

Washington Gray Wolf Conservation and Management 2020 Annual Report

A cooperative effort by the Washington Department of Fish and Wildlife, Confederated Tribes of the Colville Reservation, Spokane Tribe of Indians, USDA-APHIS Wildlife Services, and U.S. Fish and Wildlife Service



Photo: Sarah Bassing, University of Washington

This report presents information on the status, distribution, and management of wolves in the State of Washington from Jan. 1, 2020 through Dec. 31, 2020.

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Suggested Citation: Washington Department of Fish and Wildlife, Confederated Tribes of the Colville Reservation, Spokane Tribe of Indians, USDA-APHIS Wildlife Services, and U.S. Fish and Wildlife Service. 2021. Washington Gray Wolf Conservation and Management 2020 Annual Report. Washington Department of Fish and Wildlife, Ellensburg, WA, USA.



Date of publication: April 23, 2021

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 WDFW wildlife managers documented a resident pack in Okanogan County. Since then, the number of wolves has increased every year, to a minimum of 132 in areas managed by WDFW and 46 wolves reported on the Confederated Tribes of the Colville Reservation (CTCR) in 2020. Most packs range across public and private land in Ferry, Stevens, and Pend Oreille counties in the northeast corner of the state and southeast Washington, but increasing numbers are present in the north-central region.

Gray Wolves' Legal Status

Gray wolves have been classified as endangered in all or part of Washington since federal lawmakers enacted the [Endangered Species Act](#) (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. They retained that classification throughout the state in 2020, regardless of their status under federal law.

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, and 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 U.S. Fish and Wildlife Service had the lead role in the other two recovery regions in 2020. Wolves that inhabit tribal lands in the Eastern Washington recovery region are managed by those specific tribal entities. However, in January 2021, wolves were federally delisted from the Endangered Species Act and are currently managed by WDFW as a state endangered species.

Wolf Recovery and Management in 2020

Key developments in 2020 included:

- The state's minimum year-end wolf population increased by 22 percent and marks the 12th consecutive year of population growth. As of Dec. 31, 2020, WDFW counted 132 wolves in 24 packs in areas managed by the department. Thirteen of these were successful breeding pairs. These numbers compare with the previous year's count of 108 wolves in 21 packs and 10 breeding pairs. Because this is a minimum count, the total number of wolves in Washington is likely higher.

- The Confederated Tribes of the Colville Reservation (CTCR) reported 46 wolves in five packs in 2020. The CTCR considers the population of wolves on their lands recovered and did not allocate the same resources as WDFW into year-end counts for 2020. Numbers provided by CTCR reflect winter numbers incidentally gathered by biologists, hunters, trappers, and public observations rather than efforts to count wolves that include year-end track, aerial, and camera surveys conducted by WDFW and other partners for 2020. Therefore, it should be noted that these numbers are not comparable to previous year's numbers and come with less certainty.
- Pack sizes (number of individuals) ranged from two to thirteen wolves. Most packs contained three to six individuals.
- 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.
- Since the first WDFW survey in 2008, the state's wolf population has grown by an average of 26 percent per year.
- State, tribal, and federal wildlife managers captured 12 wolves (eight new wolves and four recaptures) from eight packs during the year and monitored a total of 21 unique radio-collared wolves from 14 different packs in 2020.
- Four new packs formed in 2020. The Navarre Pack formed in Okanogan County, the Vulcan Pack in Ferry County, the Onion Creek Pack in Stevens County, and wolves also reestablished in the area formerly occupied by the Skookum Pack in Pend Oreille County.
- Each year's population total reflects population losses and population gains. WDFW documented 16 wolf mortalities during 2020 (Table 1), including three removed by the department in response to wolf-caused livestock conflict, eight legally harvested by tribal hunters, one killed by a vehicle, two of natural causes (one of old age, one of broken leg and infection), one that was shot due to a perceived threat to human safety and one of unknown causes.
- 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 confirmed nine cattle as being killed by wolves during the year. Another 30 cattle and one herding dog were confirmed as being injured by wolves. Additionally, three calf mortalities and two calf injuries were considered probable depredations by wolves after investigation. Seven packs (24% of known packs) were involved in at least one confirmed livestock depredation. Seventy-six percent of the known packs were not involved in any known livestock depredation.
- During calendar year 2020, WDFW spent a total of \$1,554,292 on wolf management activities, including \$110,035 in reimbursement to 33 livestock producers for Damage Prevention Cooperative Agreements – Livestock (DPCA-L) non-lethal conflict prevention expenses (range riding, specialized lighting, and fencing, etc.), \$151,640 for 23 contracted range riders, \$17,201 to five producers for livestock losses caused by wolves, \$77,281 for

lethal removal operations in response to depredations on livestock, and \$1,198,135 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), [USDA-APHIS Wildlife Services](#) (WS), and the [U.S. Fish and Wildlife Service](#) (USFWS). WDFW personnel who played a primary role during 2020 include WDFW Director Kelly Susewind, Wildlife Program Director Eric Gardner, Deputy Assistant Director of Wildlife Mick Cope, Game Division Manager Anis Aoude, Carnivore Section Manager Stephanie Simek, Statewide Wolf Specialist Benjamin Maletzke, Wolf Biologist Trent Roussin, Wolf Biologist Gabriel Spence, Conflict Section Manager Dan Brinson, Wolf Policy Lead Donny Martorello, and Wolf Coordinator Julia Smith. Other WDFW personnel who assisted with wolf recovery and management efforts in Washington included Chris Anderson, Mike Atamian, Staci Lehman, Rich Beausoleil, Candace Bennett, Jeff Bernatowicz, Eric Boyd, Joe Bridges, James Brown, Jeff Burnham, Colleen Chandler, Dan Christensen, Treg Christopher, Jason Day, Jason Earl, Chris Erhardt, Severin Erickson, Scott Fitkin, Morgan Grant, Ellen Heilhecker, Jeff Heinlen, Eric Holman, Todd Jacobsen, Emily Jeffreys, Ryan John, Sandra Jonker, Brian Kertson, Sarah Garrison, Doug King, Keith Kirsch, Danyl Klump, Matt Konkle, Tony Leonetti, Mike Livingston, Brendan Oates, Carlo Pace, Corey Peterson, Courtney Nasset, Brent Scherzinger, Carrie Lowe, Kristin Mansfield, Joey McCanna, Troy McCormick, Scott McCorquodale, Matt Monda, William Moore, Paul Mosman, Bryan Murphie, Jerry Nelson, Eric Oswald, Steve Pozzanghera, Annemarie Prince, Dan Rahn, Scott Rasley, Kevin Robinette, Ralf Schreiner, Tucker Seitz, Nicole Stephens, Michelle Tirhi, Justin Trautman, Ben Turnock, Mark Vekasy, Dave Volsen, Robert Waddell, Jeff Wade, Don Weatherman, Kile Westerman, Steve Wetzell, Marcus Leuck, Paul Whelan, Paul Wik, Andrew Kolb, Scott Whitman, 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 Brad Thompson, Jerry Cline, Manisa Kung, Gregg Kurz, Eric Marek, and Mike Munts; WS personnel including Mike Linnell, Terry Smith, and Chad Heuser; CTCR personnel including Eric Krausz, Sam Rushing, Rose Piccinini, and Corey Peone; STOI personnel including Billy Joe Kieffer and Savannah Walker; the U.S. Forest Service including Elizabeth Berkley, Mike Borysewicz, John Chatel, Travis Fletcher, Monte Kuk, Ray Robertson, John Rohrer, Rodney Smoldon, and Aja Woodrow; the Washington Department of Natural Resources including Dan Boyle, Matt Fromherz, Andrew Hayes, Scott Fisher, and Jeff Wolf; the National Park Service including Roger Christophersen, Jason Ransom, 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; Dan Thornton, and Travis King from Washington State University; Sarah Bassing, Lauren Satterfield, Taylor Ganz, Beth Gardner, Aaron Wirsing and Sarah Converse from the University of Washington; and Leo DeGroot 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, Nathaniel Cheshire, and Travis Wisberg of Northern Air (Bonners Ferry, ID), Brian Elfers of Inter-State Aviation (Pullman, WA), and Jess Hagerman and Brandon Arago of Northwest Helicopters (Olympia, WA).

Finally, we could not list every person who contributed to wolf recovery and management efforts in Washington during 2020. We thank all who participated, particularly private landowners, for their access and cooperation and the many people who provided wolf observation reports.

Table of Contents

Introduction

Definitions	8
Federal Status	8
State Status	10
Funding	11

Population Monitoring

Monitoring Techniques	12
Population Status and Distribution	13
Wolf Captures and Monitoring	17
Known Dispersals	18
Regulated Harvest	19
Mortalities	20

Management

Livestock Depredations	21
Number of Packs Involved in Livestock Depredations	21
Minimizing Wolf Conflicts with Livestock	23
Damage Prevention Cooperative Agreements	24
WDFW Livestock Depredation Program	25
Livestock Review Board	26
State Grants for Non-Lethal Conflict Prevention Activities	26
WDFW Creative Solutions to Reduce Livestock-Wolf Interactions	27
Wolf Interactions with Ungulates	27

Research

Ongoing Projects	28
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Outreach

Wolf Advisory Group	34
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Washington Contacts	36
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List of Tables

Table 1. Known wolf packs in Washington by WDFW Recovery Region, minimum estimated size of known packs, documented mortalities, number of known wolves that dispersed, and number that went missing in 2020 16

Table 2. Confirmed wolf-caused livestock and dog injuries and mortalities in Washington, 2013 – 2020 23

List of Figures

Figure 1. Federal classification of wolves in Washington State from 2011 – 2021..... 9

Figure 2. Washington wolf recovery areas as defined in the 2011 Wolf Conservation and Management Plan 10

Figure 3. Minimum known number of wolves in Washington, 2008 – 2020 14

Figure 4. Minimum known number of packs by Recovery Region in Washington, 2008 – 2020..... 15

Figure 5. Minimum known number of breeding pairs by Recovery Region in Washington, 2008 – 2020 15

Figure 6. Known wolf packs and pack territories in Washington, 2020, not including unconfirmed or suspected packs or border packs from other states and provinces. 17

Figure 7. Collared wolves that dispersed from known Washington packs, 2020 19

Figure 8. Total number of confirmed wolf-caused livestock mortalities in Washington, 2007 - 2020 21

Figure 9. Number of confirmed wolf-caused livestock mortalities and/or injuries by month in Washington, 2020..... 22

Figure 10. Minimum number of known packs that existed at some point during the calendar year and the number of confirmed depredating packs (livestock only) in Washington, 2007 – 2020 22

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 will 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.

Gray wolves in Washington initially received federal protections in 1973, when Congress passed the ESA. The [1987 Northern Rocky Mountain \(NRM\) 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 wolf population, 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 (in a section of the Department of Defense and Full-Year Appropriations Act) 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).

