolf population dynamics, survival, and cause-specific mortality. Brenna is currently the Wolf Monitoring and Data Coordinator for Colorado Parks and Wildlife. See pages 10-11 in this report for a summary.

Jack Rabe, PhD, completed his doctoral thesis at the University of Minnesota, advised by Dr. Joseph Bump. His thesis examined how carnivores compete for resources across the landscape through time, how this competition impacts predator-prey relationships, and how we can use machine learning to predict predation patterns from large carnivore GPS data. Jack is now a Research Associate for the Yellowstone Wolf, Cougar, and Elk Project. See pages 18-19 in this report for a summary.

Wes Binder, a PhD candidate at Oregon State University advised by Dr. Taal Levi, continues his projects focused on wolf and cougar interactions with each other and elk, estimating cougar abundance and density from



Doctoral candidate Wes Binder (right) takes tooth measurements on M233 during capture and collaring as field biologist Claire Lacey (left) looks on. Annual capture events allow biologists to not only fit GPS collars for monitoring, but also gather general biological data on condition, morphometrics, genetics, and disease. (D. Stahler/NPS photo)

trail camera detections, and fine-scale predator behavior using GPS accelerometer data.

Cameron Ho, an MSc student at the University of Washington co-advised by Dr. Beth Gardner and Dr. John Marzluff, is exploring how the presence of wolves and cougars impact scavenger winter foraging and how local, naturally occurring carrion impacts raven foraging decisions.

Staff Outreach

Yellowstone Wolf, Cougar, and Elk Project staff gave 154 formal presentations, 22 interviews, presented one conference poster, gave three conference presentations, and led 25 field trips. During the summer months, staff helped



Rescue Creek's alpha female 490F broadcasts a howl near her densite as several of her pups gather round. It is common to find numerous bones and antlers scattered about wolf homesites that serve as chew toys for the pups' sharp and developing teeth. (D. Stahler/NPS photo)



Project staff Taylor Rabe and Gordy Scott check settings and swap out memory cards on one of the many ARUs distributed across the northern range as part of the Wolf Project's bioacoustic research (J SunderRaj/NPS photo)

educate at least 9,456 people while viewing wildlife and gave 82 informal presentations in the field. In addition, Taylor Rabe, Jeremy SunderRaj, and Claire Lacey counseled 60 volunteers or job shadow guests. Staff also assisted other Yellowstone Center for Resources wildlife programs and park departments.

Cougar documentary

Guardians of Yellowstone: the Yellowstone Cougar Project, is a feature-length documentary about cougar research in YNP beginning over 35 years ago. The film highlights the three distinct phases of the Yellowstone Cougar Project through changes in fieldwork, technology, and leadership. The cougars are unknowing stars as the film uses videos from camera traps to tell the life stories of several well-known, secretive residents. These intimate scenes inform the researchers of the sometimes dramatic, sometimes serene lives of Yellowstone's most-elusive predator.

Guardians of Yellowstone was produced and edited by the fStop Foundation, a long-time supporter of the Yellowstone Cougar Project through Yellowstone Forever. The documentary has already won several awards and been officially selected for national and international film festivals. *Guardians of Yellowstone* has aired on PBS stations across the country and can currently be streamed through the PBS app.

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Benson, M.J. Cherry, C.W. Epps, R.J. Fletcher, D.W. Smith, D.R. Stahler, et al. 2025. The influence of human presence and footprint on animal space use in US national parks. *Proc. R. Soc. B: Biol. Sci.* 292 (292).

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Project staff Kira Cassidy (left) and Erin Stahler (right) scan the landscape for animal activity after setting up a new solar ARU station. The eyes and ears of the Yellowstone Wolf, Cougar, and Elk Project are made up of a wide variety of tools used for data collection, but at its core, lies a team of skilled and dedicated biologists. (D. Stahler/NPS photo)



Dan Stahler (left) takes a throat length measurement on Junction Butte wolf 1545M with helicopter pilot, Wayne Huey (right). The data will correlate a wolf's age, sex, and body size with vocal parameters as part of the Project's bioacoustic research. (J SunderRaj/NPS photo)

(publications cont'd) Rabe, J.W., W.J. Binder, C.B. Anton, C.J. Meyer, M.C. Metz, B.J. Smith, T.K. Ruth, K.M. Murphy, J.K. Bump, D.W. Smith, and D.R. Stahler. 2025. Prey size mediates interference competition and predation dynamics in a large carnivore community. *Commun. Biol.* 8 (1). 424.

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Acknowledgements

We thank the many people who come forward every year to study and support wildlife research in YNP. First and foremost, we thank the Wolf, Cougar, and Elk Project seasonal technicians, without whom we would not be able to complete and continue this research. We thank Yellowstone Forever for their continued support of these programs. We are especially grateful for the many generous individuals, foundations, and organizations that have provided funding for our program, either through Yellowstone Forever, the National Park Service, or through in-kind support. This support funds many of our permanent staff, as well as our seasonal technicians. We appreciate the valuable collaborations with our academic, research, and interagency partners who contribute expertise and vision to many aspects of our programs.

We deeply value the safe and skilled piloting from Mark Packila of Wildlife Air, Jim Pope and team of Leading Edge, and Troy Woydziak and Wayne Huey of Baker Aviation. We thank Justin Duffy, Brad Schultz, and their hounds for their skill and dedication toward safe and effective cougar collaring. We thank Jeff Reed of Grizzly Systems for his generous time and knowledge surrounding bioacoustics research. We would not be able to learn and teach others about YNP wildlife without all the aforementioned people and their exceptional skills. Lastly, we also appreciate the efforts of Charissa Reid for her many years of editing and formatting our past reports.

Seasonal Technicians in 2025.

Name	
Caleb Basa	660
Hannah Butkiewicz	360
Vinny Gugliotti	300
Arthur Ingraham	300
Daralynn James	300
Louis Kreemer	300
Kole Meinhart	860
Jackman Mitchell-Robohm	360
Ellie Mondloch	660
Rosemarie Pugh	360
Nick Peterson	820
Larissa Saarl	300
Natalie Sharp	300
Ruby Shipf	520
Kirsten Terkildsen	360
Zoë Ward	660

Back page: A group of adult female elk traverse the snowy landscape in the Gardner Basin near the YNP north entrance. The area is excellent winter ungulate habitat. (K. Cassidy photo)

For more information, please visit:
www.nps.gov/yell/learn/management/wolf.htm
&
www.nps.gov/yell/learn/nature/wolf.htm



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