Washington Gray Wolf Conservation and Management 2023 Annual Report

A cooperative effort by the Washington Department of Fish and Wildlife, Confederated Tribes of the Colville Reservation, Spokane Tribe of Indians, Yakama Nation, Swinomish Indian Tribal Community, and U.S. Fish and Wildlife Service

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This report presents information on the status, distribution, and management of wolves in the State of Washington from Jan. 1, 2023 through Dec. 31, 2023.

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Cover photo by WDFW Statewide Wolf Biologist Trent Roussin.

Executive Summary

Overview

Each year, the Washington Department of Fish and Wildlife (WDFW) submits a report to the federal government for Endangered Species Act (ESA) Section 6 activities. This document details the results of its annual gray wolf (*Canis lupus*) population survey and summarizes wolf recovery and management activities from the previous year.

Washington's wolf population was virtually eliminated in the 1930s but has rebounded since 2008, when a resident pack was documented in Okanogan County. Since then, the number of wolves has increased to a minimum of 260 wolves reported in 2023. Packs range across public and private land in Ferry, Stevens, and Pend Oreille counties in the northeast corner of the state and Asotin, Garfield, Columbia, and Walla Walla counties in southeast Washington, and increasing numbers are present in Okanogan, Chelan, and Kittitas counties in the Northern Cascades Recovery area. Although the first pack to recolonize the South Cascades and Northwest Coast recovery region only had one wolf during the year end counts in 2023, we have observed multiple collared wolves cross I-90 in the last year, which likely means it is only a matter of time before new packs begin to establish in that recovery region.

Gray Wolves' Legal Status

Gray wolves have been classified as endangered in all or part of Washington since federal lawmakers enacted the ESA in 1973. In 2011, the U.S. Fish and Wildlife Service (USFWS) ended ESA protection for wolves in the eastern third of the state but preserved it for those in the western two-thirds. Under state law, wolves were listed as endangered in 1980.

Washington's wolf recovery activities are guided by the Wolf Conservation and Management Plan, adopted in 2011 by the Washington Fish and Wildlife Commission. Under the plan, Washington is divided into Recovery Regions: Eastern Washington, the Northern Cascades, the Southern Cascades and Northwest Coast. In addition, a WDFW-approved protocol sets forth criteria for the Department to collaborate with livestock producers to minimize conflicts with wolves.

WDFW had lead wolf management authority in the Eastern Washington recovery region, and the USFWS had the lead role in the other two recovery regions up until January 2021. Wolves that inhabit tribal lands in the Eastern Washington recovery region are managed by those specific tribal entities. In January 2021, wolves were federally delisted from the Endangered Species Act and were managed by WDFW as a state endangered species. Then on February 10, 2022, wolves were federally relisted in the western two-thirds and USFWS resumed the lead role in the recovery of wolves in the North Cascades and the Southern Cascades and Northwest Coast recovery regions. Gray wolves outside of the Northern Rocky Mountain population are protected under the ESA as threatened in Minnesota and endangered in the remaining states.

USFWS conducted an extensive peer-reviewed assessment using the best available data from federal, state, and tribal sources, academic institutions, and the public. On February 2, 2024, USFWS announced that the Northern Rocky Mountain Distinct Population Segment (DPS) is not a listable entity because it is not markedly separate from other wolf populations and is therefore not warranted for listing. They found that the Western United States is a listable entity; however, the DPS does not meet the definition of threatened or endangered. This finding was not action-forcing thus the legal status of wolves did not change as a result of this finding. Additionally, on February 2, 2024, USFWS announced that they will develop a national Recovery Plan for wolves in the lower 48 states for the first time.

Wolf Recovery and Management in 2023

Key developments in 2023 included:

- The state's minimum year-end wolf population increased again for the 15th year in a row. As of Dec. 31, 2023, WDFW and Tribes counted 260 wolves (20% increase) in 42 packs in Washington State. Twenty-five of these packs were successful breeding pairs. These numbers compare with the previous year's count of 216 wolves in 37 packs and 26 breeding pairs. As in past years, survey results represent minimum counts of wolves in the state due to the difficulty of accounting for every animal – especially lone wolves without a pack.
- Pack sizes (number of individuals in a pack) ranged from two to eleven wolves. Most packs contained four to six individuals.
- Since the first WDFW survey in 2008, the state's wolf population has grown by an average of 23% per year.
- State, federal, and tribal biologists captured 33 wolves from 22 different packs and monitored a total of 52 unique radio-collared wolves from 25 different packs and 3 single wolf territories in 2023.
- Six new packs formed or reestablished in 2023 including Beaver Creek pack in Okanogan County, the Skookum pack in Pend Oreille County, Ruby pack in Stevens County and the Dollar Mountain, Nason, and Scatter packs in Ferry County that overlap portions of the Confederated Tribes of the Colville Reservation (CTCR).
- The Smackout pack completely disbanded in 2023 (likely due to mortality) in Stevens County.
- Three areas were documented with just one wolf maintaining a territory in Washington including the former Teanaway pack area, the former Naneum pack area, and the former Big Muddy pack area.
- Eleven wolves were documented dispersing from their pack territories in 2023. This represents 21% of the collared wolves monitored during the calendar year.

- Each year's population total reflects population losses and population gains. WDFW documented 36 wolf mortalities during 2023 (Table 1), including two removed by the Department in response to wolf-livestock conflict, five killed by vehicles, one killed caught in the act of depredating on livestock, one of natural causes (killed by a cougar), one unknown, 22 legally harvested by tribal hunters (CTCR hunters), and four mortalities from unlawful take still under investigation.

- Wolf populations are managed to ensure progress toward the recovery goals established in WDFW's 2011 Wolf Conservation and Management Plan. Guidance from the plan states that the Department will minimize the loss of cattle and other livestock without undermining the long-term prospects for the recovery of a self-sustaining wolf population.

- WDFW investigators documented 23 depredation events and determined ten cattle (primarily calves) and two miniature donkeys were confirmed killed by wolves, and three cattle and one alpaca were probably killed by wolves. Also, seven cattle and one miniature donkey (later killed in a separate depredation event) were confirmed injured by wolves in 2023. A colt horse, one cow, and a dog were probably injured by wolves. Nine of the 42 (21%) known packs that existed in Washington at some point during 2023 were involved in at least one confirmed or probable livestock injury or mortality (Fig. 10). However, seven of the nine packs associated with livestock depredations were involved in two or less events each. Seventy-nine percent of known packs were not involved in any known livestock depredation (including probable depredations) even though many of the pack territories overlap livestock operations.

- During calendar year 2023, WDFW spent a total of $1,611,412 on wolf management activities, including $84,686 for Damage Prevention Cooperative Agreements for Livestock (DPCAL), $164,102 for Contracted Range Riders, $28,596 for livestock loss claims, $31,602 for lethal removal operations in response to depredations on livestock, and $1,302,426 for wolf management and research activities.

Acknowledgments

Wolf management in Washington is a cooperative effort by the Washington Department of Fish and Wildlife (WDFW), Confederated Tribes of the Colville Reservation (CTCR), the Spokane Tribe of Indians (STOI), Swinomish Indian Tribal Community, Yakama Nation, and the U.S. Fish and Wildlife Service (USFWS).

WDFW personnel who played a primary role during 2023 include WDFW Director Kelly Susewind, Wildlife Program Director Eric Gardner, Deputy Assistant Director of Wildlife Mick Cope, Game Division Manager Anis Aoude, Statewide Wolf Specialist Benjamin Maletzke, Wolf Biologist Trent Roussin, Wolf Biologist Gabriel Spence, Conflict Section Manager Jim Brown, Endangered Species Recovery Section Manager Julia Smith, and Chief Scientist Donny Martorello. Other WDFW personnel who assisted with wolf recovery and management efforts in Washington included Chris Anderson, Mike Atamian, Staci Lehman, Rich Beausoleil, Candace Bennett, Stefanie Bergh, Erin Wampole, Callie Moore, Eric Boyd, Joe Bridges, Jeff Burnham, Colleen Chandler, Treg Christopher, Jason Day, Jason Earl, Chris Erhardt, Severin Erickson, Scott Fitkin, Ellen Heilhecker, Jeff Heinlen, Eric Holman, Todd Jacobsen, Emily Jeffreys, Johnna Eilers, Sandra Jonker, Brian Kertson, Sarah Garrison, Doug King, Keith Kirsch, Mike Kuttel, Jr., Will Smith, Tyler Bahrenburg, Tony Leonetti, Mike Livingston, Brendan Oates, Carlo Pace, Corey Peterson, Courtney Nasset, Brent Scherzinger, Carrie Lowe, Kristin Mansfield, Joey McCanna, Troy McCormick, Matt Monda, William Moore, Paul Mosman, Bryan Murphie, Steve Pozzanghera, Annemarie Prince, Grant Samsill, Mike Sprecher, Kevin Robinette, Tucker Seitz, Nicole Stephens, Seth Thompson, Michelle Tirhi, Maci Todd, Justin Trautman, Ben Turnock, Mark Vekasy, Robert Waddell, Jeff Wade, Reagan Harris, Matthew Brinkman, Kevin O'Conner, Steve Wetzel, Marcus Leuck, Kyla West, Paul Whelan, Carly Wickhem, Paul Wik, Andrew Kolb, and Fenner Yarborough.

Other agencies also played a key role in wolf management efforts in Washington. In particular, we would like to thank personnel from the USFWS including Abby Sage, Tara Callaway, Brad Thompson, Manisa Kung, and Mike Munts; CTCR personnel including Sam Rushing, Rose Piccinini, and Corey Peone; STOI personnel including Derek Abrahamson and Savanah Walker; Yakama Nation personnel including Mark Nuetzmann, Kristi Olney, Casey Heemsah, Leon Ganuelas; Swinomish Indian Tribal Community personnel including Brandon Nickerson and Leslie Parks, the U.S. Forest Service including Elizabeth Berkley, Melissa Hunt, Mike Borysewicz, John Chatel, Travis Fletcher, Monte Kuk, Ray Robertson, David Topolewski, and Aja Woodrow; the Washington Department of Natural Resources including Paul Jensen, Dan Boyle, Matt Fromherz, Andrew Hayes, Eric Krausz; the National Park Service including Roger Christophersen, Jason Ransom, Vicki Gempko, and Jack Oelfke; Roblyn Brown from Oregon Department of Fish and Wildlife; the U.S. Air Force including Todd Foster and Major J.B. Marshal; Jeff Flood from the Stevens County Sheriff's Office; Dan Thornton from Washington State University; Sarah Bassing, Lauren Satterfield, Taylor Ganz, Beth Gardner, Aaron Wirsing and Sarah Converse from the University of Washington; and TJ Gooliaf and Luke Vander Vennen of British Columbia Ministry of Forests, Lands, and Natural Resource Operations.

We also sincerely appreciate the safe piloting and aerial telemetry skills of Dave Parker of Northern Air (Bonners Ferry, ID), Doug Uttecht of Northwest Helicopters (Olympia, WA) and Brandon Arago from Rotorhead Helicopters, LLC.

Finally, we could not list every person who contributed to wolf recovery and management efforts in Washington during 2023. We thank all who participated, particularly private landowners, for their access and cooperation and the many people who provided wolf observation reports.

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Introduction

Background

Historically, gray wolves (*Canis lupus*) were common throughout much of Washington, but their numbers began to decline as the human population increased after 1850. Due to high mortality from increased prices for hides, bounties, and government-sponsored predator control programs, wolves were believed to be extirpated from Washington by the 1930s. People reported seeing wolves sporadically over the next several decades, and reports increased in the 1990s and early 2000s, but no resident packs were documented.

Wolves that dispersed from growing populations in Idaho, Montana, and British Columbia, Canada were likely responsible for confirmed reports of wolves in northern Washington after 1990. However, the first resident pack in the state since the 1930s was not documented until 2008 in Okanogan County in north-central Washington. Since that time, wolves have continued to naturally recolonize the state by dispersing from resident Washington packs and neighboring states and provinces.

Definitions – "Pack" and "Breeding Pair"

Two terms often used when discussing gray wolves and wolf management are "pack" and "breeding pair."

A "pack" is defined as two or more wolves traveling together in winter and is primarily used to evaluate the number of wolves on the landscape. A "breeding pair" is defined as at least one adult male and one adult female wolf who raised at least two pups that survived until December 31 (Wiles et al. 2011) and is used to reflect reproductive success and recruitment. In any given year, there could be at least as many packs as breeding pairs.

Federal Status

The status of gray wolves under federal law has been debated and litigated for many years, and the level of protection for the species has changed several times. Since 2011, wolves in the eastern third of Washington have not been listed under the ESA but are classified as endangered under state law (see discussion below). Gray wolves were federally listed in the western two-thirds of the state until January 4, 2021, but were re-listed in February 2022.

Gray wolves in Washington initially received federal protection in 1973, when Congress passed the ESA. The 1987 Northern Rocky Mountain Wolf Recovery Plan addressed gray wolves in Idaho, Montana, and Wyoming, but did not include Washington. In 2007, the USFWS published a final rule, which included wolves from the eastern third of Washington and Oregon and those from the three states in the Northern Rocky Mountain populations (known as a "Distinct Population Segment" or DPS). The eastern third of Washington was included in the DPS designation to account for dispersing wolves from Idaho and Montana populations. However, federal recovery requirements have applied only to the three

states addressed in the 1987 recovery plan, and no federal wolf recovery requirements were developed for Washington.

In 2009, the USFWS published a final rule to remove the Northern Rocky Mountain DPS, excluding Wyoming, from protection under the ESA. However, the rule was blocked the following year by a federal judge whose action restored federal protections.

The situation changed again in 2011, when federal lawmakers directed the Secretary of the Interior to reissue the 2009 delisting rule. As a result, wolves in the Northern Rocky Mountain DPS, including the eastern third of Washington, were once again removed from ESA protection. Throughout this time, wolves in the western two-thirds of the state remained classified as 'endangered' under the ESA (Fig. 1).