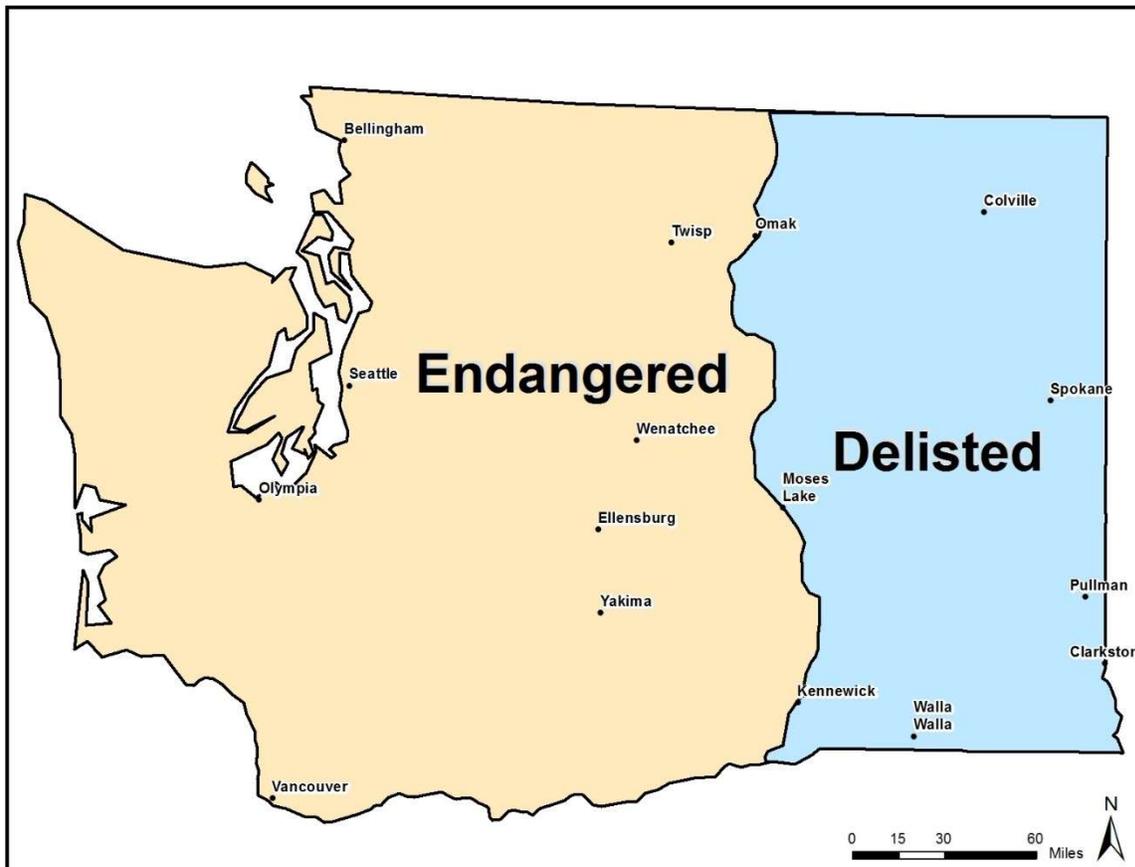


Figure 1. Federal classification of wolves in Washington State from 2011-2021.

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, the 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 is currently consistent across the state.

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).

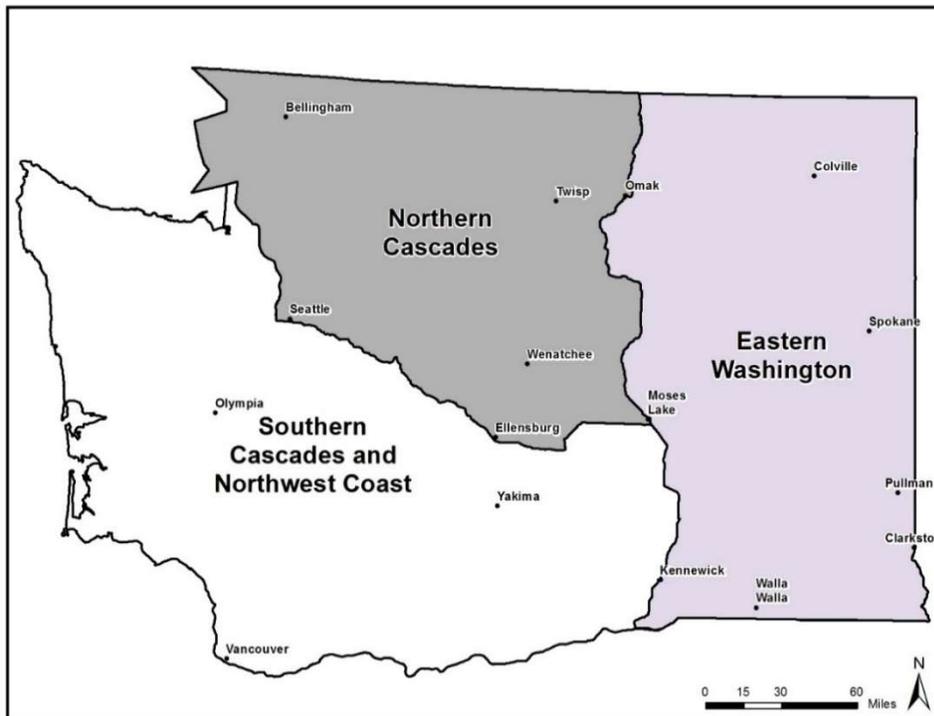


Figure 2. Washington wolf recovery regions as defined in the 2011 Wolf Conservation and Management Plan.

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. WDFW is currently 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.

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. 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 2020, WDFW spent a total of \$1,554,292 on wolf management activities, including \$110,035 in reimbursement to 33 livestock producers for Damage Prevention Cooperative Agreements – Livestock (DPCA-L) non-lethal conflict prevention expenses (range riding, specialized lighting and fencing, etc.), \$151,640 for 23 contracted range riders, \$17,201 to five producers for livestock losses caused by wolves, \$77,281 for lethal removal operations in response to depredations on livestock, and \$1,198,135 for wolf management and research activities.

Funds came from additional fees for personalized license plates (34%), endangered species license plates (5%), state general fund apportionments (25%), federal contracts (14%), unrestricted state wildlife funds (14%), wildlife compensation for livestock damage funds (7%), and wolf livestock conflict funds (<1%).

Population Monitoring

Monitoring Techniques

Prior to 2019, wolf surveys were conducted with consistent methods across the state. As the population moves toward recovery objectives in different parts of the state, monitoring techniques and population metrics may change. In 2019, the Confederated Tribes of the Colville Reservation (CTCR) considered the wolf population on tribal lands to be recovered and began monitoring that population with techniques that differ from those outside CTCR lands or lands with co-management authority.

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.

On the south half of the CTCR lands, year-end wolf numbers are compiled by biologists from winter reports from hunters, trappers, and the public rather than the survey methods described above. Therefore, it should be noted that these numbers are not directly comparable to previous year's numbers and may come with additional uncertainty.

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 2003¹), WDFW multiplies the minimum documented count by 12.5% to account for solitary wolves on the landscape. If evidence collected during the current calendar year suggest that packs and/or breeding pairs were present on the landscape during the previous year, the numbers (e.g., total number of wolves, packs, breeding pairs) will be updated to reflect this new information. Thus, numbers from past reports are subject to change and may differ from numbers in this report.

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

Population Status and Distribution

The state's minimum year-end wolf population increased for the 12th consecutive year. As of December 31, 2020, WDFW counted 132 wolves and 24 packs. Thirteen of these were considered successful breeding pairs in 2020. These numbers compare with 108 wolves in 21 packs, and 10 breeding pairs one year earlier. The CTCR reported 46 wolves in five packs in 2020. This is an increase from 2019 minimum counts of 37 wolves in five packs. Because these are minimum counts, the total number of wolves in Washington is likely higher.

Compared to 2019, the number of individual wolves on lands where WDFW has wildlife management authority (Fig. 3) increased by 24 (22%) and the number of packs (Table 1, Fig. 4) increased by three (14%). Additionally, thirteen packs were confirmed to be successful breeding pairs as of the end of 2020 and this was an increase of 30% (Table 1, Fig. 5). Without thorough survey efforts to confirm pups in the winter, successful breeding status in the CTCR packs could not be determined at the end of the year; however, pups were observed within the Frosty pack, Strawberry pack, and Nc'icn pack territories in 2020. WDFW surveyed pack sizes ranged from two to thirteen individuals and averaged 5.2 wolves per pack ($SD \pm 2.7, n=24$).

The Eastern 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 2020, the North Cascades recovery region had six packs, four of which were considered successful breeding pairs. This region would need to maintain four successful breeding pairs for three consecutive years to meet recovery objectives.

Although WDFW has documented individual wolves in the Southern Cascades and Northwest Coast recovery region, WDFW has not documented any resident packs in this region. 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 2020 population survey include the following:

- A new pack, Navarre, was confirmed in southwest Okanogan county south of the area occupied by the Lookout pack.
- A new pack, Onion Creek, was confirmed in Stevens County and is located west of the Smackout pack territory.
- A new pack, Vulcan, was confirmed in northern Ferry county west of the Togo pack.
- The Goodman Meadows pack split into two separate packs, one of which re-established the Skookum pack south of the Goodman Meadows territory in Pend Oreille County.
- WDFW winter surveys indicated only a single wolf maintaining a territory in both the Diobsud Creek pack and Kettle pack areas this winter; thus, no pack was confirmed in either area during 2020.

- There was evidence in late spring that the Butte Creek pack consisted of four adult wolves and produced nine pups; however, biologists were unable to count wolves in this pack during winter due to inaccessibility of the terrain in the wilderness area occupied by the pack.

Wolves continue to inhabit both public and private lands (Fig. 6), and 14 of the state’s 29 packs (including CTCR packs) had at least one collared wolf during 2020. Data from these wolves were used to assist WDFW in defining pack territories. The average (mean) territory size was 285 square miles (739 square kilometers), ranging from an estimated 97 to 656 square miles (250 – 1700 square kilometers).

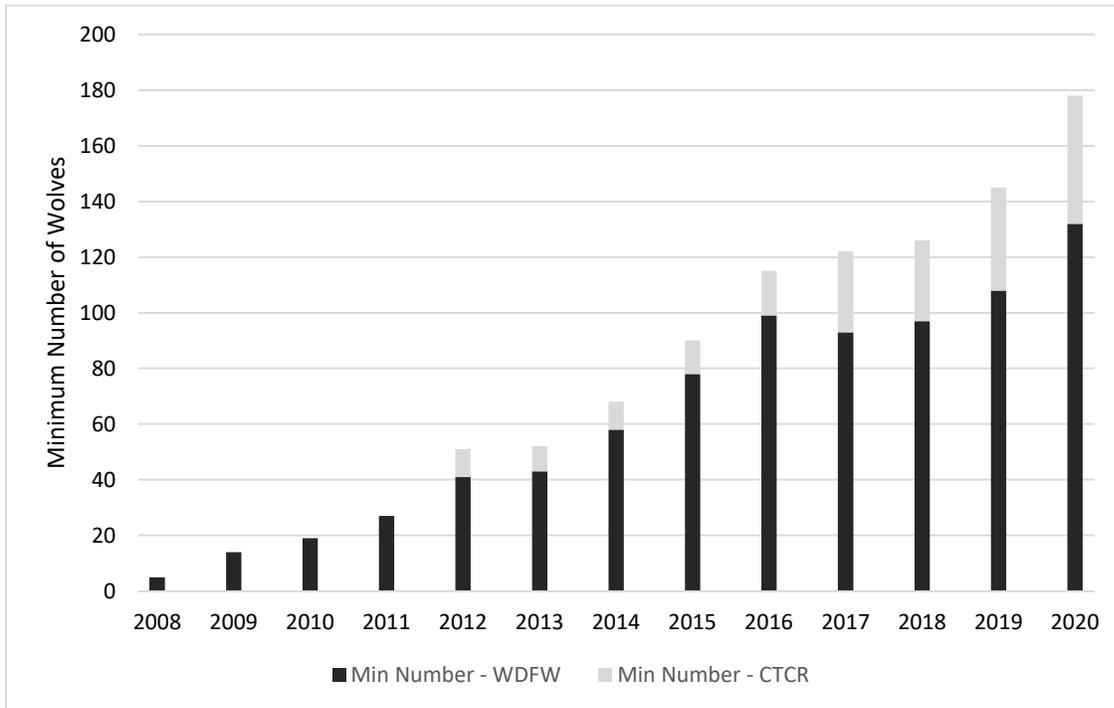


Figure 3. Minimum known number of wolves in Washington managed by Washington Department of Fish and Wildlife (WDFW), the Spokane Tribe, and the Confederated Tribes of the Colville Reservation (CTCR), 2008 – 2020. Numbers provided by CTCR reflect winter numbers incidentally gathered by biologists from hunters, trappers, and public observations rather than focused efforts to count wolves using year-end track, aerial, and camera surveys conducted by WDFW and tribal partners for 2020.

