Washington Gray Wolf Conservation and Management 2019 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

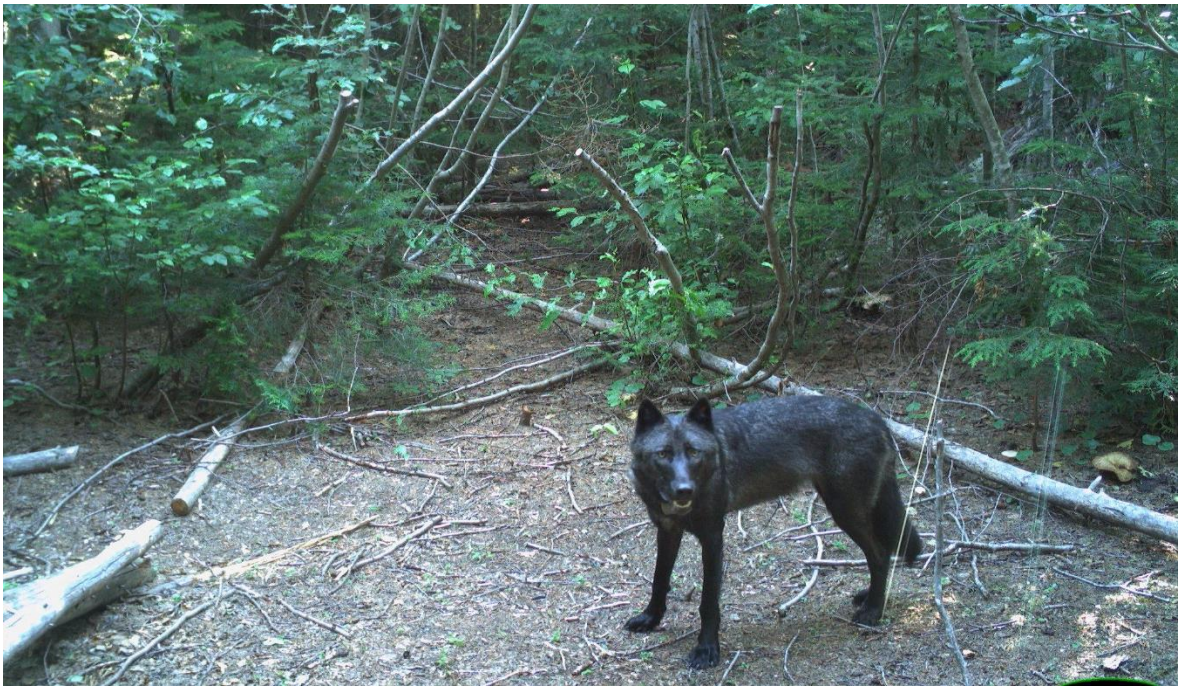

Photo: Sarah Bassing, University of Washington

This report presents information on the status, distribution, and management of wolves in the State of Washington from Jan. 1, 2019 through Dec. 31, 2019.

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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, which 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 108 in areas managed by WDFW and 37 wolves reported on the Confederated Tribes of the Colville Reservation (CTCR) in 2019. Most packs range across public and private land in Ferry, Stevens, and Pend Oreille counties in the northeast corner of the state, but increasing numbers are present in southeast Washington and 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 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 2019, 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.

Within this legal framework, 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 2019. Wolves that inhabit tribal lands in the Eastern Washington recovery region are managed by those specific tribal entities.

Wolf Recovery and Management in 2019

Key developments in 2019 included:

- The state's minimum year-end wolf population increased by 11 percent and marks the 11th consecutive year of population growth. As of Dec. 31, 2019, WDFW counted 108 wolves in 21 packs. Ten of these were successful breeding pairs. These numbers compare with the previous year's count of 97 wolves in 22 packs and 11 breeding pairs. Because this is a minimum count, the actual number of wolves in Washington is likely higher.

- The CTCR reported 37 wolves in five packs in 2019. The CTCR considers the population of wolves on their lands recovered and did not allocate resources into year-end counts for 2019. Numbers provided by CTCR reflect winter numbers incidentally gathered by biologists, hunters, trappers, and public observations rather than dedicated efforts to count wolves that include year-end track, aerial, and camera surveys conducted by WDFW and other co-managers for 2019. 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 nine 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 23 percent per year.

- State, tribal, and federal wildlife managers captured 19 wolves (16 new wolves, three recaptures, and one pup that was too small to collar) from 14 packs during the year and monitored a total of 28 unique radio-collared wolves from 16 different packs in 2019.

- Two packs formed in 2019. The Sullivan Creek Pack formed in Okanogan County and wolves also reestablished in the area formerly occupied by the OPT Pack to form the Kettle Pack in northeast Washington.

- Each year's population total reflects population losses and population gains. WDFW documented 21 wolf mortalities during 2019: nine were removed by the department in response to wolf-caused livestock deaths and injuries, six were legally harvested by tribal hunters, one was killed by a cougar, and one died of unknown causes. Four other documented human-caused deaths included two wolves killed by landowners protecting livestock (caught in the act), one wolf killed by a landowner due to a perceived threat to human safety, and one mortality still under investigation.

- Wolf populations are managed to ensure progress toward the recovery goals established in the department'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 14 cattle as being killed by wolves during the year. Another 11 cattle were confirmed to have been injured by wolves. Additionally, one mortality of a calf was considered a probable depredation by wolves after investigation. Four packs (15 percent of known packs) were involved in at least one confirmed livestock mortality. 85 percent of the known packs were not involved in any known livestock depredation.