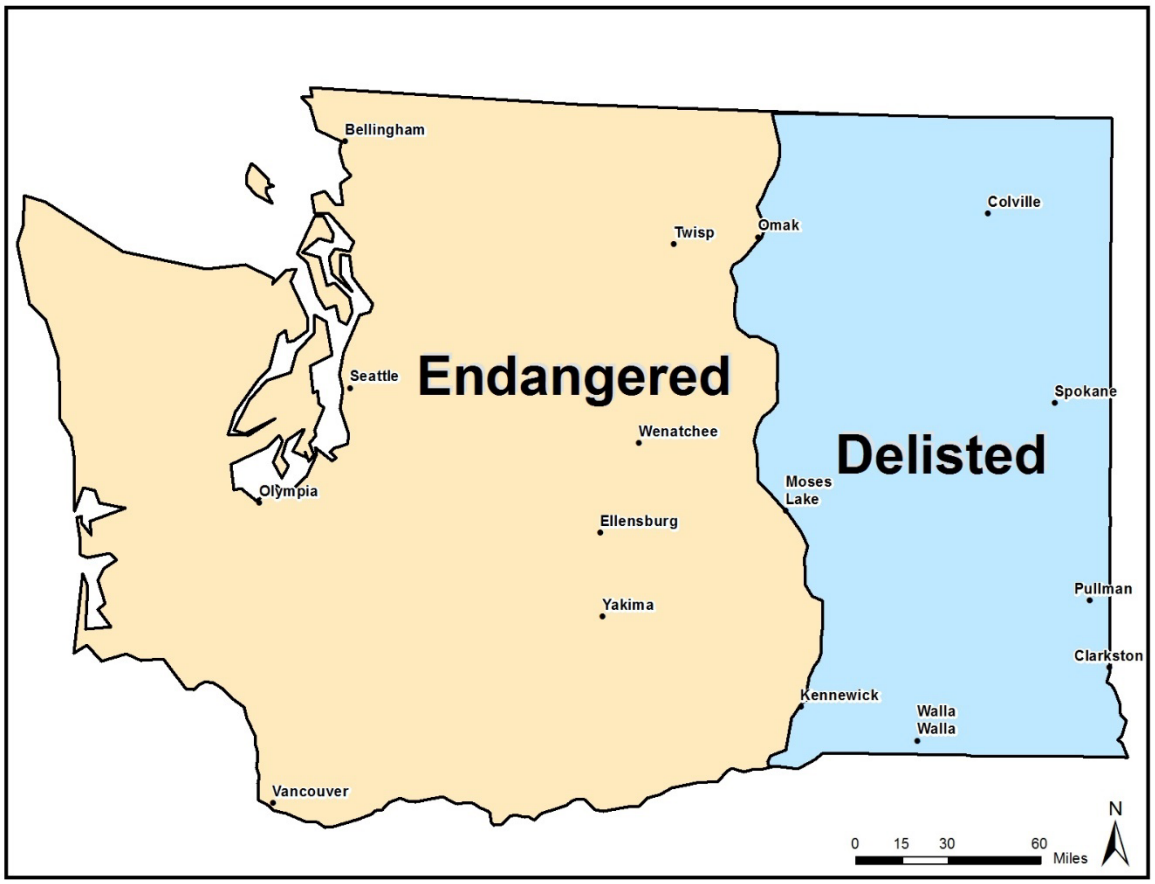

Figure 1. Federal classification of wolves in Washington State from 2011-2021. Wolves were Federally delisted in Washington in 2021 but re-listed in the Western 2/3 of Washington in February 2022.

In 2013, the USFWS issued a proposed rule (Federal Register, Vol 78, No. 114) to end ESA protection for gray wolves including those in the western two-thirds of Washington by removing them from the list of endangered and threatened wildlife. Further, the proposed rule would maintain endangered status for

the Mexican wolf (*Canis lupus baileyi*) and would reclassify the Eastern wolf (*Canis lupus lycaon)* from a subspecies of the gray wolf to a separate species (*Canis lycaon*).

The USFWS subjected the proposed rule to an independent expert peer review managed by the National Center for Ecological Analysis and Synthesis. The peer review was designed to evaluate the proposed rule and determine if the best available science was used to evaluate the status of gray wolves. After the peer review was published in early 2014, USFWS reopened the public comment period to allow for public input on the results of the peer review. However, that same year the United States District Court for the District of Columbia vacated the final rule that removed ESA protections from the gray wolf in the western Great Lakes. The 2012 decision to delist gray wolves in Wyoming was also vacated by the U.S. District Court for the District of Columbia. Because the 2013 proposal to delist the remaining listed portions of the gray wolf in the United States and Mexico relied in part on these two subsequently vacated final rules, in 2015 the USFWS only finalized the portion of the rule listing the Mexican wolf as an endangered subspecies.

On March 15, 2019, the USFWS published a proposed rule (Federal Register, Vol 84, No. 51) to remove the gray wolf from the List of Endangered and Threatened Wildlife. The USFWS proposed this action because the best available scientific and commercial information indicated that the listed gray wolves no longer met the definitions of a threatened species or endangered species under the ESA due to recovery. On January 4, 2021, wolves in Washington State were delisted from the Federal Endangered Species Act statewide, and their federal status was consistent across the state in 2021. This changed again on February 10, 2022, with a court ruling to federally relist wolves in the continental U.S. outside of the Northern Rocky Mountain DPS. Gray wolves outside of the Northern Rocky Mountain DPS are now protected under the ESA as threatened in Minnesota and endangered in the remaining states. During the time when gray wolves were delisted between January 4, 2021 and February 10, 2022, USFWS received petitions to list wolves as threatened or endangered under the ESA, including a petition to list the Northern Rocky Mountain DPS or the Western United States as a DPS and another petition to list wolves in many western states. In response to these petitions, USFWS conducted an extensive peer-reviewed assessment using robust modeling that incorporated the best available data from federal, state, and Tribal sources, academic institutions and the public. On February 2, 2024, USFWS announced a not warranted finding based on the results from that analysis. The analysis indicates that wolves are not at risk of extinction in the Western United States now or in the foreseeable future. Specifically, they found that the Northern Rocky Mountain DPS is not a listable entity because it is not markedly separate from other wolf populations and is therefore not warranted for listing. They found that the Western United States is a listable entity; however, the DPS does not meet the definition of threatened or endangered. This finding was not action-forcing thus the legal status of wolves did not change as a result of this finding. Additionally, on February 2, 2024, USFWS announced that they will develop a national Recovery Plan for wolves in the lower 48 states for the first time.

State Status

In 2007, anticipating dispersal of wolves into Washington from surrounding states and provinces, and the likely formation of resident packs, the Washington Department of Fish and Wildlife (WDFW)

initiated development of a state Wolf Conservation and Management Plan for Washington (Plan). Assisted by an 18-member working group comprised of stakeholders, the WDFW plan was adopted in December 2011 by the state Fish and Wildlife Commission (Commission).

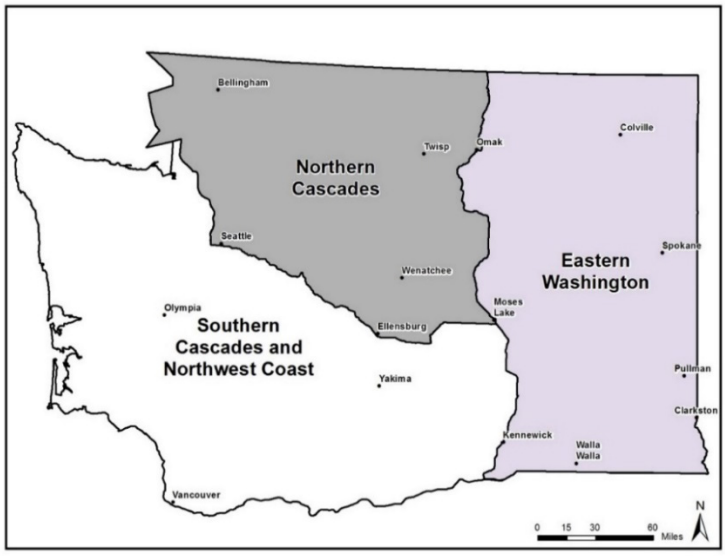

Figure 2. Washington wolf recovery regions as defined in the 2011 Wolf Conservation and Management Plan.

At present, wolves are classified as endangered under state law (WAC 220-610-010) throughout Washington, regardless of their federal ESA classification. State law RCW 77.15.120 protects endangered species from hunting, possession, malicious harassment, and killing; and penalties for illegally killing a state endangered species range up to $5,000 and/or one year in jail.

The Plan designates three recovery regions: Eastern Washington, the Northern Cascades, and the Southern Cascades and Northwest Coast (Fig. 2). Before January 4th, 2021, WDFW was the primary agency responsible for managing wolves in the Eastern Washington recovery region and worked as a designated agent of the USFWS under Section 6 of the federal ESA in the other two recovery regions. In 2021, WDFW was the primary agency responsible for managing wolves statewide except on tribal lands. Tribal governments manage wolves that inhabit their tribal lands in each of the recovery regions. As a result of a February 10, 2022 federal court decision, the North Cascades and Southern Cascades and Northwest Coast recovery regions fell back under USFWS jurisdiction. The Eastern recovery region is currently under WDFW management jurisdiction.

WDFW periodically reviews classification of species under state law. In considering the appropriate classification for gray wolves under WAC 220-610-110, the Commission will assess whether the species meets the definition of “endangered,” “threatened,” or “sensitive.”

- "Endangered" means any wildlife species native to Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state.

- "Threatened" means any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.
- "Sensitive" means any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats.

The Commission's consideration of possible down- or delisting will also evaluate whether gray wolves are in danger of failing, declining, are no longer vulnerable, and/or whether the recovery plan goals have been met. A periodic status review of wolves was drafted in February 2024 and based on their current population trends and biological status, WDFW staff recommended wolves be downlisted to Sensitive status. This recommendation is currently under review by the Commission.

The Plan contemplates down-listing of gray wolves under the following terms:

- They could be reclassified from endangered to threatened when six successful breeding pairs are present for three consecutive years, with two successful breeding pairs in each of the three recovery regions.
- They could be reclassified from threatened to sensitive status when 12 successful breeding pairs are present for three consecutive years, with four successful breeding pairs in each of the three recovery regions.

The Plan anticipates full delisting under two possible scenarios:

- When at least four successful breeding pairs are present in each recovery region and there are three additional breeding pairs anywhere in the state for three consecutive years; or
- When there are at least four successful breeding pairs in each recovery region and six additional breeding pairs anywhere in the state for a single year.

Funding

During calendar year 2023, WDFW spent a total of $1,611,412 on wolf management activities, including $84,686 for Damage Prevention Cooperative Agreements – Livestock (DPCA-L) non-lethal conflict prevention expenses (range riding, specialized lighting and fencing, etc.), $164,102 for WDFW contracted range riders, $28,596 to claims for livestock losses caused by wolves, $31,602 for lethal removal operations in response to depredations on livestock, and $1,302,426 for wolf management and research activities.

Funds came from additional fees for personalized license plates (55%), state general fund apportionments (24%), unrestricted state wildlife funds (19%), and wolf livestock conflict funds (2%).

Population Monitoring

Monitoring Techniques

Biologists use a variety of monitoring techniques to evaluate pack size and reproductive success, identify pack territories, monitor movements and dispersal events, identify new areas of possible wolf activity, and mitigate conflicts with livestock. Wolf monitoring activities occur year-round and may include direct observational counts from either the ground or the air, track surveys, and remote camera surveys. However, it is always possible that some wolves were present in surveyed areas but evaded detection.

WDFW and tribal partners use a combination of the techniques described above to derive a **minimum number** of wolves known to exist at the end of each calendar year. Thus, documentation of total wolf numbers and reproductive success (e.g., breeding pair status) is conservative and the total number of wolves in Washington is likely higher.

The annual survey includes lone wolves when reliable information is available. However, because lone or dispersing wolves are difficult to document and account for 10% to 15% of the known winter population (Mech and Boitani 2003[1]), WDFW multiplies the minimum documented count by 12.5% to account for solitary wolves on the landscape.

Population Status and Distribution

The number of packs in Washington increased again in 2023 with a resulting increase of 44 wolves for the state's minimum year-end wolf population. As of December 31, 2023, WDFW and Tribal partners counted 260 wolves and 42 packs. Twenty-five of these packs were considered successful breeding pairs in 2023. These numbers compare with 216 wolves in 37 packs, and 26 breeding pairs one year earlier. Because these are minimum counts, the total number of wolves in Washington is likely higher.

Compared to 2022, the number of individual wolves (Fig. 3) increased by 20% and the number of packs (Table 1, Fig. 4) increased by five (14%). Additionally, twenty-five packs were confirmed to be successful breeding pairs as of the end of 2023 and this was a decrease of 4% (Table 1, Fig. 5). Pack size ranged from two to eleven individuals and averaged 5.2 wolves per pack (SD ± 3.1, n=42).

The Eastern recovery region and the North Cascades recovery region exceeded the minimum recovery goals (four successful breeding pairs for three consecutive years) set for the individual region by the Plan because it has had greater than four breeding pairs for greater than three consecutive years. During 2023, the Eastern Recovery region had 33 packs, 20 of which were considered successful breeding pairs. The North Cascades recovery region had nine packs, five of which were considered successful breeding

[1] Mech, L.D. and L. Boitani. 2003. Wolves: Behavior, Ecology, and Conservation. The University of Chicago Press. Chicago, Illinois, USA.

pairs. This region has maintained a minimum of four successful breeding pairs for three consecutive years and continues to meet recovery objectives.

WDFW had documented the first resident pack in the Southern Cascades and Northwest Coast recovery region in 2022; however, one of those wolves went missing and the pack is now down to only one wolf maintaining a territory and no longer meets the definition of a pack. WDFW is currently monitoring two collared male wolves that dispersed into the Southern Cascades.

To reach statewide recovery objectives for wolves in Washington, the Southern Cascades and Northwest Coast would need a minimum of four successful breeding pairs while the other two regions maintain a minimum of four successful breeding pairs and at least six additional successful breeding pairs located anywhere in the state.

Additional findings from the 2023 population survey include the following:

- The Big Muddy, the first pack to establish in the South Cascades and Northwest Coast recovery region and named by the Yakama Nation, no longer meets the definition of a pack but still has one wolf maintaining a territory.
- The Ruby pack reestablished in Pend Oreille and Stevens Counties when members of the Dirtyshirt pack split off, produced a litter of pups and occupied a territory adjacent to the Dirtyshirt pack.
- CTCR Biologists confirmed the reestablishment of the Nason pack on tribal lands in Okanogan County and confirmed the Dollar Mountain pack as a new pack primarily on tribal lands in Ferry County.
- The Skookum pack was reestablished in Pend Oreille County.
- The Beaver Creek pack reestablished in Okanogan County.
- A new pack, Scatter, was confirmed in Ferry and Okanogan Counties near Republic.
- A new pack, Couse pack (formerly called WA 139 Group) established in Asotin County.
- The Teanaway and Naneum territories were each occupied by single wolves and failed to meet the definition of a pack.
- After the breeding female of the Smackout pack was killed by a vehicle, that pack appeared to disband last summer and portions of that pack territory were taken over by the Onion, Dominion and Ruby packs.
- No wolves were located in the former Diobsud Creek territory during survey efforts over winter. It is unknown what happened to the wolf that had been occupying that territory.