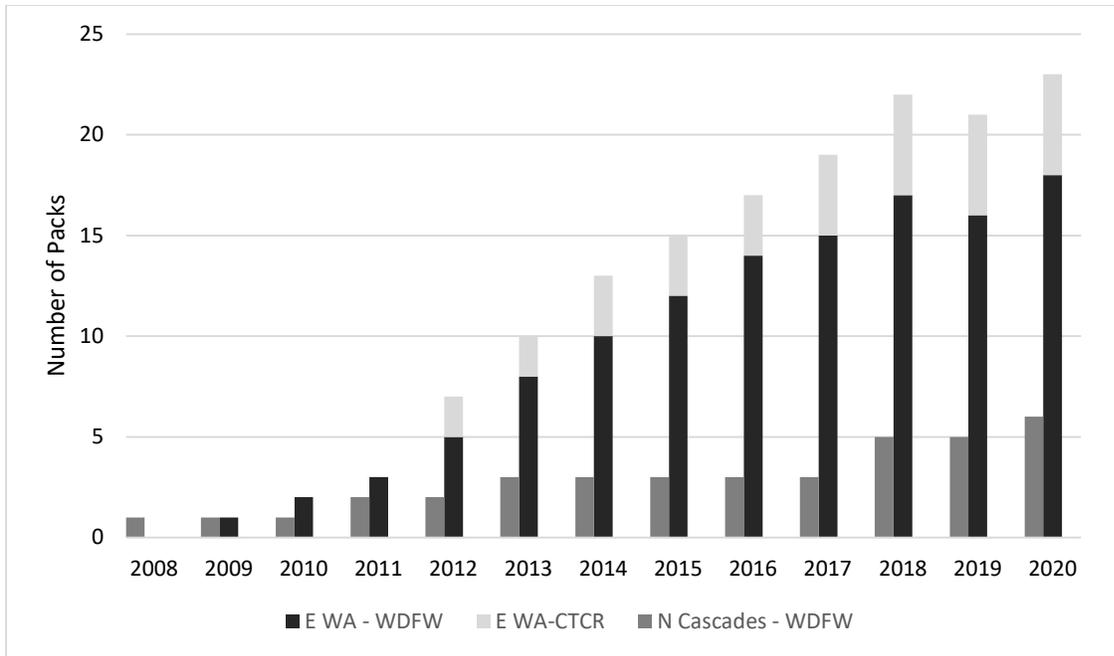


Figure 4. Minimum known number of packs by recovery region in Washington, 2008 – 2020. Wolf packs counted by Washington Department of Fish and Wildlife (WDFW), the Spokane Tribe, and Confederated Tribes of the Colville Reservation (CTCR) are displayed separately. There are no known packs in the Southern Cascades and Northwest Coast recovery region.

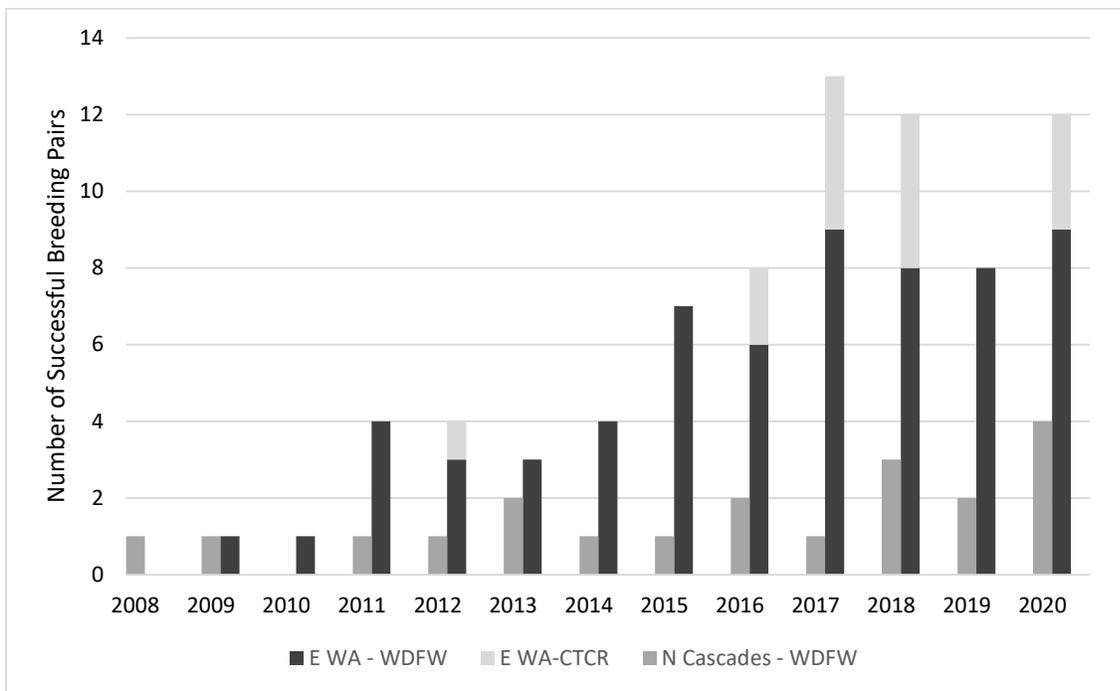


Figure 5. Minimum known number of successful breeding pairs by recovery region in Washington, 2008 – 2020. Wolf packs counted by Washington Department of Fish and Wildlife (WDFW), the Spokane Tribe, and Confederated Tribes of the Colville Reservation (CTCR) are displayed separately. There are no known packs in the Southern Cascades and Northwest Coast recovery region.

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 2020. Underlined and italicized packs were counted as successful breeding pairs. CTCR = Confederated Tribes of the Colville Reservation. Numbers provided by CTCR reflect winter numbers incidentally gathered by biologists, hunters, trappers, and public observations rather than dedicated efforts to count wolves using year-end track, aerial, and camera surveys conducted by WDFW and other tribal partners for 2020. CTCR and Spokane Tribe harvest numbers were documented by tribal biologists.

Wolf Pack	Recovery Area	Minimum Known Pack Size Dec 2020	Documented Mortalities					Known	
			Natural	Human	Unknown	Harvest	Control	Dispersed	Missing
Beaver Creek	E. Wash	3		1		1			
Butte Creek	E. Wash	unk							
<u>Carpenter Ridge</u>	E. Wash	6	1					1	
<u>Dirty Shirt</u>	E. Wash	5							
<u>Frosty (CTCR)</u>	E. Wash	10							
Grouse Flats	E. Wash	3							
Goodman Meadows	E. Wash	5						3	
<u>Huckleberry</u>	E. Wash	7							
<u>Kettle</u>	E. Wash	1							
<u>Leadpoint</u>	E. Wash	9						1	
Nason (CTCR)	E. Wash	8							
<u>Nc'icn (CTCR)</u>	E. Wash	9				3			
Onion Creek	E. Wash	3							
<u>Vulcan</u>	E. Wash	5							
Salmo	E. Wash	3							
<u>Skookum</u>	E. Wash	4							
<u>Smackout</u>	E. Wash	6		1					
<u>Stranger</u>	E. Wash	5		1					
<u>Strawberry (CTCR)</u>	E. Wash	10							
Togo	E. Wash	3							
<u>Touchet</u>	E. Wash	13							
Tucannon	E. Wash	4							
Wedge	E. Wash	2				1	3		
Whitestone (CTCR)	E. Wash	4				3			
<u>Diobsud Creek</u>	N Cascades	1							
<u>Lookout</u>	N Cascades	8						1	
<u>Loup Loup</u>	N Cascades	6							
Navarre	N Cascades	2							
Naneum	N Cascades	3							
<u>Sullivan Creek</u>	N Cascades	5							
<u>Teanaway</u>	N Cascades	5	1					2	
Misc/Lone Wolves	Statewide	20							
WASHINGTON TOTALS		178	2	3	0	8	3	8	0

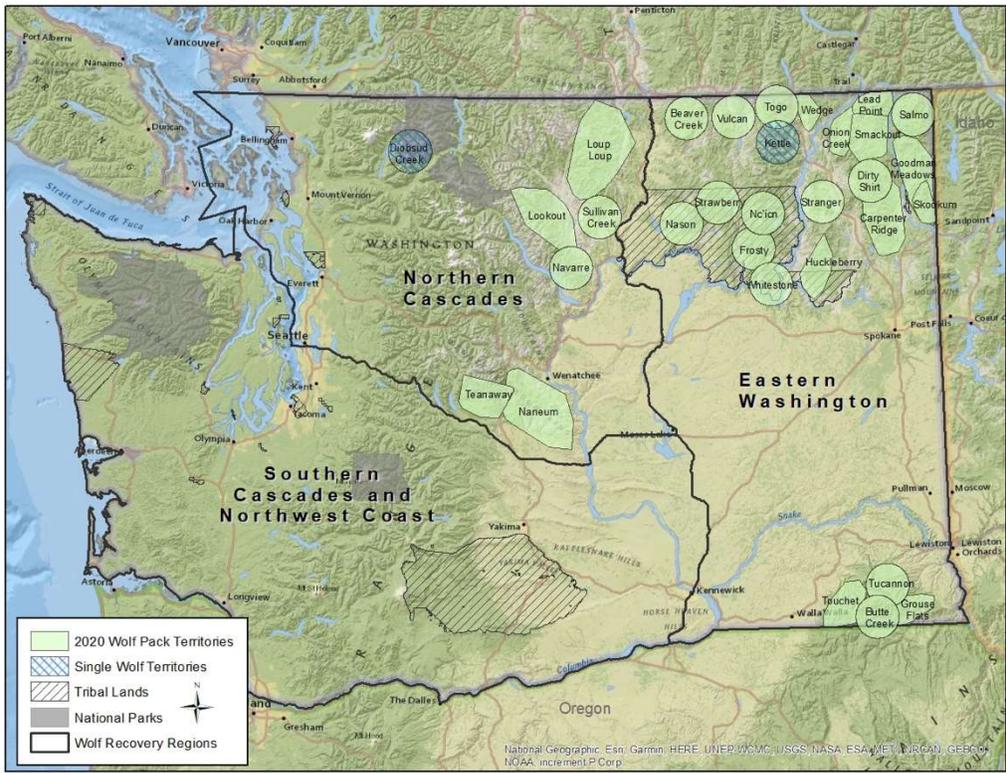


Figure 6. Known wolf packs and single wolf territories in Washington, 2020, not including unconfirmed or suspected packs or border packs from other states and provinces. The Touchet and Grouse Flats pack territory boundary is not displayed where it overlaps Oregon.

Wolf Captures and Monitoring

State, federal, and tribal biologists captured 12 wolves from eight different packs in 2020. Ten (10) adults, one yearling and one-nine-month-old pup were captured including six males and six females. Four wolves had been captured and marked in previous years. All captured wolves were fitted with either global positioning system (GPS) collars or very high frequency (VHF) radio collars.

Twenty-one radio-collared wolves were monitored from 14 different packs representing 48% of the known packs in Washington. However, due to mortalities, dispersals, scheduled collar releases, and radio collar failures, only 16 radio-collared wolves (fourteen GPS, three VHF collars) were being monitored at the end of the year. This accounts for approximately 9% of the minimum known population from 10 different packs (35% 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. Eight wolves wearing GPS or VHF radio collars dispersed from their pack territories in 2020 (Table 1, Fig. 7).

- 1.) WA32M was collared in the Teanaway Pack in May 2013 and recollared in May 2019. In March 2020, 32M dispersed and settled a short distance away in an area between the Teanaway and Naneum pack. He later died in late June or early July 2020.

- 2.) WA102M was collared in the Teanaway Pack in February 2020. He dispersed to the Naneum Pack territory in March 2020.
- 3.) WA93M was collared in the Lookout pack in May 2019. He dispersed roughly 480 miles north near the town of 100Mile House in British Columbia, Canada before radio contact was lost.
- 4.) WA80M was collared in the Goodman Meadows Pack in January 2018. He dispersed northeast toward Kootenay Lake in British Columbia, Canada before radio contact was lost.
- 5.) WA105M was collared in the Lead Point Pack in June 2020. He dispersed south into the Carpenter Ridge pack territory in December 2020.
- 6.) WA107F was collared in July 2020 as a two-year-old in the Carpenter Ridge Pack. In December 2020, she dispersed north to the area just west of the Smackout pack territory and formed a new pack called the Onion Creek Pack.
- 7.) WA41M was originally collared in July 2014 as an adult in the Goodman Meadows Pack. He was recollared as a member of that pack in January 2020. Around August 2020, WA41M and WA008F both dispersed/shifted south into the old Skookum pack territory where they raised two pups in 2020.
- 8.) WA008F was originally collared in June 2010 in the Diamond pack as a yearling. She was recollared in March 2015 as part of the Goodman Meadows pack. In February 2020, WA008F dispersed from the Goodman Meadows pack with WA41M and re-established a pack in the old Skookum pack territory.



Figure 7. Generalized dispersal paths for eight collared wolves that dispersed from known wolf packs in Washington in 2020.

Regulated Harvest

Regulated wolf harvest occurs on CTCR tribal lands for tribal members only. In September 2018, the CTCR established a hunting season for wolves with no annual harvest limits for both the North Half and South Half of the Colville Reservation. A change to the regulations occurred in February 2019, allowing for a year-round hunting season for wolves. The 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 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 eight wolves in 2020. Six of the wolves were harvested on the South Half and two wolves were harvested on the North Half of the Colville Reservation.

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 reported no wolves harvested on the reservation.

No regulated harvest occurred in Washington outside of the CTCR and Spokane Indian tribal lands.

Mortalities

WDFW documented 16 wolf mortalities during 2020 (Table 1), including three removed by the department in response to wolf-livestock conflict, eight legally harvested by tribal hunters, one killed by a vehicle, two that died of natural causes (one of old age, one of broken leg and infection), and one that was shot due to a perceived threat to human safety, and one unknown.

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 2020, investigators confirmed that wolves were responsible for nine cattle deaths (Fig. 8), injuries to 30 cattle, and the injury of one herding dog (Table 2). Additionally, three calf mortalities and two injured calves were considered probable wolf-caused depredations. Most mortalities occurred during the summer-fall grazing season from June through August (Fig. 9).

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

Number of Packs Involved in Livestock Depredations

Seven of the 29 (24%) known packs that existed in Washington at some point during 2020 were involved in at least one confirmed livestock mortality or injury (Fig. 10). Seventy-six percent of Washington's wolf packs were not involved in any known livestock depredations.

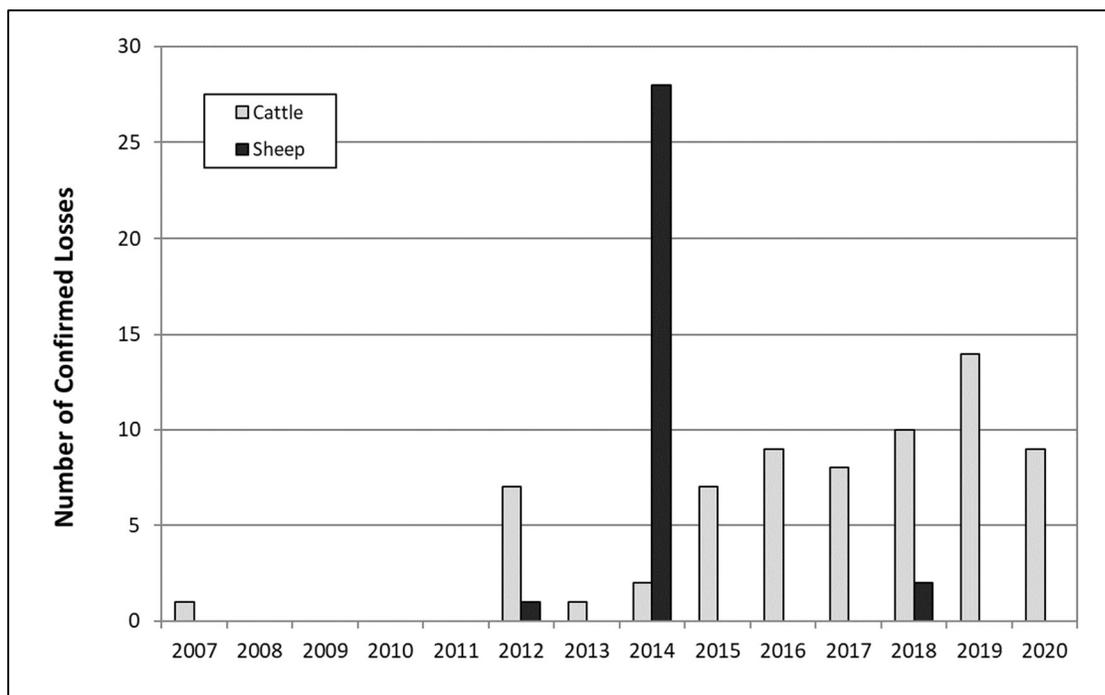


Figure 8. Total number of confirmed wolf-caused livestock mortalities in Washington, 2007-2020.

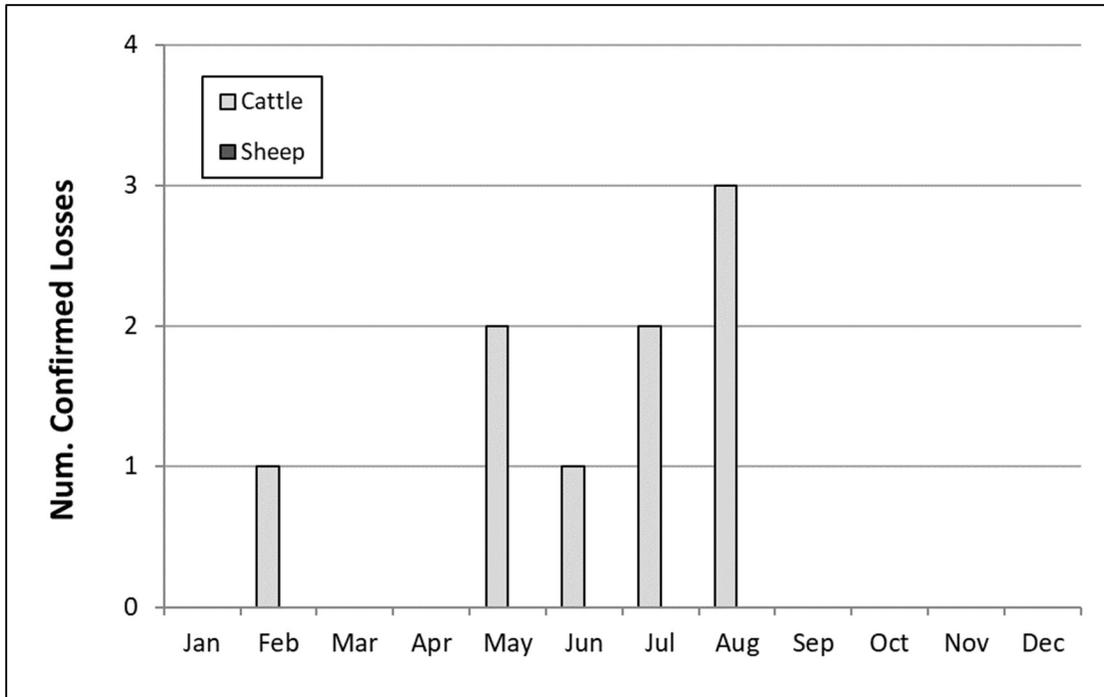


Figure 9. Number of confirmed wolf-caused livestock mortalities by month in Washington, 2020.