Wolves continue to inhabit both public and private lands (Fig. 6), and 25 of the state's 42 packs (including CTCR packs) had at least one collared wolf during 2023. Data from these wolves were used to assist WDFW in defining pack territories. The average (mean) territory size was 311 square miles (807

square kilometers), ranging from an estimated 54.2 to 700.9 square miles (140.5 – 1,815.4 square kilometers).

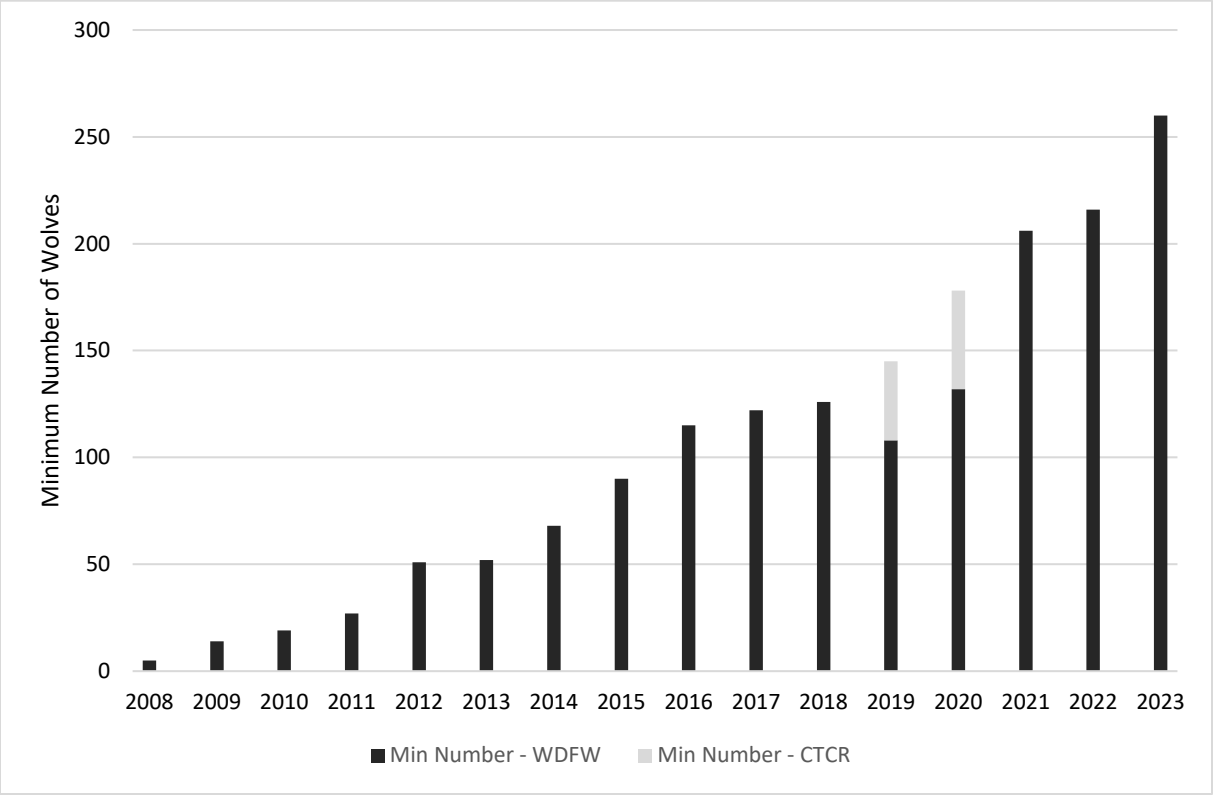

Figure 3. Minimum known number of wolves in Washington managed by Washington Department of Fish and Wildlife (WDFW), the Spokane Tribe, and the Confederated Tribes of the Colville Reservation (CTCR), 2008 – 2023. CTCR packs were monitored differently during 2019 and 2020. Numbers provided by CTCR in 2019 and 2020 reflect winter numbers incidentally gathered by biologists from hunters, trappers, and public observations. In 2021 the CTCR allocated focused efforts to count wolves using year-end track, aerial, and camera surveys similar to WDFW and Tribal partners.

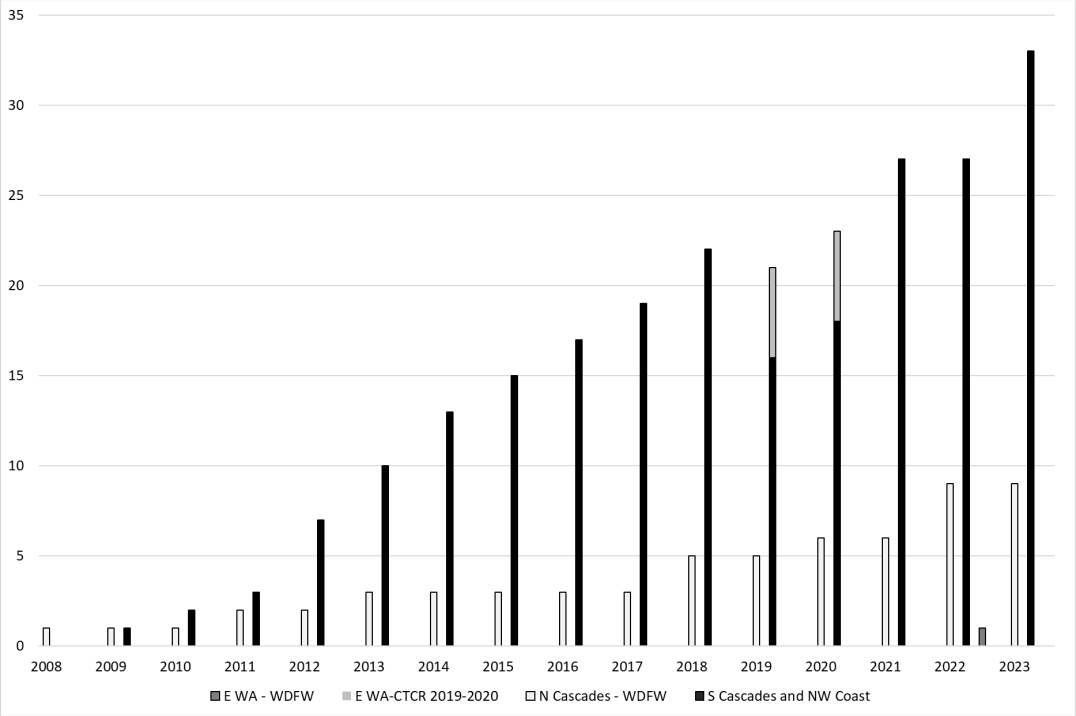

Figure 4. Minimum known number of packs by recovery region in Washington, 2008 – 2023. Wolf packs counted by Washington Department of Fish and Wildlife (WDFW), the Spokane Tribe, and Confederated Tribes of the Colville Reservation (CTCR). CTCR packs were monitored differently during 2019 and 2020.

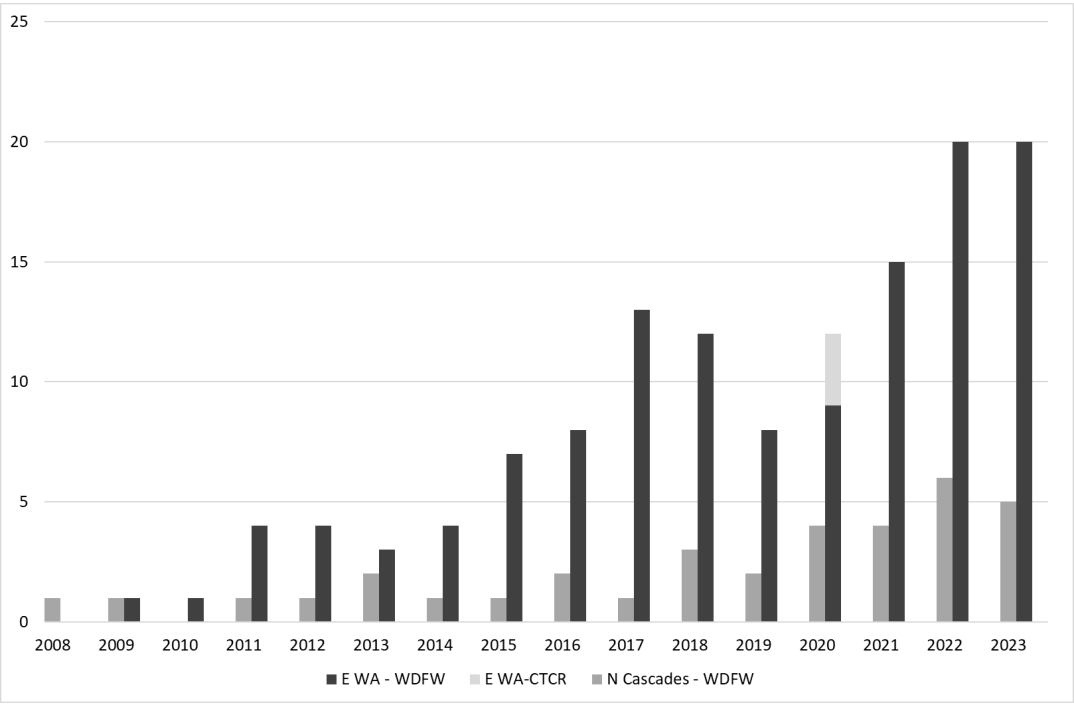

Figure 5. Minimum known number of successful breeding pairs by recovery region in Washington, 2008 – 2023. Confederated Tribes of the Colville Reservation (CTCR) did not count successful breeding pairs in 2019.

Table 1. Known wolf packs in Washington by recovery region, minimum pack size of known packs, documented mortalities, and the number of known wolves that dispersed in 2023. Underlined packs were counted as successful breeding pairs. CTCR = Confederated Tribes of the Colville Reservation. Harvest numbers were documented by CTCR and Spokane Tribe biologists.

	Recovery	Minimum Known	Documented Mortalities					Known
Wolf Pack	**Area**	**Pack Size Dec 2023**	**Natural**	**Human**	**Unknown**	**Harvest**	**Control**	**Dispersed**
Beaver Creek	E. Wash	2						
Butte Creek	E. Wash	6						
Carpenter Ridge	E. Wash	9						
Couse (former WA139 group)	E. Wash	5					2	
Columbia	E. Wash	3						1
Dirty Shirt	E. Wash	9						1
Dollar Mountain (CTCR)	E. Wash	10				1		
Dominion	E. Wash	4						
Five Sisters	E. Wash	4						
Frosty Meadows (CTCR)	E. Wash	11				1		
Grouse Flats	E. Wash	10						
Goodman Meadows	E. Wash	6						
Huckleberry	E. Wash	3		1				
Keller Ridge (CTCR)	E. Wash	10						
Leadpoint	E. Wash	7	1					1
Mt Spokane	E. Wash	2						
Nason Basin (CTCR)	E. Wash	2				6		
Nc'icn (CTCR)	E. Wash	9				3		
Onion Creek	E. Wash	10						
Ruby Creek	E. Wash	5						
Salmo	E. Wash	2						
Scatter	E. Wash	7				1		
Sherman	E. Wash	6						
Skookum	E. Wash	2						
~~Smackout~~	E. Wash	0		1				
~~Sprague~~	E. Wash	0						
Stranger	E. Wash	3		1				
Strawberry (CTCR)	E. Wash	8				5		
Togo	E. Wash	5						
Touchet	E. Wash	9						1
Tucannon	E. Wash	5						1
Vulcan	E. Wash	2		1				
Wedge	E. Wash	2						
Whitestone (CTCR)	E. Wash	6						1
Wilmont (CTCR)	E. Wash	2				1		

Table 1. Known wolf packs in Washington by recovery region, *continued*.

	Recovery	Minimum Known	Documented Mortalities					Known
Wolf Pack	**Area**	**Pack Size Dec 2023**	**Natural**	**Human**	**Unknown**	**Harvest**	**Control**	**Dispersed**
Chewuch	N Cascades	5						
Chopaka	N Cascades	4						
~~Diobsud Creek~~	N Cascades	0						
Lookout	N Cascades	10						
Loup Loup	N Cascades	5						2
Maverick	N Cascades	2						
~~Naneum~~	N Cascades	1						
Napeequa	N Cascades	2						
Navarre	N Cascades	3		3				1
Shady Pass	N Cascades	4						1
Sullivan Creek	N Cascades	7						
~~Teanaway~~	N Cascades	1						1
~~Big Muddy~~	S Cascades	1						
Misc/Lone Wolves	Statewide	29		4		4		
WASHINGTON TOTALS		260	1	11	0	22	2	11