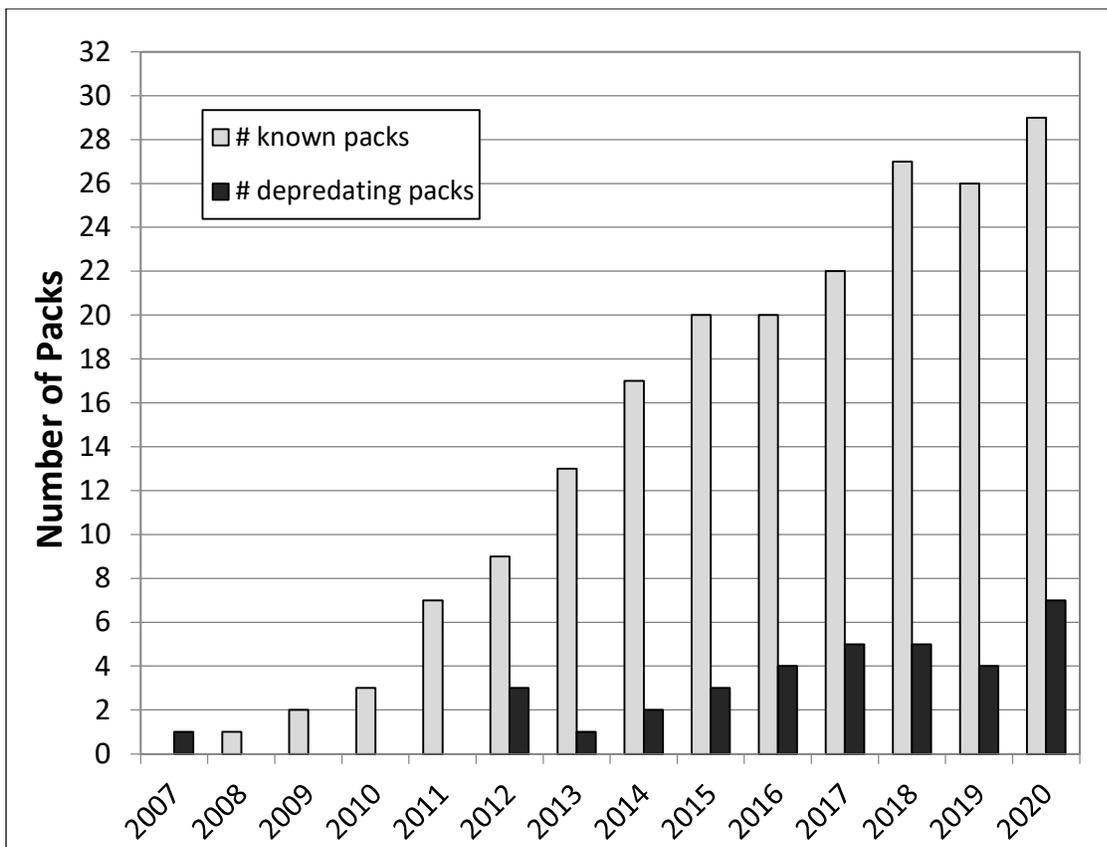


Figure 10. Minimum number of known packs that existed at some point during the calendar year and the number of confirmed depredating packs (on livestock) in Washington, 2007 – 2020.

Minimizing Wolf Conflicts with Livestock

One goal of the Plan is to manage wolf-livestock conflicts without undermining the recovery and long-term perpetuation of a sustainable wolf population. In 2020, as in previous years, preventative measures were used in an attempt to minimize livestock depredations.

Measures included:

- Non-electrified and electrified fladry (red flagging strung around a pasture),
- Radio-activated guard (RAG) boxes,
- Fox lights (Foxlights International PTY LTD, Bexley North Australia),
- Livestock guard dogs and range riders.

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 transfers 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 2020, lethal removal was authorized in three packs (Togo, Wedge, and Leadpoint), which resulted in three wolves from the Wedge pack (the entire known pack) being killed during two separate agency lethal actions (See Appendix A for a summary). The Department did not remove wolves from any other pack in 2020.

Table 2. Confirmed wolf-caused livestock and dog injuries and mortalities in Washington, 2013-2020.

	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

In the western two-thirds of Washington, where wolves remained classified as an endangered species in 2020 under the ESA, the USFWS was the lead management agency (Fig. 2). The ESA prohibited lethal removal in this part of the state. No wolves were captured or relocated through USFWS actions.

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. These permits could not be issued in the western two-thirds of the state where wolves remained federally listed. WDFW did not issue any permits to livestock producers in 2020.

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. Since January 2021, wolves were Federally delisted from the ESA and now are under WDFW management statewide following the guidance of the Plan. 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. No wolves were killed by landowners protecting livestock under the caught-in-the-act (CIA) rule for the Eastern Washington recovery region in 2020.

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 conflict prevention measures.

During the calendar year 2020, WDFW had cooperative agreements with 33 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). WDFW had \$180,000 allocated to fund DPCAL's in 2020, but WDFW paid producers \$110,035 for DPCA-L reimbursements.

During calendar year 2020, WDFW paid 23 range riders \$151,640. WDFW contracted with 15 private vendors for range riding services; however, through subcontracts, 23 range riders were employed for the 2020 grazing season. In addition, Northeast Washington Wolf-Cattle Collaborative (NEWWCC) supported 20 full or part-time range riders during the 2020 grazing season at a cost of

\$242,522, and Cattle Producers of Washington (CPoW) supported five (four full and one part-time) range riders at a cost of \$132,000 to assist producers in monitoring livestock to minimize interactions with wolves.

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 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.

WDFW Livestock Depredation Program

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, and 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 probable. 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.
 - **For each probable depredation**, WDFW compensates producers for the full market value of only the affected animal(s).
 - **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 current 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 five direct claims in 2020 and paid \$17,201 to compensate livestock producers who experienced livestock losses or injuries caused by wolves.

Livestock Review Board

WAC 220-440-170 provides for potential compensation of indirect losses experienced by commercial livestock owners subject to the restrictions in the WAC. The primary objective of the [Livestock Review Board](#) is to review claims filed for indirect losses (e.g., greater than normal losses, reduced weight gain, reduced pregnancy rates) that may have been caused by wolves and recommend to WDFW whether the claim should be paid. The board is composed of five citizen members, with two representing the livestock industry, two representing conservation interests, and one member at-large.

One claim was filed with the board for indirect losses caused by wolves that occurred during the 2019 grazing season and a settlement of \$44,788 was agreed upon after appeal in 2020 and will be paid in 2021. Another indirect loss claim was filed with WDFW for the 2020 grazing season for \$52,483.50 and is still under review and payment has not been finalized.

State Grants for Non-lethal Conflict Prevention Activities

During 2020, 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 was funded \$189,492 and CPoW was funded \$144,908 for non-lethal deterrence through range riding, and projects such as fencing for calving areas to provide long-term solutions to prevent wolf-livestock interactions.

WDFW Creative Solutions to Reduce Livestock-Wolf Interactions

With the increasing challenges of wolf management in Washington, WDFW staff began a pilot project initially coined “creative solutions” to identify and develop additional tools for reducing wolf-livestock interactions. These tools will be focused on areas known for repeated depredations in this upcoming 2021 grazing season. Examples of these include but are not limited to, using VHF ear tags for cattle for ease of locating where they are on the allotment, reflective collars and bell to place on livestock as an additional tool for cattle location, notification beacons that work in concert with GPS collars to notify range riders when cattle are grazing near known dens and rendezvous sites, stockpiles of deterrent tools available in areas convenient for producers to access, and issuing Garmin InReach handheld GPS/Satellite Communication devices to range rider giving them not only a convenient way of providing GPS tracks of their daily activity but also having a means of communication (text messaging) when operating in the rugged remote areas where no cell service exists.

Another project underway is the development of a state-of-the-art new Radio Guard (RAG) Box. A multi-agency/non-government organization (NGO) collaborative design team worked together with a technician to identify what field operational needs would enhance this device that is triggered by radio collared wolves and delivers a variety of flashing lights and sounds as a deterrent. The new RAG box will have many new features including extended battery and self-charging capability, remote monitoring, data collection, etc. The prototype is near ready for field testing and will be deployed in the next weeks.

Wolf Interactions with Ungulates

Ungulate populations naturally fluctuate over time and space 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.

Through support from state legislators, WDFW began a five-year research study on predator-prey dynamics. WDFW staff have been working in cooperation with faculty and graduate students at the University of Washington to better understand carnivore and ungulate interactions as wolves recolonize Washington. The [Washington Predator-Prey Project](#) is quantifying the effects of wolf predation on ungulate species demographics in the areas where wolves are naturally recolonizing. This study also examines the effects of the wolf recolonization on cougar foraging and population dynamics. WDFW initiated the research in December 2016 and work is occurring in two study areas within Okanogan and Stevens Counties. See the research updates section below to learn more about these projects.

Research Updates

Ongoing Projects:

Title: [Washington Predator-Prey Project](#)

Principle Investigators: Dr. Melia Devivo & Dr. Brian Kertson

Cooperators: Washington Department of Fish and Wildlife, University of Washington

Project Summary: The Predator-Prey Project seeks to quantify the effects of recolonizing wolf populations on co-occurring ungulate species and another top predator, the cougar. The two primary objectives of this project are to 1) examine the effects of wolf predation on ungulate demography and population growth and 2) investigate the impacts of recolonizing wolves on cougar population dynamics, space use, and foraging behavior. This project consists of two study areas: one in northeast Washington encompassing the majority of Stevens and Pend Oreille counties, where the wolf population is larger and more widely distributed, and the other in Okanogan county in north-central Washington where the wolf population is smaller and portions of suitable habitat remain unoccupied. There is increasing understanding that a multi-species approach to predator-prey studies is relevant to account for the various interactions among apex predators and their prey. To implement a system-based approach, Washington Department of Fish and Wildlife and University of Washington project personnel captured and radio-collared 93 elk, 230 white-tailed deer, and 34 cougars in NE Washington and 137 mule deer and 21 cougars in the Okanogan. The project will also attempt to maintain at least two active GPS collars on wolves in each project study pack. Research efforts were initiated in December 2016 and slated to continue through 2021.

Title: Coast to Cascades Habitat Connectivity Analysis for a Reestablishing Gray Wolf Population

Principle Investigators: Wolf Haven International, Defenders of Wildlife, Conservation Northwest, Washington Department of Transportation, Washington Department of Fish and Wildlife, Conservation Biology Institute, Washington Conservation Science Institute

Project Summary: Efforts begun by the Washington Wildlife Habitat Connectivity Working Group (WWHCWG) to model connectivity for multiple species in an area of western Washington dubbed the “Cascades to Coast,” have morphed into a collaboration to build a similar model for the gray wolf. Multiple non-governmental organizations, government agencies and members of academia comprise this team, whose primary goals involve identifying and prioritizing gray wolf corridors, while also ranking core habitat important to a reestablishing gray wolf population. This information is intended to support the goals of the statewide wolf recovery plan, as well as provide a tool for proactive gray wolf conflict mitigation. Finally, this broad model will help pinpoint locations for future fine-scale research.

Title: Ungulate - Predator Dynamics in Northern Washington

Graduate Student (PhD): Taylor Ganz, University of Washington

Major Advisor: Laura Prugh, University of Washington

Cooperators: Dr. Melia DeVivo, Washington Department of Fish and Wildlife

Project Summary: As a component of the WDFW/UW Predator-Prey Project, this team seeks to determine how wolves impact mule deer, white-tailed deer, and elk within the context of other predators, varied habitat and nutrition, and human use of the landscape. GPS and radio-tracking collars are used to compare the rates and causes of mortality and movement patterns of ungulates between wolf occupied and wolf un-occupied areas. 2020 was the fourth year of fieldwork for this project, and data collection will conclude in 2021 as collared animals continue to be tracked. In 2020, 31 neonatal white-tailed deer, 18 juvenile white-tailed deer, 35 adult female white-tailed deer, 35 mule deer, 10 neonatal elk, and 7 adult female elk were collared. As of the end of 2020, collars have been deployed on 230 white-tailed deer (149 fawns and 131 adult females), 137 mule deer (all adult female, fawns are not captured as part of this study), and 93 elk (63 adult female and 30 calves). Mule deer captures will continue in winter 2021, but white-tailed deer and elk captures are complete for this study. Habitat structure and vegetation was surveyed at 100 randomly selected sites and 29 collared ungulate mortality sites in GMU 121 and 117, to understand how habitat structure and availability of nutrition influence ungulate movement and vulnerability to predators. Between 2019 and 2020, a total of 262 sites have been surveyed in GMUs 121 and 117, which concludes vegetation surveys.

Title: Spatiotemporal Patterns of Predator-Prey Interactions

Graduate Student (PhD): Sarah Bassing, University of Washington

Major Advisor: Beth Gardner, University of Washington

Cooperators: Dr. Melia Devivo, Dr. Brian Kertson, Trent Roussin, and Matt VanderHaegen, Washington Department of Fish and Wildlife

Project Summary: Wolves and other carnivores can influence the behaviors of their prey, which can affect when and how prey animals use habitat across the landscape. As part of the Washington Predator-Prey Project, our goal is to better understand how predator-prey interactions influence the spatial distribution and activity patterns of species in a multi-prey (e.g., deer and elk), multi-predator (e.g., cougars, bears, coyotes) ecosystem where wolves are present on the landscape. We have deployed and maintained remotely sensed cameras in Pend Oreille, Stevens, and Okanogan Counties since June 2018. The cameras collect data year-round and will remain deployed through May 2021, generating photo-capture data from over 350 camera stations in total. To date, 67 University of Washington undergraduate interns have classified and counted the species detected in more than 2,000,000 images. Microsoft AI for Earth is being utilized in this project to use machine learning and image recognition to expedite image classification. All species of primary interest to the project have been detected on camera (white-tailed deer, mule deer, elk, moose, cougar, bobcat, coyote, and wolf). Wolves have been detected at 47 cameras during the first two years of data collection, providing information on wolf occurrence, evidence of reproduction, and even early detection of the recently established Sullivan pack.

Photo-capture data is being used to address four broad research questions: 1) how does predator hunting behavior and seasonal constraints on prey resources influence habitat use among a community of species, 2) how do antipredator behaviors vary with predation risk at different temporal scales, 3) how do the spatial and temporal distributions of game species change during hunting seasons, and 4) how does camera placement and animal behavior influence camera trap data under a multi-species monitoring framework? It is hoped that results from this research will improve understanding of how recolonizing wolves influence the broader ecological community in eastern Washington and may help inform a monitoring program for wolves across the state.

Title: Interactions between wolves and cougars in eastern Washington State

Graduate Student (PhD): Lauren Satterfield, University of Washington

Major Advisor: Aaron Wirsing, University of Washington

Cooperators: Dr. Brian Kertson, Washington Department of Fish and Wildlife

Project Summary: Wolves (*Canis lupus*) recolonized Washington starting in 2008 and have grown to an estimated population of at least 178 individuals across 29 confirmed packs. Cougars (*Puma concolor*) occupy a similar niche as wolves by hunting large prey, and likely compete directly and indirectly with wolves for space and food resources. Working as part of the WDFW/UW Washington Predator-Prey Project, a multiple predator-multiple prey research study, the interactions between wolves and cougars in landscapes in northeast and north central Washington are being examined. This PhD project aims to understand whether and how a) the recolonization of wolves in Washington State is impacting cougar resource selection, b) the co-occurrence of wolves and cougars impacts risk landscapes for ungulate prey, and c) anthropogenic landscape impacts and human presence influence resource use for both predators. To date, 60 cougars and 16 wolves (representing 6 packs) have been fitted with GPS collars, which has allowed visitation of 477 potential cougar feeding sites and 211 potential wolf feeding sites across two study areas totaling 10,000 square kilometers (3860 square miles) from 2017 to 2020. Field investigations for both predators involve searches to classify the location as either a probable feeding site (when a carcass is found), or a probable resting site (when no carcass is found). During investigations, species, age, sex, condition, and location of prey are recorded when possible, along with habitat and terrain characteristics at both feeding and resting sites. At a subset of locations, camera traps are placed while cougars are still active at cougar feeding sites to assess prey handling times, kleptoparasitism, and scavenging by other predators. To date, 54 cameras have been placed at cougar feeding sites and another 73 cameras have been placed on other dead deer (e.g., found opportunistically or GPS collared deer that died) resulting just under 1 million camera trap photos of feeding and scavenging events. Wolf and cougar GPS location data, and locations of cougar and wolf feeding sites, will be used to quantify both cougar and wolf space use (especially changes to cougar space use in relation to wolf pack density) and potential encounters between these two apex predators. Information gained will be valuable when setting management goals for both cougars and ungulates, as well as for understanding how wolves and cougars might alter their use of the managed landscape in which they reside. Project fieldwork began December 2016 and concluded in July 2020. Dissertation completion is anticipated by Dec 2022. More information can be found on the "Wolf-Cougar

Interactions” page of Washington Predator-Prey Project website:
<https://predatorpreyproject.weebly.com/wolf-cougar-interactions.html>.

Title: Interactions among Large and Small Carnivores in Washington

Research Scientist: Becca Windell, University of Washington

Principle Investigator: Laura Prugh, University of Washington

Cooperators: Dr. Brian Kertson, Washington Department of Fish and Wildlife

Project Summary: This study aims to better understand how large predators (i.e., wolves and cougars) influence the behavior, movements, and population dynamics of mesocarnivores (i.e., coyotes and bobcats). The primary objectives of this study are to: 1) install remote wildlife cameras at a variety of ungulate mortality sites to investigate mesocarnivore scavenging behavior; 2) deploy GPS collars on mesocarnivores to track survival and patterns of avoidance and attraction in response to large carnivores; and 3) collect scat for fecal genotyping to measure key mesocarnivore population parameters. The mesocarnivore study works in collaboration with the Washington Predator-Prey Project in both the Northeast and Okanogan study areas, and 2020 was the mesocarnivore team’s third field season. At the conclusion of the 2020 field season, a total of 37 bobcat collars, 35 coyote collars had been deployed and 2377 scats collected. With WDFW, the wolf-cougar (Lauren Satterfield), and ungulate (Taylor Ganz) teams, 184 cameras were deployed on ungulate carcasses to monitor scavenging. Mesocarnivore collaring efforts concluded in 2020; however, in 2021 the mesocarnivore team will continue to monitor collared animals, collect scat, and deploy cameras at ungulate carcass sites.

Title: Influence of Gray Wolves on Interspecies Movement Patterns in the Central Cascades

Undergraduate Student: Story Warren, University of Montana

Major Advisor: Mark Hebblewhite, University of Montana

Cooperators: Dr. Ben Maletzke, Washington Department of Fish and Wildlife, Sarah Bassing, University of Washington

Project Summary: Soon after gray wolves (*Canis lupus*) began recolonizing Washington in 2008, wolves reappeared in the Central Cascades. As wolves return to Washington ecosystems, they may impact how other species use the land. For example, coyotes (*Canis latrans*) may avoid wolves to minimize the risk of direct conflict. Conversely, coyotes may follow wolves in order to increase their opportunity to scavenge wolf kills. This undergraduate research project aims to investigate whether and how gray wolves influence the spatial and temporal movement patterns of other species in a Central Cascades ecosystem. Within the known territory of a Central Cascades wolf pack, a study area composed of a grid of sixteen 25 km² cells was established. In May and June of 2018, 16 remote cameras were deployed. To maximize the probability of detecting animals moving through the landscape, cameras were set to photograph animals traveling on gated roads and trails within each cell. A multi-species evaluation will be conducted to examine the interspecies effects of wolf occurrence. Analyses will include examining the influence of wolf occurrence on coyote

movements. Data collection has concluded, and research cameras were removed from the study area in August 2019. Image classification has been completed and data analysis is ongoing.

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 Summary: To date, the majority of Washington State's wolf recolonization has occurred north of the Interstate-90 highway. Our study aims to determine *how wolf recolonization of Central WA will impact the predator-prey community as well as the occurrence of human-wildlife conflict*. For the past three years we have been monitoring the distribution and diets of the medium to large carnivores in the Cascade Mountain Range, from I-90 south to the Columbia River, prior to wolf presence in the area. Wolf impacts will be based on changes in these measures once wolf recolonization occurs.

The study area covers 11,000km² across the Eastern Cascade Region of Central Washington, from I-90 south to the Columbia River. The study area includes 3,000km² of Yakama Nation land and areas within Mount Rainier National Park. In total, over 4,000 georeferenced carnivore scats have been collected by scat detection dog teams during the 2018, 2019 and 2020 survey seasons. The detection dogs were trained to detect wolf, cougar, coyote, bobcat, coyote, wolverine, fisher, and fox scat that were georeferenced and collected for DNA analysis of species ID and diet. During the 2020 season, three dog teams collected 1,670 scat samples between June and November. Of these samples, 345 carnivore scat samples were collected on Yakama land, and 64 samples were collected in Mount Rainier National Park.

DNA extracted from the 4,000 samples are being analyzed using metabarcoding methods to identify the carnivore species that left each sample as well as all wild and domestic prey found in their scat at the time of collection. Since existing genetic measures have difficulty distinguishing wolves from domestic dogs, we developed and published a new method using single nucleotide polymorphisms (SNPs) that is able to reliably discriminate wolves from domestic dogs (Reese et al. 2020. Conservation Genet Resour. <https://doi.org/10.1007/s12686-020-01130-2>). This method enables us to exclude domestic dogs from our analyses.

Our Center conducted wolf surveys in NE Washington between 2015 and 2017 and estimated a higher population of wolves than those determined by Washington Department of Fish and Wildlife. This difference could have been due to our detection dogs locating a higher number of transient individuals not detected by conventional methods. However, it is also possible that the six microsatellite DNA markers we used to identify unique wolves were insufficient to reliably estimate the wolf population size in NE Washington. To address that concern, we are now validating a larger panel of 15 microsatellite DNA loci to assure the accuracy of our wolf population estimates. Twelve of the 15 loci are the same as those used by Washington Department of Fish and Wildlife to determine the individual identities and relatedness of wolves. The new panel will be used to re-estimate the wolf population size in NE Washington at the time of our earlier study, and will also be applied to any new wolf samples collected south of I-90. The overlap in these markers will also

help determine the origin of wolves found south of I-90 by comparison to the state's genetic database.

We are still genetically determining the carnivore identities and their associated diets from the 4,000 scats we collected between 2018 and 2020. For the 2018 season we processed nearly all the samples for species ID and did not find any wolf scats south of I-90. We also did not detect any wolves among the 10% of samples from 2019-2020 that visually appeared to be most likely of wolf origin. This research is funded by a grant from the Washington State Legislature.

Title: Methods for Long-term Monitoring of Wolves

Graduate Student (MS): Trent Roussin, University of Washington

Major Advisor: Beth Gardner, University of Washington

Cooperators: Washington Department of Fish and Wildlife

Project Summary: In coordination with the WDFW/UW predator-prey project and WDFW, camera traps and bioacoustic monitors are being used to develop more efficient methods to accurately monitor Washington's expanding wolf population. These tools will be used in addition to GPS telemetry data to gain a better understanding of the biotic and abiotic factors that influence wolf distribution and densities on local and statewide scales. During 2020, this team worked with other members of the Washington Predator-Prey Project and WDFW staff to retrieve and redeploy cameras and bioacoustic recorders at 240 random sites across roughly 10,000km² in northeastern and northcentral Washington. Bioacoustic recorders were also placed near known wolf rendezvous sites in Northcentral Washington. In total, roughly 90,000 hours of acoustic data and roughly 1,000,000 images were collected in 2020. Audio data collected from wolf rendezvous sites in 2019 was used to train machine learning algorithms to identify wolf howls, and this is being used to efficiently process the acoustic data from the 120 random sites during 2019, as well as data from 120 new random sites in 2020. In addition to training machine learning algorithms, the data from the rendezvous sites is also being used to document reproductive success, count individuals within packs, and determine daily and seasonal howling rates. The data from the random sites will be used to document habitat use, occupancy, and recolonization of current and new packs on the landscape.