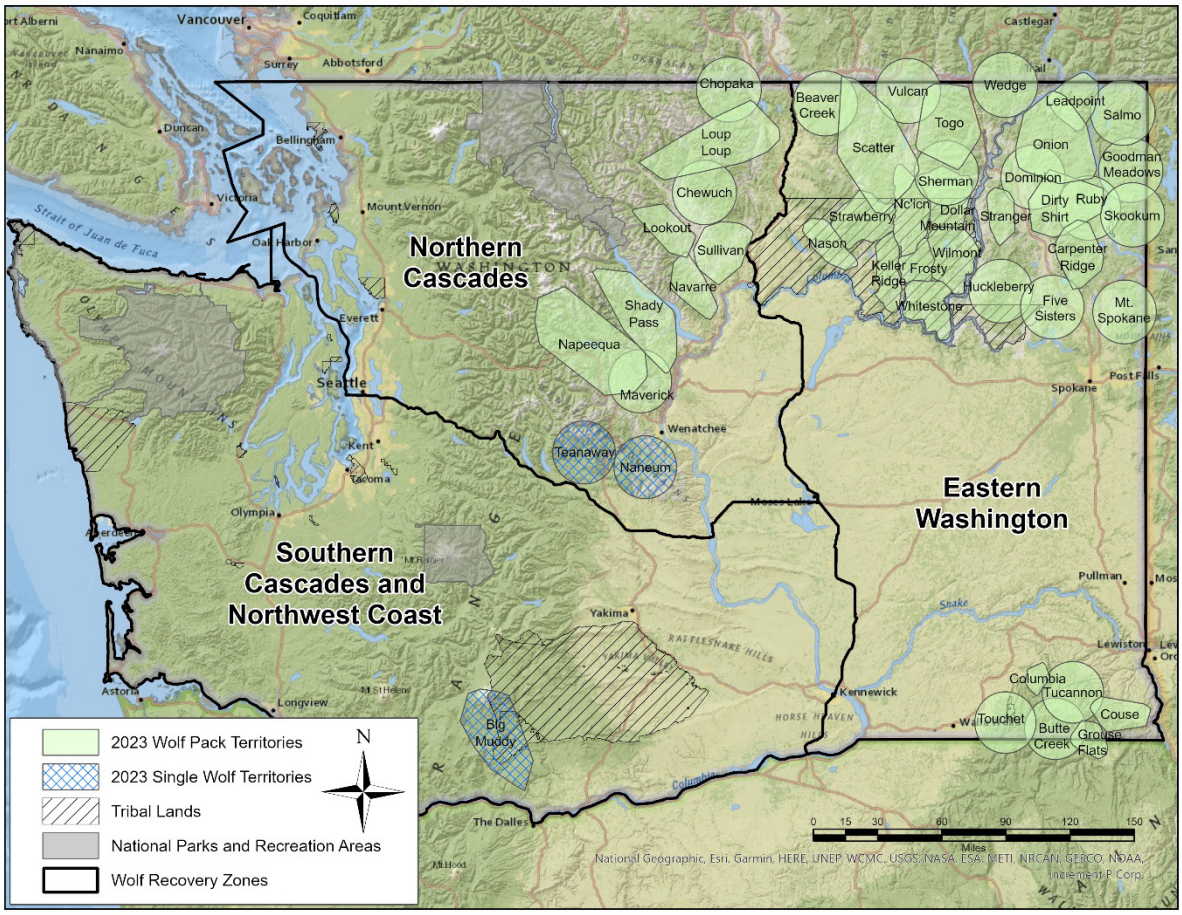

Figure 6. Known wolf packs and single wolf territories in Washington, 2023, not including unconfirmed or suspected packs or border packs from other states and provinces.

Wolf Captures and Monitoring

State, federal, and tribal biologists captured 33 wolves from 22 different packs in 2023. Of those, WDFW captured 16 males and 14 females including 20 adults, nine yearlings, and 1 pup. Eight of the wolves had been captured and marked in previous years. All wolves captured were fitted with either global positioning system (GPS) collars or very high frequency (VHF) radio collars.

Fifty-two radio-collared wolves were monitored from 25 different packs and 3 single wolf territories, representing 60% of the known packs in Washington. However, due to mortalities, dispersals, scheduled collar releases, and radio collar failures, only 37 radio-collared wolves (36 GPS, one VHF collars) from 15 packs were being monitored at the end of the year. This accounts for approximately 14% of the minimum known population from 15 different packs (36% of known packs) in Washington.

Known Dispersals

A dispersal occurs when a wolf leaves the pack territory where it was born (or previously resided) in search of a new pack or territory. Eleven wolves were documented dispersing from their pack territories in 2023 (Table 1, Fig. 7).

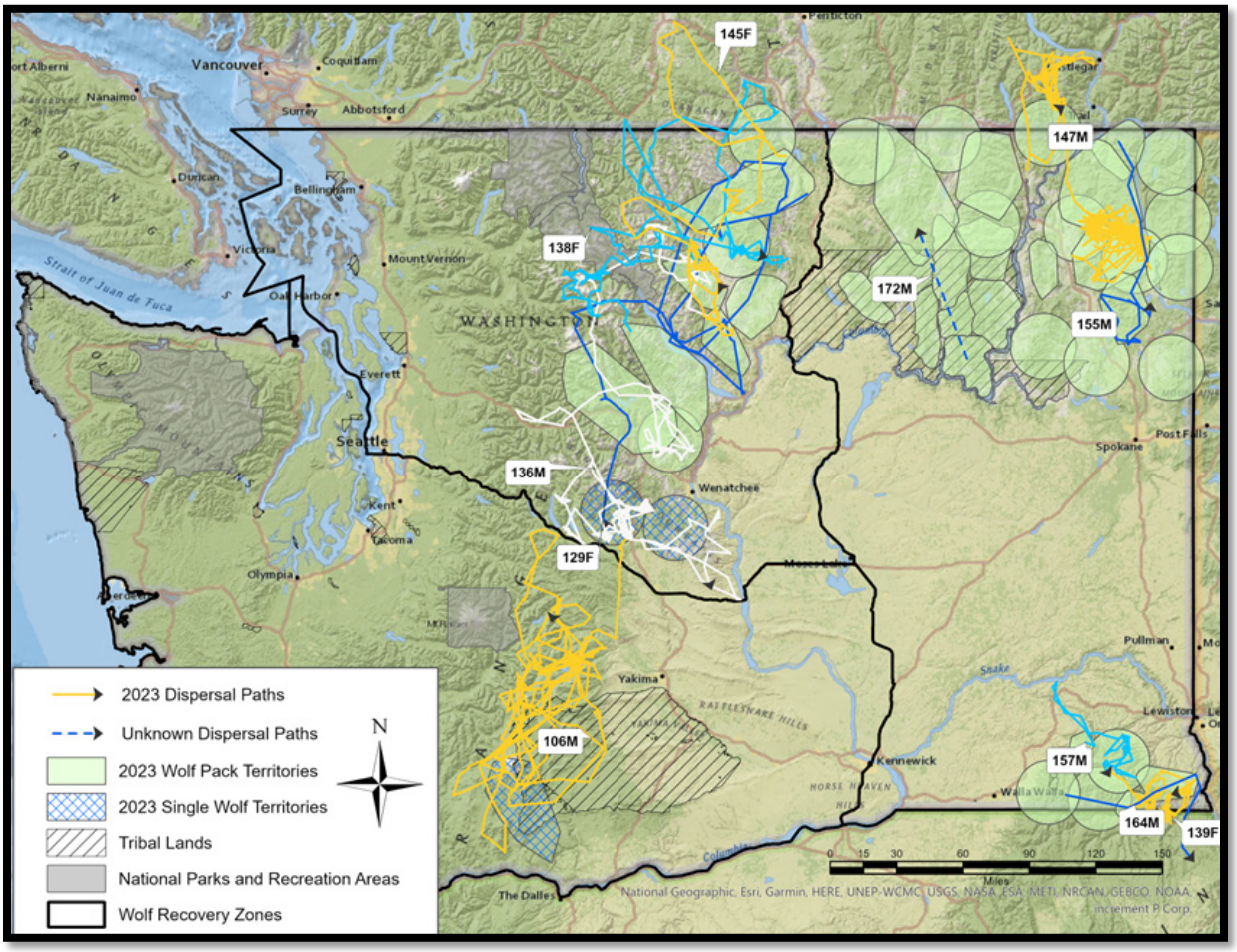

Figure 7. Generalized dispersal paths of collared wolves that dispersed from known wolf packs in Washington in 2023.

1.) 106M was collared in the Teanaway Pack Territory in June of 2020 as an adult and spent several years in the Teanaway pack. He was recollared in January 2023 in the Teanaway when the batteries on his collared were beginning to fail. He had spent much of summer and fall of 2022 alone in the Teanaway. He dispersed from the Teanaway to South Cascades in early summer and spent much of the summer into fall covering a large area likely searching for a mate. He was found dead in fall 2023 and is currently under investigation.

2.) 129F was collared in the Loup Loup pack territory in January 2022 as a pup. She dispersed from her natal pack in late spring 2023 as a 2-year-old. She headed south and was struck by a vehicle attempting to cross I-90 just west of Cle Elum.

3.) 136M was collared in the Navarre pack as a 2-year-old in May 2022. In summer of 2023 he dispersed south to the former Teanaway pack area and then moved east to the former Naneum pack area where he currently maintains a territory.

4.) 138F was collared in the Shady Pass pack as a yearling in May 2022. She dispersed in the summer of 2023 up into British Columbia and then wandered back north of Loup Loup pass where her collar stopped transmitting location data.

5.) 145F was collared in the Loup Loup pack territory as a yearling in January 2023. She dispersed north into British Columbia and then moved back south into the Lookout pack territory.

6.) 147M was collared in the Dirtyshirt pack territory as a yearling in January 2023. He dispersed to the Ruby pack territory over the summer and then dispersed again up to British Columbia.

7.) 157M was collared in the Columbia pack territory as a 3-year-old in May 2023. He dispersed to the Tucannon pack territory during the summer and the collar stopped transmitting location data.

8.) 164M was collared in the Touchet pack territory as a yearling in September 2023. He dispersed during fall to Oregon.

9.) 139F was collared in the Tucannon pack as a yearling in the June 2022. She dispersed with other members of the Tucannon pack and formed the Couse pack (former WA139 Group) in late January 2023.

10.) 155M was collared in the Leadpoint pack as a yearling in May 2023. He dispersed to the Carpenter Ridge pack area.

11.) 172M was collared in the Whitestone pack by the CTCR biologists. The collar stopped transmitting locations data, but we later recaptured him in the Scatter pack and replaced the old collar with a new functioning collar.

Regulated Harvest

Regulated wolf harvest occurs on CTCR tribal lands for tribal members only. In 2012, the CTCR established a hunting season for wolves in three wolf management zones on the “South Half” Reservation with an annual harvest limit of nine wolves, three wolves for each wolf management zones. In 2015 an additional wolf management zone was included allocating 12 wolves to be harvested within the four wolf management zones. With the development of the CTCR wolf management plan in 2016, the CTCR set wolf harvest limits for a recovering wolf population based off of 10% of the annual minimum known population at three wolves for the “South Half” of the Reservation. In September of 2018 the CTCR expanded their wolf hunting season with no annual harvest limit for both the North Half and South Half of the Colville Reservation. In 2019 new CTCR Tribal hunting regulations were created for 2019-2021, allowing for a year-round hunting season for wolves on both the North Half and South Half

Reservation. The current CTCR hunting regulations allow for the use of any legal weapon, harvest of either sex, and no daily or season limits. Trapping and snaring seasons run November 1 – February 28 (in 2024 this season had been extended to March 31) and include either sex harvest using any legal trap or snare and no daily or season limit. Harvested wolves are required to be sealed within 15 days of harvest or 15 days after the close of the trapping season, whichever comes first. CTCR reported harvesting a total of 22 wolves in 2023, 25% of the minimum known number of wolves on the CTCR. The CTCR Wolf Management Plan identifies a preferred harvest target of 24% for a recovered population. Twenty of the wolves were harvested on the "South Half" of the reservation and two wolves were harvested on the North Half.

Regulated wolf harvest is also allowed for tribal members on the Spokane Indian Reservation. Wolf seasons remain open year-round or until a maximum of 10 wolves are taken during the calendar year. Trapping and/or snaring is allowed by special permit only with a season from October 1 – February 28. The Spokane Tribe of Indians did not have any reported wolf harvested on the reservation.

No regulated harvest occurred in Washington outside of the CTCR or the North Half or Spokane Indian tribal reservation.

Mortalities

WDFW documented 36 wolf mortalities during 2023 (Table 1), including two removed by the Department in response to wolf-livestock conflict, five killed by vehicles, one killed while caught in the act of depredating on livestock, one of natural causes (killed by a cougar), one unknown, 22 legally harvested by tribal hunters (CTCR hunters), and four mortalities from unlawful take still under investigation.

The investigations into the unlawful take of a wolf from the Smackout Pack and Wedge Pack in 2021 have reached the statute of limitations and the investigations are closed. The investigation into the unlawful poisoning of six wolves from the Wedge Pack in 2022 has also reached the statute of limitations and the investigation is closed. The remaining investigations into the unlawful take of a wolf/wolves remain open and are active investigations.

Management

Livestock Depredations

Reports of wolf-caused livestock depredations are classified as confirmed, probable, confirmed non-wolf (domestic dog, cougar, bear, etc.), unconfirmed depredation, non-depredation, or unconfirmed cause of death. Specific criteria for these classifications are outlined in the Plan.

Reports of wolf depredations on livestock are investigated by WDFW personnel with assistance, as needed, from USFWS staff and local county officials and sheriffs' department personnel. In 2023, investigators confirmed that wolves were responsible for killing 10 cattle (nine calves and one adult cow), and two miniature donkeys. Wolves were also confirmed to have injured seven cattle (three adult, four calves) and one miniature donkey that was killed later in another depredation event (Fig. 8, Table 2). Additionally, wolves probably killed three calves and one alpaca and probably injured one dog, one colt horse, and one calf. Most mortalities occurred during the summer-fall grazing season from April through August (Fig. 9).

Livestock depredation statistics in this report are based on livestock injuries and mortalities reported by producers and investigated by WDFW. They do not include lost or missing livestock.

Number of Packs Involved in Livestock Depredations

Nine of the 42 known packs (21%) that existed in Washington at some point during 2023 were involved in at least one confirmed or probable livestock mortality or injury (Fig. 10). Seven of the nine packs associated with livestock depredations were involved in two or less events each. Seventy-nine percent of Washington's wolf packs were not involved in any known livestock depredations.