In 2021 we will retrieve cameras and bioacoustic recorders deployed during 2020 from the 120 random locations in northeastern and northcentral Washington. Bioacoustic recorders will also be placed at 10-15 known wolf rendezvous sites across the state. Data from these deployments will be processed and analyzed throughout 2021. Results from this research will improve the ability to accurately and efficiently monitor and estimate wolf population metrics in Washington.

Title: A semi-spatial integrated population model to assess the population dynamics of wolves in Washington state

Postdoctoral Researcher: Lisanne Petracca, Washington Cooperative Fish and Wildlife Research Unit, University of Washington

Principal Investigators: Sarah Converse (US Geological Survey, Washington Cooperative Fish and Wildlife Research Unit, University of Washington) and Beth Gardner (School of Environmental and Forest Sciences, University of Washington)

Cooperators: Dr. Ben Maletzke (Washington Department of Fish and Wildlife), Sarah Bassing (University of Washington), Robert Long (Woodland Park Zoo), Jason Ransom (National Park Service), Lisa Shipley (Washington State University), Daniel Thornton (Washington State University)

Project summary: Washington State law requires a periodic review of the status of gray wolves, given their status as a state-protected species. During a status review, progress toward recovery criteria can be assessed. The purpose of this project is to develop a population model for gray wolves in Washington, leveraging multiple data sources that have been collected over the past 13 years by WDFW and other researchers, to inform this status review. Integrated population models (IPMs) have proven useful for making inference about population dynamics (e.g., abundance, survival, reproduction) by integrating multiple data streams. More recently, spatially explicit integrated population models (SIPMs) have leveraged the power of spatial capture-recapture approaches, resulting in spatially explicit estimates of population dynamics. A full SIPM approach requires information on the spatial observation process to correctly model spatially explicit data, a component that was missing for wolves in Washington. However, the team wanted to leverage the power of SIPMs to describe the recolonization process, which is critical to wolf recovery and are developing a semi-spatial integrated population model, based on telemetry, camera trap, and count data from wolves in Washington. In this model, non-spatial data on survival and reproduction will be integrated into a semi-spatial model comprising [1] territory size estimated from telemetry data, [2] territory-specific count data, [3] probabilities of dispersal specific to month, age, and pack size estimated from telemetry data, [4] least-cost movement paths between territories of origin and potential new wolf territories (estimated from telemetry data and a second-order resource selection function [RSF]), and [5] a process by which a wolf can remain in a potential territory based on an underlying habitat suitability model (estimated using camera trap data). This model will allow for estimation of demographic rates and dispersal and provide projections of expected time to recovery, future distribution, and future abundance under a variety of ecological and management scenarios. Information on these demographic outcomes will inform the status review for wolves in Washington state.

All the data has been compiled and the team is currently developing and testing models. Model results are expected in April or May 2021.

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 2020, 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, local interest groups, and professional conferences.

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.

WDFW staff made a concerted effort to do an increased amount of wolf outreach via social media in 2020. This included sharing media articles and wolf content via WDFW's Facebook, Twitter, Instagram, YouTube, and blog accounts, as well as providing links to new information posted on the WDFW website, and broadcasting wolf presentations and other events using Facebook Live. WDFW also produced several [videos and recorded presentations](#) about wolves in 2020.

Wolf Advisory Group

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

The WAG met five times (once in person and four virtual) and held four conference calls in 2020. Core goals of the WAG are to reconcile divergent views and build resilient relationships among stakeholder groups, including WDFW. As such, the 18-member WAG spent time developing relationships that foster respect, honest dialogue, and mutual learning. The WAG continued development of a revision of the wolf-livestock interaction protocol last revised in 2017. This revision reframes the overarching goal of the protocol, adds definition to the critical task of range riding, and addresses chronic conflict areas in the state. All WAG meetings are open to the public. [Agendas, notes, handouts, and meeting minutes](#) are posted on WDFW's website.

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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. 2020 – 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 2020 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 three packs in 2020: Togo, Wedge, and Leadpoint. The lethal removal operations resulted in WDFW staff lethally removing three wolves from the Wedge pack, but no wolves were removed from the Togo or Leadpoint packs.

In Togo, WDFW utilized a helicopter to attempt to remove wolves, but due to the dense forest cover and terrain, did not remove any during this operation. The affected livestock producer and range riders continued to utilize nonlethal tools and depredations subsided. After the helicopter operation, the decision was made to move to an evaluation period to monitor the situation. No depredations occurred in Togo the rest of the year.

In Leadpoint, WDFW staff utilized trapping as a method to target wolves interacting with livestock in private pastures where the depredations had been occurring. Traps were set in and surrounding the pasture and monitored daily. With this action in conjunction with the nonlethal methods already employed, depredations subsided. After running the trapline for 14 days with no wolf activity in the vicinity and no further depredations, the decision was made to move to an evaluation period for the Leadpoint pack. No further depredations occurred the rest of the year.

For the Wedge pack, a summary of the lethal removal operations and the events that led up to them are described below.

Summary of Events Leading to the Wedge Pack Lethal Removal Operation

Background

WDFW has been monitoring the Wedge pack annually and three wolves were observed from track and camera surveys in the winter of 2019/20. The pack appeared to have two adults and one pup that had survived to Dec 31, 2019 but did not meet the definition of a successful breeding pair. This was documented in the Washington Gray Wolf Conservation and Management 2019 Annual Report.

Timeline: Summer 2019 – December 2020.

On June 12, 2019, WDFW staff investigated a report of two cow carcasses discovered in Stevens County by ranch staff. One carcass of an adult cow was discovered on June 10 and another was discovered the following day about a quarter of a mile away. Both cows were grazing on private leased property within the Wedge pack territory.

The first carcass was scavenged but mostly intact. No hemorrhaging was documented on the skin; possible hemorrhaging was noted on the distal portions of the right rib bones, but no bones were broken. Despite a thorough investigation, no sign of injury by wildlife was located and the cause of death for this cow was unconfirmed. The carcass was scavenged on by bears, turkey vultures, and coyotes based on sign and a trail camera placed by a Stevens County Special Deputy.

The second carcass was mostly intact with some scavenging identified. Bite wounds were documented on the tail, both rear legs, right elbow, and throat. Hemorrhaging was noted at all locations accompanied by bite wounds with varying degrees of severity. Based on the combination of bite wounds with associated hemorrhaging and wolf sign in the area, WDFW staff classified this event as a confirmed wolf depredation. It was evident from sign and scavenging patterns that the carcass had also been fed on by bears.

Proactive, non-lethal deterrents (range riding, human presence, monitoring via trail camera, and hazing of wolves when seen) were in place at the time of the depredation. The carcasses were left to be scavenged and were monitored near daily for further interactions as cattle were no longer in the area. Trail cameras were placed on the carcasses to continue to monitor activity.

Wolf biologists scouted the area but were unable to find enough fresh sign to warrant deploying traps. Wolf biologists continued to deploy cameras to monitor wolves in the Wedge pack territory in August 2019. No other depredations occurred during the summer or fall of 2019.

WDFW staff and an outdoor journalist documented tracks of three wolves while conducting a winter track surveys in March 2020.

On May 11, 2020 WDFW staff responded to conduct an investigation on an injured calf in a private pasture in Stevens County. The investigation revealed puncture wounds and lacerations consistent

with injury by wolves. The combination of bite wounds and lacerations with associated swelling, wolf tracks scattered throughout the pasture, witness accounts, and howling heard in the area were all consistent with a confirmed wolf depredation.

The injured calf was monitored but died from its injuries the following day. The affected livestock producer lives near the pasture where the incident occurred. Wolves were hazed away from the calf when it was being attacked. A Cattle Producers of Washington (CPOW) range rider was assigned to the area.

On May 19, WDFW staff responded to a report of a dead calf in a private pasture in Stevens County. A second injured calf was located in an adjacent pasture after the first depredation investigation was completed.

The investigation of the dead calf revealed bite wounds, lacerations and hemorrhaging consistent with wolf depredation. Wounds accompanied by significant hemorrhaging were documented. The carcass was removed from the pasture and disposed of.

The investigation of the injured calf showed bite wounds and lacerations consistent with a wolf attack. Swelling was noted on both rear legs. The calf was accounted for and uninjured as of May 11, therefore the injuries occurred within the last week and were estimated to be at least two days old. The calf was treated for its wounds and was monitored.

The combination of bite wounds and lacerations with associated hemorrhaging, wolf tracks, signs of a struggle, and trail camera photos provide evidence consistent with confirmed wolf depredations.

The affected livestock were pastured near the livestock producer's home; they were checked daily and there was regular human presence in the area. Following these depredations, WDFW staff placed Fox lights along the pasture and an additional (two total) CPOW wolf-livestock conflict monitor was assigned to the area.

These incidents were the second and third depredations in approximately one week attributed to the Wedge pack. Because WDFW was exploring additional avenues for responsive nonlethal deterrents and gathering more information about the Wedge pack, lethal removal was not considered at the time. WDFW staff continued to work with the producer and CPOW as well as continued to monitor the area to mitigate future conflict.

The affected livestock producer had proactive, nonlethal deterrents (calving near the producer's home, monitoring for sick/injured livestock, carcass sanitation, human presence, and hazed wolves away during the first depredation incident) in place at the time of these depredations. WDFW was supportive of the livestock producer's efforts and continued to collaborate with this producer and others on wolf-livestock conflict mitigation.

Toward the end of May, wolf biologists started trapping in the area near where the depredations were occurring to try to collar a wolf in the Wedge pack territory. On June 5, wolf biologists captured and collared an adult female wolf in the Wedge pack territory.

On June 17, WDFW staff conducted an investigation of an injured calf in a private pasture within the Wedge pack territory.

The investigation of the injured calf showed bite wounds and lacerations consistent with a wolf attack. The calf and its mother were removed from the private 800-acre pasture to the livestock producer's home for further monitoring. The combination of bite wounds and lacerations with associated hemorrhaging and recent wolf locations in the area provide evidence consistent with a confirmed wolf depredation.

This depredation within the Wedge pack territory affected a different livestock producer from those documented on May 11 and May 19.

The affected livestock producer had the following proactive, nonlethal deterrents in place at the time of the depredation: removing or treating sick or injured livestock when discovered, carcass sanitation, calving away from areas occupied by wolves, delaying the turnout of livestock until wild ungulates are born, human presence around livestock, and using range riders.

This livestock producer used CPOW range riders for six full days and eight partial days from May 21 through mid-June mainly on an 800-acre private pasture. Range riders has been transitioning with the livestock to larger summer grazing allotments. WDFW staff continued to work with the producer and CPOW as well as continued to monitor the area to mitigate future conflict.

This incident was the fourth depredation since May 11, 2020 attributed to the Wedge pack. WDFW staff discussed how to most effectively address the situation; Director Susewind also assessed this situation and considered what action to take.

On July 11, a group of livestock producers and ranch staff discovered multiple injured calves while gathering cattle in a U.S. Forest Service grazing allotment within the Wedge pack territory. WDFW staff investigated eight total injured calves the day they were reported.

The investigations of seven of the eight injured calves revealed bite wounds and lacerations consistent with wolf depredation. The injuries to three of the calves were estimated to have occurred 1-2 days prior to the investigation; wounds on another calf were estimated to be 2-3 days old; wounds on another calf were estimated to be 3-4 days old; and injuries to the two remaining calves were estimated to have occurred 5-7 days prior to the investigation. Based on the estimated ages of the injuries, WDFW staff considered these depredations as four separate events.

When range riders observed a group of cattle that were bedded and appeared to be relaxed and calm, riders did not make them stand, attempt to move them, or harass them; as such, injured calves were not always readily discernible and easily observed. The livestock producers removed the most severely injured calves from the range back to the ranch headquarters for medical attention and monitoring.

On July 13, an additional injured calf was reported to and investigated by WDFW staff, and was confirmed as a wolf depredation.

The combination of bite wounds and lacerations with associated swelling consistent with hemorrhaging on all of the calves and recent wolf locations in the area provide evidence consistent with confirmed wolf depredations.

The affected livestock producer had the following proactive, nonlethal deterrents in place at the time of the depredation: removing or treating sick or injured livestock when discovered, carcass sanitation, calving away from areas occupied by wolves, delaying the turnout of livestock until wild ungulates are born, human presence around livestock, and using range riders.

On July 23, WDFW Director Kelly Susewind authorized WDFW staff to lethally remove a wolf from the Wedge pack territory in response to repeated depredations of cattle on grazing lands in Stevens County.

The proactive and responsive non-lethal deterrents used by the affected livestock producers (described below) 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 a Wedge wolf was as follows:

WDFW had documented nine depredation incidents (five within the last 30 days) resulting in two dead livestock and ten injured livestock since May 11, 2020 attributed to the Wedge pack. All nine events were classified as confirmed wolf depredations.

At least two proactive deterrence measures and responsive deterrence measures (if applicable) were implemented by each of the two livestock producers affected by the depredations:

Producer 1

- At the time of the first depredation, the affected livestock were pastured near the producer's home; they were checked daily and there was regular human presence in the area. The producer calved near the home, monitored for sick/injured livestock, used carcass sanitation, and hazed wolves away during the first depredation incident. Following the depredations, WDFW staff placed Fox lights in the pasture. Producer 1 used Cattle Producers of Washington range riders for six full days and eight partial days starting May 11 mainly on a 100-acre private pasture near the residence. Range riders had been transitioning with the livestock to larger summer grazing allotments.

Producer 2

- The producer removed or treated sick or injured livestock when discovered, used carcass sanitation, calved away from areas occupied by wolves, delayed turnout of livestock until wild ungulates were born, had human presence around livestock, and used range riders.

This livestock producer used CPOW range riders for six full days and eight partial days from May 21 through June 18 mainly on an 800-acre private pasture. Range riders transitioned with the livestock to larger summer grazing allotments. Following the depredation confirmed on [June 17](#), range riding and livestock monitoring efforts were intensified. Range riding had been occurring four days a week, with the largest gap in coverage being two days. In addition to this increase in range riding, the producer, family members, or ranch staff had checked the cattle on the grazing allotment near the Wedge territory on a daily basis since the depredation confirmed on June 17.

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 and range riders.

WDFW expected depredations to continue even with non-lethal tools being utilized. Staff also believed there are no reasonable, additional reactive non-lethal tools that could have been deployed.

The lethal removal of a wolf from the Wedge pack territory was not expected to harm the wolf population's ability to reach the statewide recovery objective. WDFW had documented two known wolf mortalities in the state since Jan 1, 2020. In previous years, WDFW has documented 12 – 21 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 the action to jeopardize wolf recovery in the eastern recovery zone or statewide.

WDFW discussed the impacts of removing a wolf from the Wedge pack territory and determined the current level of mortality should not negatively impact the ability to recover wolves in Washington.

WDFW provided one full business day (eight hours) advance public notice before initiating lethal removal activity.

WDFW staff confirmed two additional depredations two days after Director Susewind's authorization.

On July 27, the Washington Department of Fish and Wildlife (WDFW) lethally removed an adult, non-breeding female member of the Wedge wolf pack.

WDFW's approach to incremental removal consists of a period of active operations followed by an evaluation period to determine if those actions changed the pack's behavior (for example by disrupting the overlap of wolves and livestock or the pattern of repeated depredation). The department entered an evaluation period.

Following the lethal removal, WDFW staff conducted multiple depredation investigations of livestock reported as injured by wolves in the Wedge pack territory. Of these investigations, nine livestock belonging to two different livestock producers were determined to have been injured or killed by wolves (one probable mortality and eight confirmed injuries). Based on the age of the documented injuries, two of these events were believed to have occurred after the July 27 lethal removal. As such, Director Susewind considered reinitiating lethal removal actions in the Wedge pack.

The depredations documented since the lethal removal had affected two different livestock producers. Following the depredation confirmed on [June 17](#), Producer 2 intensified range riding and livestock monitoring efforts. Range riding had been occurring four days a week, with the largest gap in coverage being two days. In addition to this increase in range riding, the producer, family members, or ranch staff have checked the cattle on the grazing allotment.

The other affected livestock producer had the following deterrent measures in place at the time of the depredations:

The producer removed or treated sick or injured livestock when discovered, used carcass sanitation, delayed turnout of livestock to forested/upland grazing pastures, and had daily human presence around livestock. Following depredations documented in August, this livestock producer deployed two Northeast Washington Wolf Cattle Collaborative (NEWWCC) range riders as well.

On August 11, 2020, Director Susewind reauthorized WDFW staff to lethally remove one to two wolves from the Wedge pack territory in response to repeated depredations of cattle on grazing lands in Stevens County. The Department believed there were two adult wolves remaining in the pack.

WDFW had documented 16 depredation events (12 within the last 30 days) resulting in four dead livestock and 19 injured livestock since May 11, 2020 attributed to the Wedge pack. All events were considered confirmed wolf depredation incidents with the exception of one probable incident.

At least two proactive deterrence measures and responsive deterrence measures (if applicable) were implemented by each of the three livestock producers affected by the depredations:

Producer 1

- At the time of the first depredation, the affected livestock were pastured near the producer's home; they were checked daily and there was regular human presence in the area. The producer calved near the home, monitored for sick/injured livestock, used carcass sanitation, and hazed wolves away during the first depredation incident. Following the depredations, WDFW staff placed Fox lights in the pasture. Producer 1 used CPoW range

riders mainly on a 100-acre private pasture near the residence. Range riders transitioned with the livestock to larger summer grazing allotments. Producer 1 has not experienced any depredation events since May 19.

Producer 2

- The producer removed or treated sick or injured livestock when discovered, used carcass sanitation, calved away from areas occupied by wolves, delayed turnout of livestock until wild ungulates were born, had human presence around livestock, and used range riders. This livestock producer used CPoW range riders for six full days and eight partial days from May 21 through June 18 mainly on an 800-acre private pasture. Range riders transitioned with the livestock to larger summer grazing allotments. Following the depredation confirmed on [June 17](#), range riding and livestock monitoring efforts were intensified. Range riding has been occurring four days per week, with the largest gap in coverage being two days. In addition to this increase in range riding, the producer, family members, or ranch staff have checked the cattle on the grazing allotment in the Wedge territory on a daily basis since the depredation confirmed on June 17.

Producer 3

- The producer removed or treated sick or injured livestock when discovered, used carcass sanitation, delayed turnout of livestock to forested/upland grazing pastures, used a CPoW range rider, and had daily human presence around livestock. Following depredations documented in August, this livestock producer deployed two NEWWCC range riders.

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 and range riders.

WDFW expected depredations to continue even with non-lethal tools being utilized. Staff also believed there were no reasonable, additional, responsive, non-lethal tools that could be deployed.

The lethal removal of one or two wolves from the Wedge pack territory was not expected to harm the wolf population's ability to reach the statewide recovery objective. WDFW had documented three known wolf mortalities in the state since Jan 1, 2020. In previous years, WDFW had documented 12 – 21 mortalities per year and the population had continued to grow and expand its range.

WDFW discussed the impacts of removing one or two wolves from the Wedge pack territory and determined the current level of mortality should not negatively impact the ability to recover wolves in Washington.

WDFW provided one full business day (eight hours) advance public notice before initiating lethal removal activity.

On August 13, the Washington Department of Fish and Wildlife (WDFW) lethally removed the two known remaining members of the Wedge wolf pack (an adult male and an adult female). The last documented livestock depredation in this pack territory occurred on August 1.

In December, WDFW staff spoke to a livestock producer in the pack territory who reported above-average end of grazing season counts.

Details of the Wedge Pack depredation incidents are as follows:

Date of Depredation	Depredation Type	Proactive Non-lethal	10-month window
June 12, 2019	Confirmed mortality (cow)		April 12, 2020
May 11, 2020	Confirmed mortality (calf)	Y	March 11, 2021
May 19, 2020	Confirmed mortality (calf)	Y	March 19, 2021
May 19, 2020	Confirmed injury (calf)	Y	March 19, 2021
June 17, 2020	Confirmed injury (calf)	Y	April 17, 2021
July 11, 2020	Confirmed injuries (3 calves)	Y	May 11, 2021
July 11, 2020	Confirmed injury (calf)	Y	May 11, 2021
July 11, 2020	Confirmed injury (calf)	Y	May 11, 2021
July 11, 2020	Confirmed injuries (2 calves)	Y	May 11, 2021
July 13, 2020	Confirmed injury (calf)	Y	May 13, 2021
July 25, 2020	Confirmed 1 Injury/1 mortality (calves)	Y	May 25, 2021
July 29, 2020	Probable mortality (calf)	Y	May 29, 2021
July 29, 2020	Confirmed injuries (2 calves)	Y	May 29, 2021
July 30, 2020	Confirmed injuries (2 calves)	Y	May 30, 2021
July 31, 2020	Confirmed injuries (2 calves)	Y	May 31, 2021
July 31, 2020	Confirmed injury (calf)	Y	May 31, 2021
August 1, 2020	Confirmed injury (calf)	Y	June 1, 2021

A series of WDFW investigations had shown the Wedge pack responsible for 24 confirmed or probable depredation incidents that included 19 injured calves confirmed cause by wolves, three

dead calves confirmed cause by wolves, one dead cow confirmed cause by wolves and one dead calf which was a probable cause by wolves. [All updates are available online.](#)

WDFW Lethal Removal Operation

Total expenditure for the lethal removal operation in 2020 (staff time, contractor time and aerial support) was \$41,779.72 allocated from unrestricted Wildlife State Funds from licensing sales.

Details of the Wedge Pack Lethal Removal Operations are below:

Wedge Pack Lethal Operation			
Date	Wolf	Sex	Age
July 27, 2020	1	Female	Yearling
August 13, 2020	1	Female	Adult
August 13, 2020	1	Male	Adult