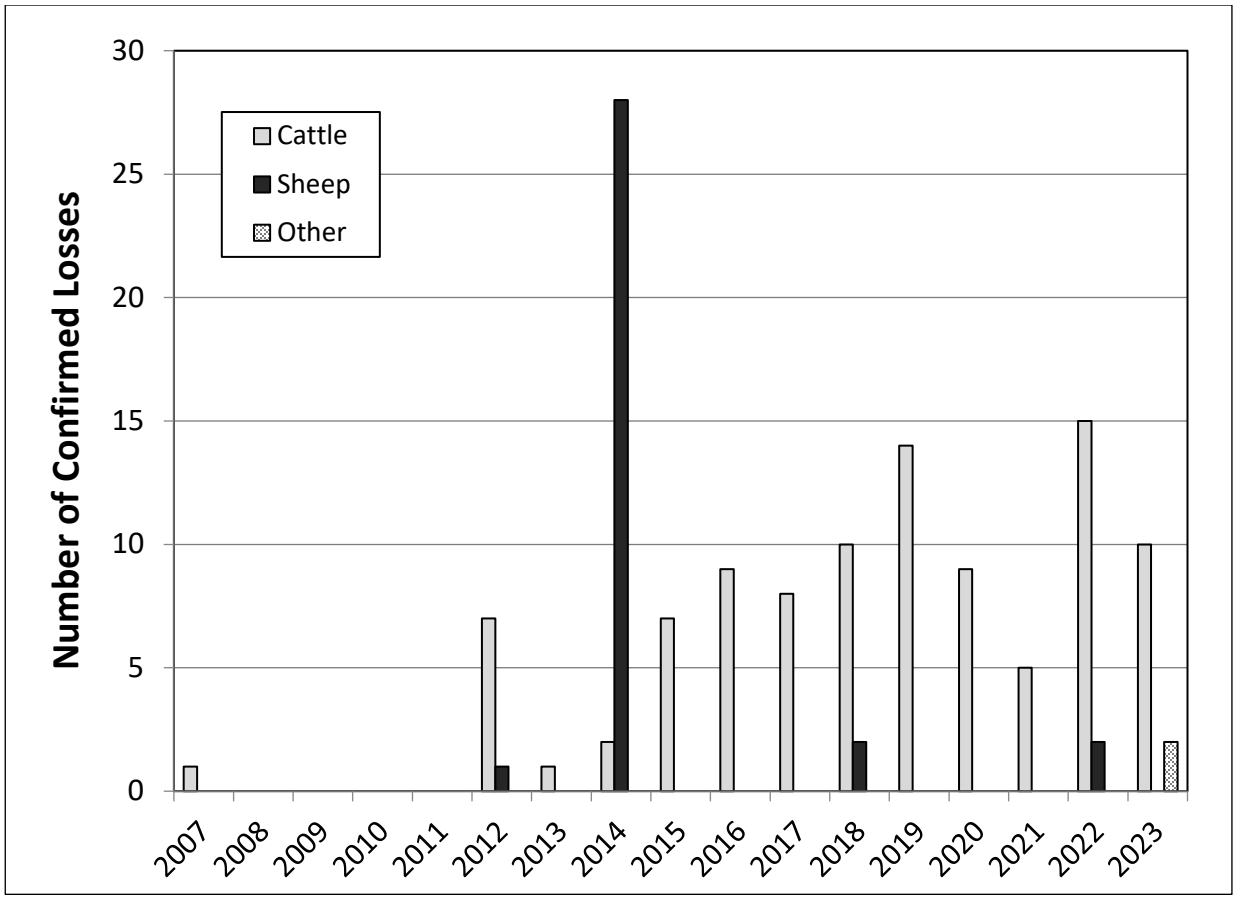

Figure 8. Total number of confirmed wolf-caused livestock mortalities in Washington, 2007-2023.

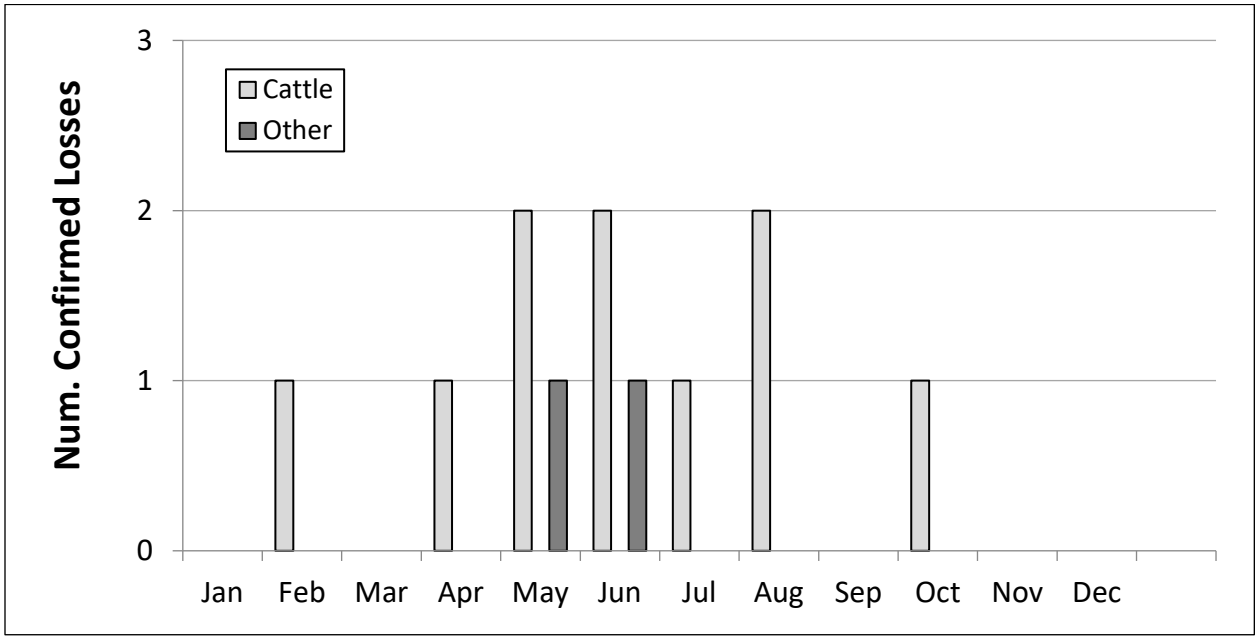

Figure 9. Number of confirmed wolf-caused livestock mortalities by month in Washington, 2023.

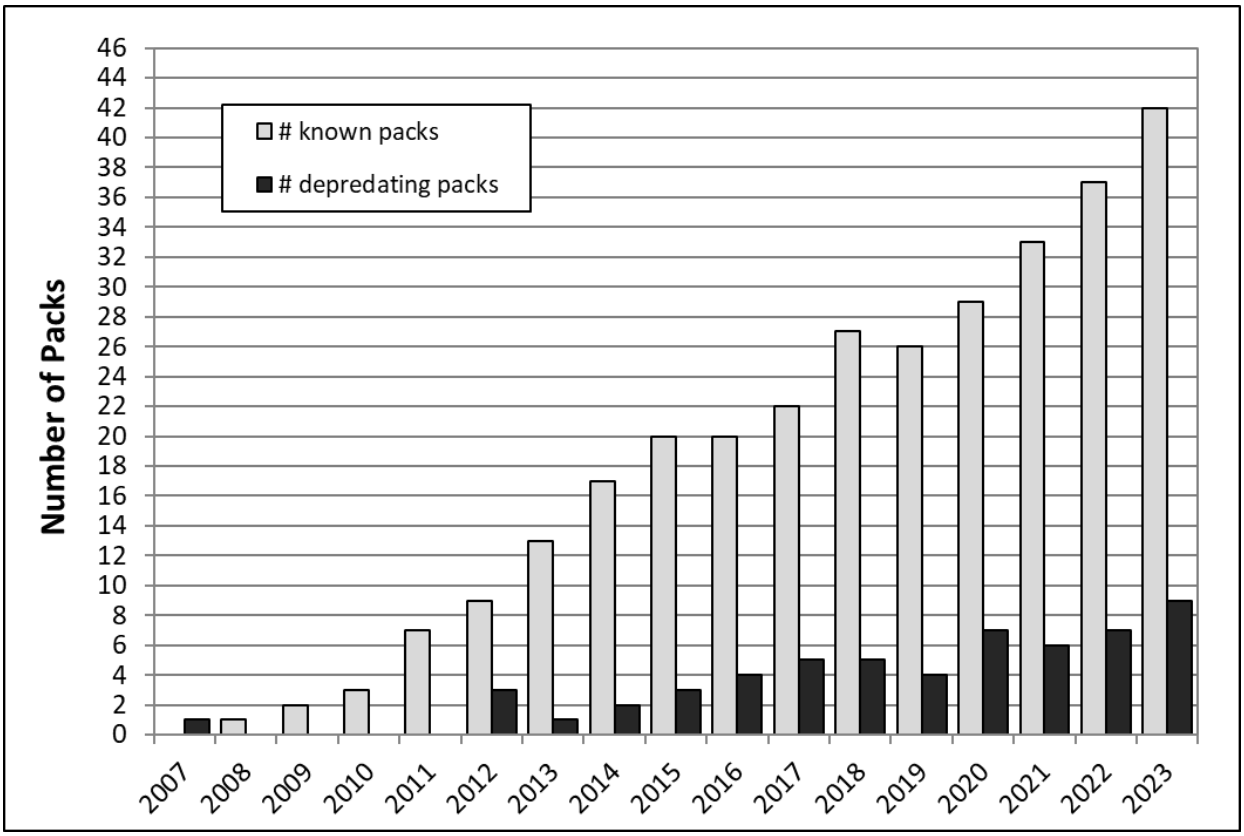

Figure 10. Minimum number of known packs that existed at the calendar year and the number of confirmed depredating packs (on livestock) in Washington, 2007 – 2023.

Minimizing Wolf Conflicts with Livestock

One goal of the Wolf Conservation and Management Plan is to manage wolf-livestock conflicts without undermining the recovery and long-term perpetuation of a sustainable wolf population. In 2023, as in previous years, preventative measures were used in an attempt to minimize livestock depredations.

Measures included, but were not limited to:

- Non-electrified and electrified fladry (red flagging strung around a pasture),
- Temporary fencing, to create enclosures for livestock,
- Radio-activated guard (RAG) boxes,
- Fox lights (Foxlights International PTY LTD, Bexley North Australia),
- Livestock guard dogs,
- Providing education and assistance regarding removal of attractants, including proper carcass disposal,
- Range riding activities to monitor cattle, including those contracted directly by WDFW.

WDFW also provided livestock producers with wolf location data to help identify high wolf-activity areas. The information enables producers to move livestock away from high wolf-activity areas or monitor livestock more closely. Some producers protected livestock by penning animals, especially at night, and by removing injured and/or dead livestock from grazing sites. In the Eastern Washington recovery region only, WDFW used incremental lethal removal of wolves in an attempt to change pack behavior after repeated depredations.

WDFW has management authority of wolves in the Eastern Washington recovery region (Fig. 2) and as of January 4, 2021, wolves were delisted from the Federal Endangered Species Act, which transferred the management authority to WDFW for the western two-thirds of the state. Under state law (RCW 77.12.240), WDFW can implement lethal removal, and the Plan contemplates the use of lethal removal as a tool to change pack behavior after repeated livestock depredations. In 2023, lethal removal was authorized in the Couse pack (formerly WA 139 Group), which resulted in two wolves being killed during an agency lethal removal action (See Appendix A for a summary).

Table 2. Confirmed wolf-caused livestock and dog injuries and mortalities in Washington, 2013-2023.

	2013		2014		2015		2016	
	Injuries	Mortalities	Injuries	Mortalities	Injuries	Mortalities	Injuries	Mortalities
Cattle	0	1	2	2	0	7	6	9
Sheep	0	0	6	28	0	0	0	0
Other	0	0	0	0	0	0	0	0
Dogs	3	0	1	0	1	0	0	0
Total	**3**	**1**	**9**	**30**	**1**	**7**	**6**	**9**

	2017		2018		2019		2020	
	Injuries	Mortalities	Injuries	Mortalities	Injuries	Mortalities	Injuries	Mortalities
Cattle	5	8	19	10	11	14	30	9
Sheep	0	0	1	2	0	0	0	0
Other	0	0	0	0	0	0	0	0
Dogs	0	0	0	0	0	0	1	0
Total	**5**	**8**	**20**	**12**	**11**	**14**	**31**	**9**

	2021		2022		2023	
	Injuries	Mortalities	Injuries	Mortalities	Injuries	Mortalities
Cattle	8	5	9	15	7	10
Sheep	0	0	0	2	0	0
Other	0	0	0	0	1	2
Dogs	0	0	0	0	0	0
Total	**8**	**5**	**9**	**17**	**8**	**12**

Under state laws RCW 77.36.030 and RCW 77.12.240, administrative rule (WAC 220-440-080), and the provisions of the Plan, WDFW may permit livestock producers and their authorized employees to lethally remove wolves caught in the act of attacking livestock on private land and public grazing allotments they own or lease after a documented depredation. WDFW did not issue any permits to livestock producers in 2023.

Also, state law and related regulations (WAC 220-440-080) permit owners of domestic animals (defined as any animal that is lawfully possessed and controlled by a person) and their immediate family members or authorized agents to kill one gray wolf without a permit if the wolf is attacking their domestic animals. This rule applied only in the Eastern Washington recovery region where wolves were federally delisted and did not apply in areas where wolves remain classified as endangered under the Federal ESA. In January 2021, wolves were Federally delisted from the ESA and were under WDFW management statewide following the guidance of the Plan. However, federal jurisdiction has since been resumed as of February 10, 2022, in the Western 2/3 of Washington. Any wolf removed under this rule must be reported to WDFW within 24 hours. The owner of the domestic animals must turn in the wolf carcass and cooperate with WDFW during an investigation. One wolf from the Vulcan pack was killed by a landowner protecting livestock under the caught-in-the-act (CIA) rule in 2023.

Damage Prevention Cooperative Agreements

Ranching and farming are essential components of Washington's economy, and the lands devoted to these activities provide critical habitat for many wildlife species.

To minimize conflicts between wolves and livestock on public and private lands, WDFW personnel work with livestock producers to identify and implement non-lethal conflict prevention measures suitable for each producer's operation. Interested producers may also participate in a Damage Prevention Cooperative Agreement for livestock (DPCA-L) with WDFW, which provides a cost-share for implementing various conflict prevention measures.

During the calendar year 2023, WDFW had cooperative agreements with 26 livestock producers across the state. Operators with an active DPCA-L received reimbursement from WDFW for a percentage of each conflict prevention measure's cost, up to a maximum of $10,000. The most common non-lethal conflict prevention measures used were range riders, improved sanitation practices (such as treatment or removal of injured or dead livestock), daily livestock checks, and fencing (e.g., fladry). DPCA-L contracts issued only in 2023 had a combined total amount of $101,500, but WDFW paid producers $62,472.06 for DPCA-L reimbursements.

During calendar year 2023, WDFW paid 11 range riders $159,534.79. WDFW contracted with 8 private vendors for range riding services; however, through subcontracts, 3 range riders were employed for the 2023 grazing season. In addition, the Department of Agriculture funds and oversees two organizations including Northeast Washington Wolf-Cattle Collaborative (NEWWCC), which supported 14 full time and 13 part-time range riders during the 2023 grazing season.

Cattle Producers of Washington (CPoW) supported eight full and two part-time range riders to assist producers in monitoring livestock to minimize interactions with wolves. These range riders logged roughly 4800 hours during the 2023 grazing season. CPOW also noted that eight producers also documented about 2000 additional hours of their time to monitor their livestock during the 2023 grazing season.

Range riders monitored livestock on open-range grazing allotments to minimize encounters with wolves. All WDFW-funded (either through cost-share agreements or contracts with WDFW) range riders were required to keep daily logs of activities and coordinate regularly with WDFW Wildlife Conflict Specialists and the producers they assisted. Examples of information collected and provided to both WDFW and the producer by range riders included livestock behavior, carnivore activity and sign in the grazing areas, reports of sick or injured livestock, and suspected depredations. WDFW contracted range riders were also required to collect daily GPS tracks of their work with Garmin InReach units that were allocated to them.

WDFW Direct Livestock Loss Claims

The Plan explains what compensation is available for wolf depredations under state law (RCW 77.36) and administrative rules (WAC 220-440), as detailed in Appendix F of the Plan.

When funding is available, producers may be eligible for compensation for deaths or injuries to cattle, sheep, horses, swine, mules, llamas, goats, including indirect losses for missing livestock, and for actively working guarding/herding dogs. To receive compensation, WDFW personnel or an authorized agent of WDFW must have classified the deaths or injuries as confirmed or probably caused by wolves. Operators must show that they have used methods to minimize wolf damage. Compensation is not provided for injuries or the deaths of domestic pets or hunting dogs that are not guarding or herding livestock.

The state's compensation program is multi-tiered, based on the size of the grazing site, whether the wolf depredations were classified as confirmed or probable, and whether the animals were killed or injured. Compensation is limited to $10,000 per claim, although higher amounts may be awarded based on appeals to the WDFW director.

- On grazing sites of at least 100 acres:
    - **For each confirmed depredation,** WDFW will compensate producers for the full value of the animal if it had gone to market, plus the full market value of one additional animal. Payments will be reduced by half if all the remaining livestock are accounted for.
    - **For each probable depredation,** WDFW compensates producers for the full market value of only the affected animal(s). Payments will be reduced by half if all the remaining livestock are accounted for.
    - **For livestock and guarding/herding dogs injured by wolves,** WDFW compensates producers for veterinary costs associated with their treatment.

- On grazing sites of less than 100 acres:
    - **For each confirmed depredation,** WDFW will compensate producers for the full market value of the affected animal. In these cases, WDFW compensation covers only the affected animal.
    - **For each probable depredation,** WDFW will compensate producers for half of the full market value (if it had gone to market) of the livestock.
    - **For livestock and guarding/herding dogs injured by wolves,** WDFW compensates producers for veterinary costs associated with their treatment.

The WDFW program is designed to avoid reimbursement from multiple sources for the same incident. Therefore, compensation to producers is reduced by the amount of other financial support, including payments from insurers or proceeds from the sale of partially salvaged carcasses or other products. Additional payments do not apply if all livestock are accounted for at the end of the grazing season.

Administrative rules (WAC 220-440-180) revised in 2015 by the Washington Fish and Wildlife Commission require producers to notify WDFW within 30 days of a depredation if they intend to seek compensation, and to submit the completed claim within 90 days.

To receive compensation, operators must have (a) complied with a WDFW checklist of non-lethal conflict prevention measures, (b) have a current Damage Prevention Cooperative Agreement with WDFW, or (c) received a waiver of these requirements from the WDFW director.

WDFW also compensates producers for veterinary costs associated with treatment of livestock and guarding/herding dogs injured by wolves (WAC 220-440-040, WAC 220-440-010). Livestock producers would be able to recoup veterinary treatment costs for injured animals, not exceeding their current market value. If injured livestock need to be euthanized, owners will receive compensation for the current market value of the animal. If livestock are injured to the extent that they must be sold prematurely, the operator will receive the difference between the selling price and current market value. Under (RCW 77.36), compensation to individual producers who experience damage shall not exceed $10,000 per claim without an appeals review.

WDFW received one direct claim for the 2022 grazing season and paid $2,107.14. For the 2023 grazing season, the Department received eight direct claims from livestock producers who experienced livestock losses or injuries caused by wolves. Two of them were paid with a combined total of $10,850, one is pending accept or appeal notice from the livestock producer, and the remaining five are still under review.

WDFW Indirect Livestock Loss Claims

WAC 220-440-170 provides for potential compensation of indirect losses experienced by commercial livestock owners subject to the restrictions in the WAC. Indirect losses considered for compensation are higher than normal livestock loss, reduced weight gain, or reduced pregnancy rates likely due to the

harassment of livestock caused by wolves. These claims are calculated by determining the loss in excess of the immediately preceding three-year running average loss for each category.

WDFW received three indirect claims for the 2021 grazing season with two still going through the appeal process and one has been paid $26,488.41 after a final order was issued from the Office of Administrative Hearings (OAH). For the 2022 grazing season, the department received three indirect claims where one was paid $7,402.81, one is still in the appeal process, and the last one is still under review. Six claims were received for the 2023 grazing season with five of them still under review and one has been paid $32,019.75 after an order was issued from OAH.

State Grants for Non-lethal Conflict Prevention Activities

During 2023, Washington state legislators created an account through Washington State Department of Agriculture to provide grants to interested non-profit organizations or producers for non-lethal deterrents in Okanogan, Ferry, Stevens, and Pend Oreille counties. NEWWCC spent $340,000 and CPoW spent $220,000 on range riding and equipment costs for the 2023 grazing season.

Wolf Interactions with Ungulates

Ungulate populations naturally fluctuate over time and area in response to various changes on the landscape. With the exception of the Columbia Basin, large carnivores are common throughout Washington's diverse landscapes and managed alongside the state's many ungulate species to ensure stable populations and healthy, functional ecosystems. The Department uses harvest data and annual population surveys of deer and elk herds throughout the state to monitor long-term status and inform management decisions. The results of these surveys and other monitoring and research efforts are published each year in the Department's annual Game Status and Trend Reports. To date, most significant fluctuations observed in ungulate populations in Washington are in response to major shifts in habitat quality and availability, weather, and disease occurrence that affect reproduction and survival across a large area, regardless of species or geographic region.

Research Updates

Ongoing Projects

Title: Monitoring Impacts of Wolf Recovery on Medium to Large Carnivores and Their Prey in Washington State

Principle Investigator: Samuel Wasser, University of Washington Project

Project Summary: In anticipation of eventual wolf recolonization south of interstate 90 (I-90), baseline data has been collected to answer the question: How will wolf recolonization impact the predator-prey community and the extent of human-wildlife conflict in Central Washington south of I-90? This six-year study has focused on collecting signs of wolf presence as well as baseline measures of the distribution and diets of the medium to large carnivores in the Cascade Mountain Range, from I-90 south to the Columbia River. The intention is to use those findings to assess how the distributions and diets of medium to large carnivores change as wolf recolonization of the area progresses.

Main findings: For the second year in a row, wolves were found south of I-90. Sampling in 2023 collected four scat samples from three individual wolves. Genotypes from two of those individuals match the female and male wolves detected in 2022. The two other samples belong to a third wolf: a male detected for the first time in the 2023 field season. Scat for all three wolves was found in the same region as in 2022: south-east of Mount Adams, between Mount Adams and the Conboy Lake National Wildlife Refuge. One of the two scats from the third wolf was also found further north, just north of route 12 and east of Rimrock.

Study Area: The 2023 season marked the sixth year of scat collect in the south Cascades. Sampling in 2018, 2019, and 2020 covered an area of 11,000 km2 across the Eastern Cascade Region of Central Washington, including 3,000 km2 of Yakama Nation land and areas within Mount Rainier National Park. In 2021, teams reduced coverage to prioritized areas based on wolf sighting information, concentrating surveys in the northern half of the study area. The 2018 and 2021 sampling also included the Teanaway wolf pack home range, just north of I-90, as a control site to confirm that detection dogs were successfully locating wolf samples. This assured that the absence of wolf samples south of I-90 was not due to dog failure; dogs were able to locate wolf scat in the control area in both the 2018 and 2021 field seasons but did not locate any wolf scat south of I-90 in 2018-2021. Teams continued to focus survey efforts in areas with the highest likelihood of finding wolf scat in 2022 and 2023, which included more southern USFS forest land, including the Yakama Reservation, state and private lands in the south Cascades (between Highway 12 and the Columbia River). Thirteen wolf scat was located from two individuals (one male and one female) in 2022 and four wolf scat from three individuals in 2023 (the male and female from 2022 and one additional male).

Survey Method: Data was collected using highly trained scat detection dogs. Two trained detection dogs and their handlers surveyed wilderness areas, locating medium to large carnivore scats. Dogs were trained to locate wolf, cougar, coyote, bobcat, bear, wolverine, fisher, marten, and fox scat. Scat was logged and collected for DNA analysis at a laboratory facility at the University of Washington. Trained dogs are able to survey large geographic areas quickly, with minimal impact on the wildlife and/or timber operations taking place in the area. The canine detection teams collected 1,253 scats between September 8 and October 28, 2023. Since 2018, teams have collected over 6,700 georeferenced carnivore scats in the south-central Cascades.

Lab Protocol: Scat samples from all six years were identified to predator species using the ATP6 and Canid SNP mitochondrial DNA markers to distinguish cougar, bobcat, coyote, wolverine, fisher, marten, fox, wolf and dog. Individual wolves and identified and their sex confirmed using the 11 microsatellite DNA markers including one sex microsatellite marker developed by the Waits lab (Stansbury et al. 2014). This is the standard method for individual wolf identification used in the state of Washington. The predator ID and prey data was presented in reports provided to the State in 2021, 2022 and 2023. The 2023 carnivore scat samples are currently being processed for prey using the same metabarcoding methods used in 2018-2022 samples. Those data will be presented along with detailed predator distributions in a forthcoming report to the State.

Results: DNA from 450 of the 517 scat samples collected in 2023 was successfully amplified. Four of those samples were typed as wolf, 303 as coyote, 114 as bobcat, 16 as cougar, 3 as dog, 9 as marten, and 1 as fisher. The four wolf scat samples were from three individual wolves. One is a female wolf whose genotype matches the female wolf detected in 2022, one is a male wolf whose genotype matches the male wolf detected in 2022, and two samples belong to a third wolf: a male observed for the first time in this field season (2023). Figure 11 shows locations of the wolf samples among all samples processed for DNA over the entire 2023 sampling area. The outline color of the wolf samples represents the genotype of the given scat. The four wolf samples from the three individuals were found in the same area where the wolves were found last year: south-east of Mt. Adams (between Mt. Adams and the Conboy Lake National Wildlife Refuge). One of the two samples from the wolf first observed in 2023 was found just north of route 12 and east of Rimrock, indicating that this wolf has been traveling over a large area.

Funding: This research is funded by a grant from the Washington State Legislature.

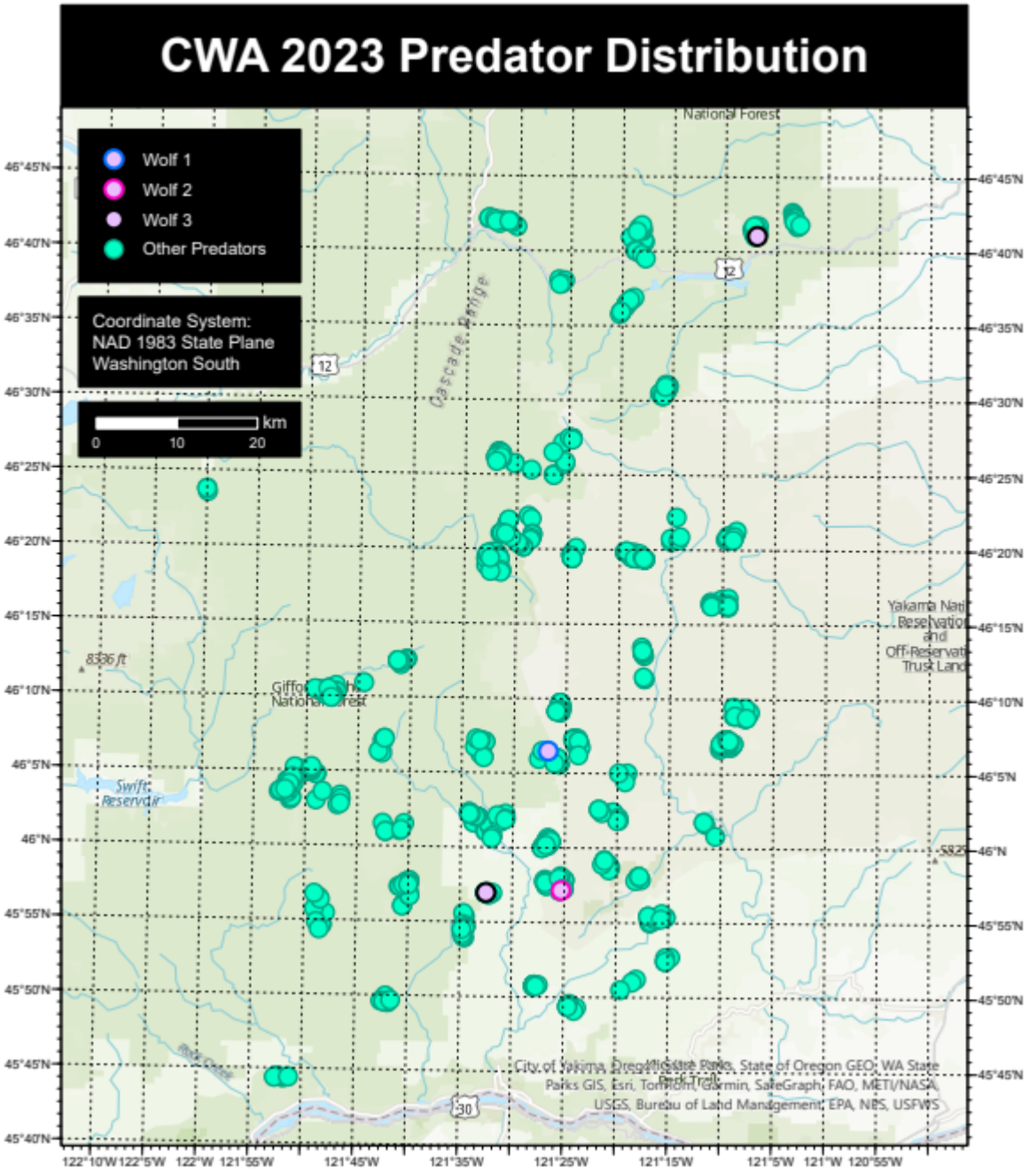

Figure 11. Location of carnivore scats identified in the region surveyed during the 2023 field season. Samples colored in teal represent non-wolf predators. The four wolf samples are indicated by circles with light pink centers, with each individual wolf represented by a unique colored ring around the pink circle. The female, also detected in 2022, is depicted by a dark pink outer ring. The male, also detected in 2022, is depicted by a blue outer ring. The new male first discovered in 2023 is depicted by a black ring.

Title: Researching the Effectiveness of Range Riding to Prevent Depredations on Livestock

Graduate Student (PhD): Rae Nickerson, Utah State University

Project Summary: The Conservation on Working Lands Conservation Innovation Grant (CoW-CIG) is a collaborative team consisting of livestock producers, Western Landowners Alliance, Heart of the Rockies, Defenders of Wildlife, Wildlife Services and other state and federal wildlife agencies, and Utah, Colorado, and Montana state universities. The team is tasked with evaluating the effectiveness of several nonlethal tools at reducing conflict between livestock, wolves, and grizzly bears. Across seven western states, PhD candidate Rae Nickerson and her field team are deploying game cameras, taking hair samples from cattle, conducting interviews with producers, and helping riders with daily logs to evaluate riding's effectiveness. It is hoped that findings will inform how to make range riding most effective both in cost and conflict reduction. The team has several sites in northeast Washington, and this will be the third and final year of field work. Data analysis will begin this spring, and while funding continues through May 2026, the hope is to have preliminary results to share by next spring. This summer three range rider workshops (Montana, Washington, and Arizona) will be hosted to bring producers, riders, and other stakeholders together for collaborative discussion around range riding's challenges. Earlier this year, collaboration efforts resulted in an additional $22 million becoming available for range riding financial support in a diversity of states through NRCS. For more information, please contact Rae Nickerson at rae.nickerson@usu.edu."

Title: Wildlife and Humans in Shared Landscapes (WHISL)

Principal Investigator: Chloe Wardropper (University of Illinois); **Co-Principal Investigators:** Luke Sheneman (University of Idaho), Jeremy Bruskotter (Ohio State University), Neil Carter (University of Michigan), Taal Levi (Oregon State University); **Collaborators:** Casey Brown (Oregon Department of Fish and Wildlife), Leandra Merz (University of Florida), Jeff Martin (USFS), Tavis Forrester (USFS); Joel Ruprecht (Oregon State University); Nick Bergmann (University of Idaho; Washington State University), Jennifer Hinds (University of Idaho); **Graduate Student:** Lara Mengak (Oregon State University)

Project Summary: The WHISL project seeks to improve understanding related to the socioecological effects of climate change and predator recolonization on ranching-wildlife systems in the Pacific Northwest. Although not all components of the project focus on wolf related research, there are four areas of current research. 1) Luke Sheneman (University of Idaho) is developing and field testing a novel camera trap and data processing technology to help improve wildlife population estimates (including wolf abundance); 2) Leandra Merz (University of Florida) along with Neil Carter (University of Montana) and Jeremy Bruskotter (Oregon State University) are developing socioecological models to help explain state-level variation in wolf management and the relationship among recreational hunting and trapping, livestock depredation, and lethal removal of wolves; 3) Nick Bergmann (University of Idaho/Washington State University) along with Chloe Wardropper (University of Idaho) are leading a qualitative social

science analysis related to the emotional dimensions of wolf management; 4) Lara Mengak (Oregon State University) and Chloe Wardropper (University of Idaho) are leading a quantitative social science analysis focused on 1) risk perception associated with elk competition, wolf depredation, and drought; 2) the relevance of trust in wildlife management agencies for managing wolf-livestock conflict.

Project Duration: September 1, 2021-August 31, 2026 (estimated); NSF Grant #2109005

Website: https://whisl.org

Title: Life on the Edge: Large Mammal Populations on a Wolf Recolonization Frontier

Principle Investigators: Brandon Nickerson, Leslie Parks, Erika Faubion, Brennan Watson
Organization: Wildlife Program – Swinomish Indian Tribal Community

Funding: U.S. Fish and Wildlife Service; Seattle City Light; Network for Landscape Conservation

Project Summary: In 2021, the Swinomish Indian Tribal Community began an ongoing research effort aimed at assessing the status of wolf (*Canis lupus*) recovery in the western Greater North Cascades Ecosystem (GNCE), which has proceeded slowly since the species first reappeared in the region in 2017. Specific goals of the project include estimating the minimum number of wolves in the western GNCE, establishing the geographic extant of wolf presence (i.e. locating the "recolonization frontier"), and documenting any breeding pairs of wolves that may be using the area. Simultaneously, we began collecting baseline data for other large mammal populations in the western GNCE, including elk (*Cervus canadensis*), black-tailed deer (*Odocoileus hemionus columbianus*), cougars (*Puma concolor*), and black bears (*Ursus americanus*). Our goal in collecting these data, which include formulation of relative abundance indices (RAIs) and occupancy estimation, is to assess the current status and trend of these species before wolves return to the landscape in an ecologically meaningful way, so that management strategies may adapt to the shifting predation regime wolves affect on the western GNCE.

Since summer 2021, we have maintained a network of 20-30 scent-baited camera traps across our study area (Figure 1) deployed exclusively for wolf detection. We have focused deployment on areas where wolves have previously been detected (collar data, camera trap photos, visual observations) or near topographic features likely to attract wolf activity or guide wolf movement across the landscape (mountain passes, river drainages, lakeshores, etc.). From 2021-2023 we made a total of 6 detections of wolves at 3 different camera trap locations and these detections include detections in each season (fall, winter, spring, summer). From these detections, we identified a minimum of 2 individual adult wolves of unknown sex based on pelage patterns (i.e. coat color). However, we cannot differentiate wolves of similar appearance (e.g. if two different black wolves were detected alone at separate camera trap

locations over a timeframe of weeks/months we wouldn't know if it was one animal detected twice or two different animals), so it is possible that more than two wolves were present in the area. Our camera traps did not detect multiple wolves traveling together or other evidence (e.g. lactating adult female) of pack formation or breeding activity. Additionally, the location of the recolonization frontier does not appear to have advanced westward beyond the greatest previous known extent of wolf recolonization.

For our large mammal population assessments, we established a camera trapping grid northeast of Sedro-Woolley, Washington (Figure 2) to assess the effect of recolonizing wolves on our other species, as well as to help monitor any possible wolf activity in the area. Each 2.5km x 2.5km grid cell contains one, un-baited camera trap deployed in a location within the cell to maximize the possibility of detecting all our study species (e.g. on a dirt forestry road or wildlife trail). We focus on this portion of the western GNCE because 1) it is an important hunting area for the Swinomish Community, 2) it contains the highest density of elk in the western GNCE (a potentially important food source for recolonizing wolves), and 3) the area is currently not known to contain wolves but is adjacent to the greatest known extent of wolf recolonization in the western GNCE. We are currently analyzing our camera grid data to produce RAIs and estimate detection and occupancy rates for these five study species.

We have not detected any wolves on either our wolf-specific camera traps or our large mammal grid cameras in more than a year. However, we plan to maintain our large mammal camera grid as a long-term monitoring project for our five target species into the future and will likely also continue to deploy cameras specifically to detect wolves along the edge of their known range. Collectively, this will result in dozens of camera traps on the landscape continuing to monitor wolf recovery in the western GNCE.

Figure 12. Approximate area of interest for wolf-focused, targeted camera trap deployments.

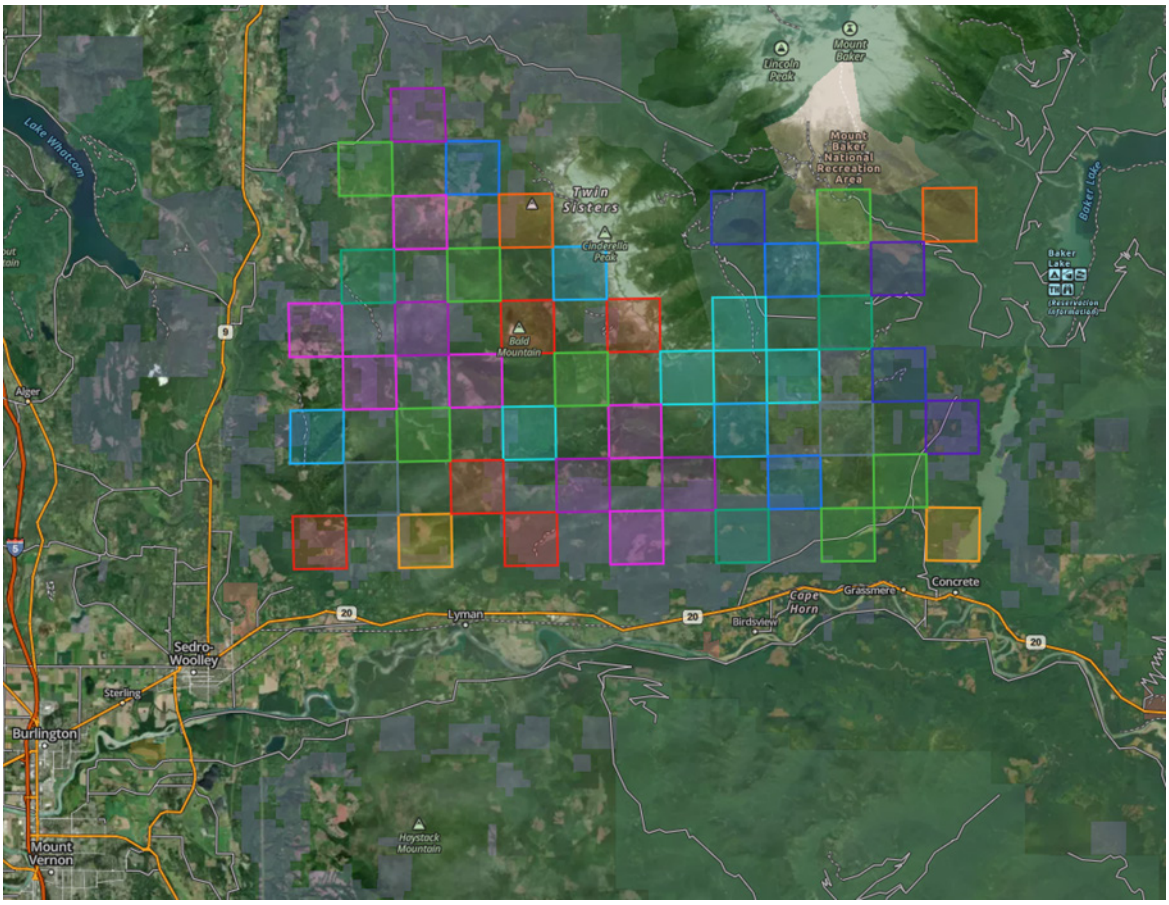

Figure 13. Current camera trap grid (colored squares) for large mammal relative abundance indices and occupancy modeling work.

Title: A Longitudinal Assessment of Social and Ecological Change Following the Establishment of Wolves in Klickitat County

Graduate Students (PhD): Lara Volski and Vivian Hawkinson, People and Wildlife Lab, University of Washington, PI: Dr. Alex McInturff

Project Summary: The Big Muddy Pack established in Klickitat County in 2022, making it Washington's newest pack and putting people and wolves in Klickitat County on the same landscape for the first time in over 80 years. It is important to proactively understand the social and ecological drivers of human-wolf interactions and learn how and if impacted communities want to be engaged in research efforts. Research outputs can matter little to people if they aren't meaningfully incorporated into the research process, and solutions that are proposed by scientists who are outsiders to a community sometimes overlook local needs and perspectives. Last year, Lara Volski lived and worked on a farm in Klickitat County as she interviewed a diverse range of residents about the arrival of wolves. These interviews revealed that one of the greatest perceived risks of wolves is the potential catalyzation of community infighting, indicating that wolves have come to symbolize attitudinal polarization and the possibility of human-human conflict even ahead of their arrival. When asked what kind of research they would like to

see conducted on wolves, interviewees responded that future research efforts should incorporate their lived experience and local expertise. They also wanted research that would help build trust at the local level.

This year, Vivian Hawkinson and Lara will return to Klickitat County to build on those interviews. Planned projects include: 1) administering a county-wide, longitudinal survey that will track how the perceived risks and benefits of wolves change over time, and allow people to share whether they feel that their concerns and perspectives are being incorporated into decisions about wolves, 2) an ecological assessment of wolf-livestock interactions within the territory of the Big Muddy Pack, and 3) continued outreach and interaction with Klickitat County residents to ensure that people's voices are heard and local knowledge is shared. For more information, please contact Lara Volski at lavolski@uw.edu, Vivian Hawkinson at vhawkin@uw.edu, or Alex McInturff at amcintur@uw.edu.

Recent Publications

Bassing, S.B., M. DeVivo, T.R. Ganz, B.N. Kertson, L.R. Prugh, T. Roussin, L. Satterfield, R. M. Windell, A.J. Wirsing, and B. Gardner. 2022. Are we telling the same story? Comparing inferences made from camera trap and telemetry data for wildlife monitoring. Ecological Applications. https://doi.org/10.1002/eap.2745

Ganz, Taylor R., Melia T. DeVivo, Brian N. Kertson, Trent Roussin, Lauren Satterfield, Aaron J. Wirsing, and Laura R. Prugh. 2022. Interactive effects of wildfires, season, and predator activity shape mule deer movements. Journal of Animal Ecology. https://doi.org/10.1111/1365-2656.13810

Ganz, Taylor, Melia T. DeVivo, Ellen M. Reese, Laura R. Prugh. 2022. Wildlife whodunnit: forensic identification of predators to inform wildlife management and conservation. Wildlife Society Bulletin. https://doi.org/10.1002/wsb.1386

Ganz, Taylor R., Melia T. DeVivo, Aaron J. Wirsing, Sarah B. Bassing, Brian N. Kertson, Savanah L. Walker, and Laura R. Prugh. 2024. "Cougars, Wolves, and Humans Drive a Dynamic Landscape of Fear for Elk." Ecology e4255. https://doi.org/10.1002/ecy.4255

Petracca, L.P., Gardner, B., Maletzke, B.T., and S.J. Converse. 2024. Merging integrated population models and individual-based models to project population dynamics of recolonizing species. *Biological Conservation.* https://doi.org/10.1016/j.biocon.2023.110340

Petracca, L.P., Gardner, B., Maletzke, B.T., and S.J. Converse. In review. Forecasting dynamics of a recolonizing wolf population under different management strategies.

Prugh, L.P., C.X. Cunningham, R.M. Windell, B.N. Kertson, T.R. Ganz, S.L. Walker, and A.J. Wirsing. 2023. Fear of large carnivores amplifies human-caused mortality for mesopredators. Science. 380, 754-758.

Outreach

Wolf conservation and management continues to attract extensive public interest, and WDFW has increased its outreach and communication activities accordingly over the past several years.

In 2023, in addition to numerous, daily interactions with the public (i.e. phone calls, emails, and personal communications), department personnel were interviewed by local radio, newspaper, and television outlets on many occasions. WDFW staff also made formal presentations to school groups, universities, wildlife symposiums, state and federal management agencies, livestock associations, conservation groups, state legislative committees, the Washington Fish and Wildlife Commission, and local interest groups.

WDFW maintains numerous pages on its website related to wolves and wolf management in Washington. In addition to general wolf information and links to other wolf-related sites, the website provides interested parties with access to the archives of the plan, agency news releases, and weekly and monthly updates of wolf management activities. The website includes a wolf observation reporting system, through which the public can report sightings or evidence of wolves to help WDFW personnel monitor existing packs and document possible wolf activity in new areas. The website also provides telephone numbers for reporting suspected livestock depredations.

Wolf Advisory Group

Since 2013, WDFW has relied on the Wolf Advisory Group (WAG) to provide guidance to the agency on wolf conservation and management under the terms of the Plan. The WAG is comprised of citizen members appointed by WDFW's director. Members serve two-year terms and represent a broad spectrum of stakeholder interests – livestock producers, conservation groups, hunters, outdoor recreationists, and others.

The WAG met four times in 2023 in hybrid meeting format to allow both in person and virtual attendance. The connections and relationship building that unfold during in-person meetings are irreplaceable, but the hybrid format allowed more members of the group as well as the public to attend the meetings. Core goals of the WAG are to reconcile divergent views and build resilient relationships among stakeholder groups, including WDFW. As such, the WAG spent time developing relationships that foster respect, honest dialogue, and mutual learning.

The WAG continued their discussion of wolf-ungulate interactions this past year and provided a letter to the Director sharing ideas of paths forward for WDFW regarding wolf-ungulate interactions. Many of the ideas shared were formed by discussing the topics presented by a number of top experts in the field to inform them on issues, including Fundamental Elements of Ungulate Population Dynamics, Factors that Influence Ungulate Populations, Ungulate Population Monitoring, Some thoughts on the relationship between wolves and their prey, Some insights from predator-prey research in Greater Yellowstone Ecosystem, and Density-dependent changes in wolf predation within the complex system of northern Yellowstone. WAG members summarized what they learned from these presentations and their discussions in a Synthesis of 2022 Wolf-Ungulate Interactions Presentations to WAG.

The WAG discussed potential collaboration between ODFW and WDFW in regard to how depredations are considered in recommendations for lethal removal where packs overlap both Washington and Oregon. WAG members also were able to come to consensus on language for a recommendation letter to the Commission regarding the need for flexibility rather than the development of rulemaking around the wolf-livestock interaction protocol. They also began conversations, which are still ongoing, on how to improve the compensation model for livestock lost to wolf depredations.

WAG and WDFW continued work with Ross Strategic to take on facilitating WAG meetings and chart the future course for WAG discussions.

All WAG meetings are open to the public. Agendas, notes, handouts, and meeting minutes are posted on WDFW's website.

Washington Contacts

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To report a suspected livestock depredation, a dead wolf in the Eastern Washington Recovery Region, or any type of illegal activity, please call: 1-877-933-9847, your local WDFW conflict specialist, or your local WDFW enforcement officer.

To report a dead wolf in western Washington, please contact your local WDFW enforcement officer.

For information about wolf management in Washington and to report a wolf sighting.

For information about wolf management on lands owned by the Colville Confederated Tribes and to report a wolf sighting on tribal lands.

For information about wolf recovery in the Northern Rocky Mountains.

Appendix A. 2023 – Wolf Removal Operation Summary

Introduction

This appendix describes the context and details of lethal management actions taken by the Washington Department of Fish and Wildlife (WDFW) to address repeated depredations by one wolf pack during the 2023 grazing season. Much of this information is available on the department's website, but this appendix consolidates that material and identifies expenditures related to each lethal removal action. This appendix also fulfills a provision of the WDFW Wolf-Livestock Interaction Protocol, which calls for WDFW to provide a final report to the public after lethal removal operations have concluded.

As in previous years, WDFW's actions were guided by the state's Wolf Conservation and Management Plan, adopted in 2011 by the Washington Fish and Wildlife Commission, and the Wolf-Livestock Interaction Protocol developed by WDFW in collaboration with its 18-member Wolf Advisory Group. The wolf plan and protocol describe strategies for minimizing wolf-livestock conflict that starts with the use of non-lethal deterrents to prevent repeated depredations on livestock. If preventive measures fail, WDFW may remove one or more wolves in an attempt to reduce the potential for depredations on livestock.

Due to reoccurring depredations, WDFW authorized and attempted to remove wolves in the Couse Pack (former - WA 139 Group) in 2023. The lethal removal operations resulted in two wolves being removed from the pack.

Couse Pack – 2023 Lethal Removal Operation Summary

January 2023

The collared wolf in this pack (WA139f) left the historical territory of the Tucannon pack in late January 2023 and over the course of several weeks moved southeast into northeastern Oregon. Biologists learned that there were multiple other wolves with the collared wolf. These wolves spent most of the month of February and some of March in northeast Oregon, where they were involved in several repeated depredations on cattle, killing seven and injuring one. One of the wolves in the group was lethally removed by an affected livestock producer in Oregon (updates for wolves in Oregon can be found at https://dfw.state.or.us/wolves/updates.html). This group of wolves was using areas in both Oregon and Washington.

February 2023

The local Wildlife Conflict Specialist (WCS) worked with producers in the Anatone area regarding wolf activity near active calving operations. The WCS met with two producers who had active calving pastures in the immediate area of the recent wolf activity. The WCS discussed preventative measures that were currently in place and recommended others. The WCS delivered Fox lights to one of the

producers to deploy around their calving pastures and the other producer deployed Fox lights that they had retained from their summer grazing pastures. One of the producers also used temporary fencing to reduce the size of their calving pasture. The WCS continued with daily or twice daily updates to producers in the surrounding area and the Asotin County Cattlemen's Association President. The WCS also spent two days checking the area for signs of wolf activity and collected information that would help determine how many wolves were possibly in the area. Two wolves were observed near one of the calving pastures and the producer hazed them out of the area.

April 2023

In late April, the pack localized in Washington. WDFW wolf biologists determined that there were at least four wolves in this group and that they appeared to be denning on private property.

WDFW wildlife conflict specialists continued to have check-ins with the Asotin County Cattleman's Association President and multiple livestock producers in this area of wolf activity. WDFW staff responded to a report of a dead cow in the Anatone area. The team investigated the carcass and surrounding area and determined that the cow had fallen off a bluff due to unknown causes. WDFW also received a report the following day of another carcass located in the same area; the livestock producer reported that the cow had pneumonia and had been treated recently. Due to rugged terrain, the carcasses could not be removed. WDFW staff located and purchased hydrated lime which was delivered to the livestock producer to be used for carcass sanitation purposes.

May 2023

WDFW staff investigated four dead calves in the same area on May 21st. Based on the investigations, staff confirmed two calves as depredated by wolves, one calf probably depredated by wolves, and the fourth calf died of an unknown cause, all which considered one event. The local wildlife conflict specialist followed up with the affected livestock producer following the investigation and provided the livestock producer with information about nonlethal deterrents and loss claims. WDFW staff continued to work with livestock producers in this area and monitored the pack numbers and movements.

June 2023

On June 20, WDFW staff investigated a dead heifer. The investigation revealed evidence on the carcass consistent with a confirmed wolf depredation. Wolf tracks and scat were found at the scene, and the collared wolf in this group was at the depredation location consistent with the time of the incident. WDFW wildlife conflict specialists continued to have check-ins with the Asotin County Cattleman's Association President and multiple livestock producers in this area of wolf activity.

July 2023

On July 31, WDFW staff investigated a dead calf on a U.S. Forest Service public grazing allotment in Asotin County. The investigation revealed evidence on the carcass consistent with a probable wolf depredation and wolf tracks nearby. This incident was the third depredation event since May 21, 2023 attributed to the pack. The local wildlife conflict specialist continued to reach out to livestock producers

across the area to let them know of activity in and around their active grazing pastures, allotments, and leases.

August 2023

On Aug. 15, WDFW staff investigated a dead calf on private land in Asotin County. The investigation revealed signs of struggle in the area of the carcass and evidence on the carcass consistent with a confirmed wolf depredation.

WDFW had documented four depredation events affecting four different livestock producers in Washington resulting in six dead livestock since May 21, 2023 all attributed to the Couse pack. WDFW staff discussed the depredations and use of non-lethal measures in this pack territory. Staff discussed how to most effectively address this situation moving forward and provided a recommendation to the Director.

On August 23, 2023, Washington Department of Fish and Wildlife (WDFW) Director Kelly Susewind authorized the lethal removal of one to two wolves from the Couse pack territory in response to repeated depredations of cattle on private and public grazing lands in Asotin County.

The proactive and responsive non-lethal deterrents used by the four affected livestock producers (described below) in the area this grazing season had not curtailed further depredations.

Director Susewind's decision was consistent with the guidance of the state's Wolf Conservation and Management Plan and the lethal removal provisions of the Department's 2017 wolf-livestock interaction protocol.

Consistent with the guidance of the plan and protocol, the rationale for authorizing lethal removal of Couse pack wolves was as follows:

WDFW had documented four depredation events affecting four different livestock producers in Washington resulting in six dead livestock since May 21, 2023, all attributed to the Couse pack. All events except one were considered confirmed wolf depredation incidents (one incident involving three individual livestock included two confirmed killed by wolves and one probably killed by wolves); the other incident was considered a probable wolf depredation. Three incidents occurred on private land (on small private pastures), and one occurred on a Forest Service grazing allotment.

At least two (in this case, more than two) proactive deterrence measures and responsive deterrence measures (if applicable) were implemented by the livestock producers affected by the depredations, including the following:

Producer 1 implemented proactive nonlethal deterrents including deploying Fox lights, removing carcasses, near daily human presence, range riding multiple pastures, and using temporary fencing to reduce pasture size.

Producer 2 provided human presence in smaller subdivided pastures (roughly 100 acres) and held back vulnerable cow/calf pairs and yearling steers from their summer pasture near the core activity center of

the Couse pack. Producer 2 also removed sick or injured livestock, implemented carcass sanitation, and deployed Fox lights.

Producer 3 implemented near daily range riding on the Forest Service grazing allotment, removed sick or injured livestock from the range, and implemented carcass sanitation.

Producer 4 provided daily human presence, removal of sick or injured livestock, and carcass sanitation. Following the depredation in this producer's pasture, WDFW staff deployed a RAG box and Fox lights.

The Department documented these deterrents in the agency's "wolf-livestock mitigation measures" checklist, with date entries for deterrent tools and coordination with the producers. The proactive and reactive non-lethal deterrence measures implemented by these livestock producers were those best suited for their operations in the professional judgment of WDFW staff.

WDFW staff discussed the recent depredations by the Couse pack and associated effectiveness of the nonlethal deterrence tools implemented by the affected livestock producers. Staff determined that range riding occurred on a daily/near daily basis on the large grazing allotment and human presence by livestock producers on small pastures occurred on a daily/near daily basis. The livestock producers used good sanitation practices and put forth a concerted effort to keep livestock in the area safe. Producer 2 held back vulnerable cow/calf pairs and yearling steers from their summer pasture near the core activity center of the Couse pack. Unfortunately, depredations continued over a widespread area and timeframe impacting four different producers. WDFW staff believed that depredations would have likely continued given pack behavior and the limited effectiveness of additional reactive measures that could be implemented in these pastures and allotments to protect livestock.

The lethal removal of up to two wolves from the Couse pack territory was not expected to harm the wolf population's ability to reach the statewide or local recovery objective. In previous years, WDFW had documented 12 – 37 mortalities per year and the population had continued to grow and expand its range. The Department's wolf plan also modeled lethal removal to help inform decision makers during this stage of recovery. The analysis in the plan included wolf survival estimates from northwest Montana, which incorporated a 28% mortality rate. It was important to note that agency lethal control was factored into that 28% mortality estimate. To err on the side of caution (i.e., when in doubt assume greater impact to wolf population so true impact is not underestimated), the scenarios modeled in the wolf plan included an even higher level of lethal control (i.e., removing 30% of population every four years in addition to baseline 28% mortality rate). Based on that modeling analysis, as well as an analysis of higher levels of potential mortality on the actual population level of wolves in the eastern recovery zone and statewide, we did not expect this action to jeopardize wolf recovery in the eastern recovery zone or statewide.

The lethal removal authorization expired when a wolf or wolves in the authorization had been removed or after Sept. 6, 2023 (regardless of whether wolves have been removed), whichever came first. The authorization could have been extended or amended to include other wolves in the pack area if additional depredations were documented following the initial authorization or other extenuating circumstances were identified.

On August 26, 2023, WDFW lethally removed an adult male wolf and a yearling female wolf from the Couse pack territory. With the removal of two wolves, the lethal removal authorization expired.

There have been no documented interactions between livestock and members of the Couse pack since August.

Cost

Total expenditure for the Couse (former WA 139 Group) pack lethal removal operation in 2023 (staff time, contractor time and aerial support) was $31,602 allocated from unrestricted Wildlife State Funds from licensing.

Details of WA Couse Pack Depredations:

Depredation Date	Depredation Type	Proactive Non-lethals	10-Month Window
5/21/2023	Confirmed mortality of two calves and probable mortality of one calf	Yes	3/21/2024
6/20/2023	Confirmed mortality of heifer	Yes	4/20/2024
7/31/2023	Probable mortality of calf	Yes	5/31/2024
8/15/2023	Confirmed mortality of calf	Yes	6/15/2024

Details of the Couse Pack Lethal Removals:

Date	Wolf	Sex	Age
August 26, 2023	1 (Agency Removal)	Female	Yearling
August 26, 2023	1 (Agency Removal)	Male	Adult