- WDFW spent a total of $1,518,659 on wolf management activities during 2019, including $134,937 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.), $251,100 for 11 contracted range riders, $8,773 to two producers for livestock losses caused by wolves, $30,103 to one producer for indirect losses, $128,613 for lethal removal operations in response to depredations on livestock, and $965,133 for wolf management and research activities.

Acknowledgements

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 2019 include WDFW Director Kelly Susewind, Wildlife Program Director Eric Gardner, Deputy Assistant Director of Wildlife Mick Cope, Game Division Manager Anis Aoude, Former 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, Cole Caldwell, Colleen Chandler, Dan Chistensen, 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, Carrie Lowe, Madonna Luers (retired), Kristin Mansfield, Joey McCanna, Troy McCormick, Scott McCorquodale, Matt Monda, William Moore, Paul Mosman, Bryan Murphie, Jerry Nelson, Eric Oswald, Nick Parkert, 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 Wetzel, Paul Whelan, Paul Wik, Gary Wiles, 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 Randy Friedlander, Eric Krausz, Sam Rushing, Jarred Erickson, and Corey Peone; STOI personnel including Billy Joe Kieffer and Savanah 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, Danielle Munzing, 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; 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 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 2019. We thank all who participated, particularly private landowners for their access and cooperation and the many people who provided wolf observation reports.

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Introduction

Background

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

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

Definitions – "Pack" and "Breeding Pair"

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

A "pack" is defined as two or more wolves traveling together in winter and is primarily used to evaluate the number of wolves on the landscape. A "breeding pair" is defined as at least one adult male and one adult female wolf who raised at least two pups that survived until December 31 (Wiles et al. 2011) and is used to reflect reproductive success and recruitment. In any given year, there 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 protected under the ESA, but are classified as endangered under state law (see discussion below). Gray wolves have remained federally protected in the western two-thirds of the state.

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 populations in Idaho and Montana. However, federal recovery requirements have applied only to the three states addressed in the 1987 recovery plan, and no federal wolf recovery requirements have been 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 once again 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 have remained classified as 'endangered' under the ESA (Fig. 1).

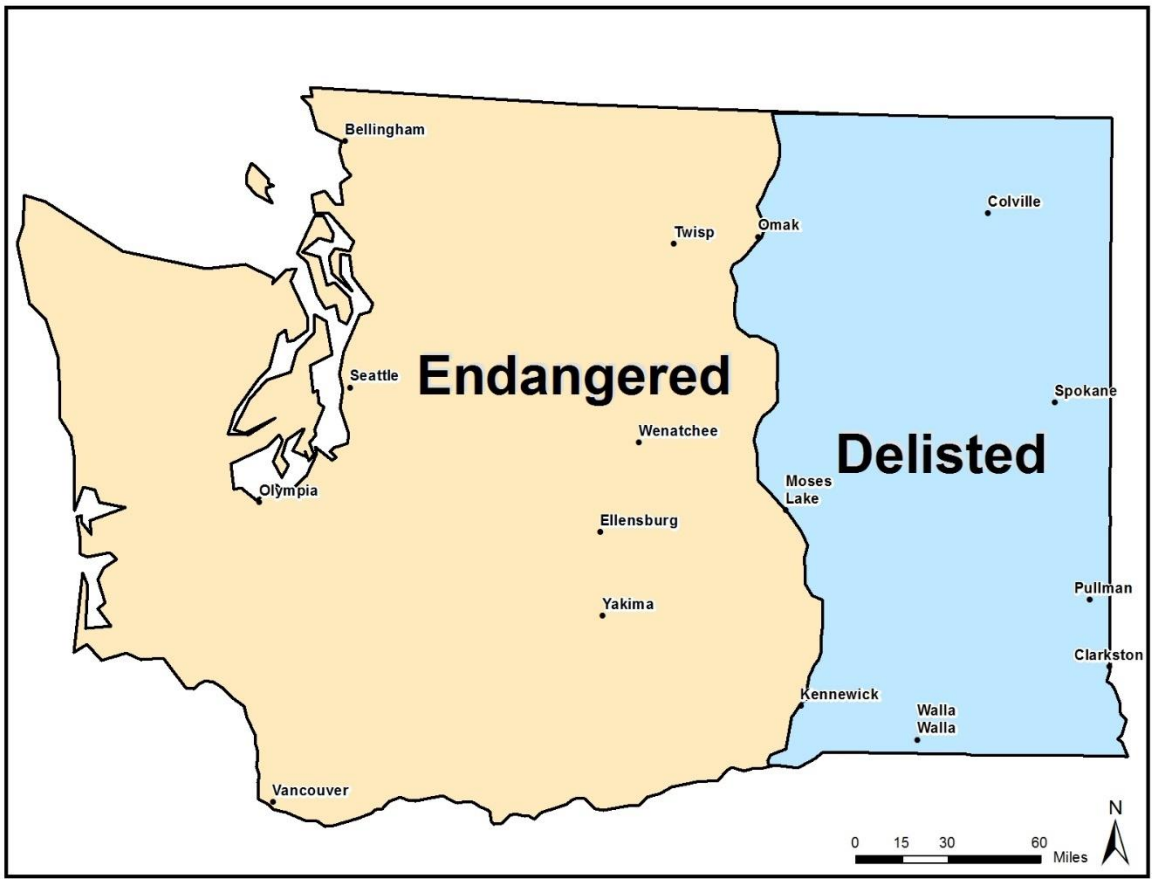

Figure 1. Federal classification of wolves in Washington State, 2019.

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 indicates that the currently listed gray wolves no longer meet the definitions of a threatened species or endangered species under the ESA due to recovery. The effect of this rulemaking action in Washington (if the rule is finalized as proposed) would be to remove the gray wolf from ESA protection statewide.

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).

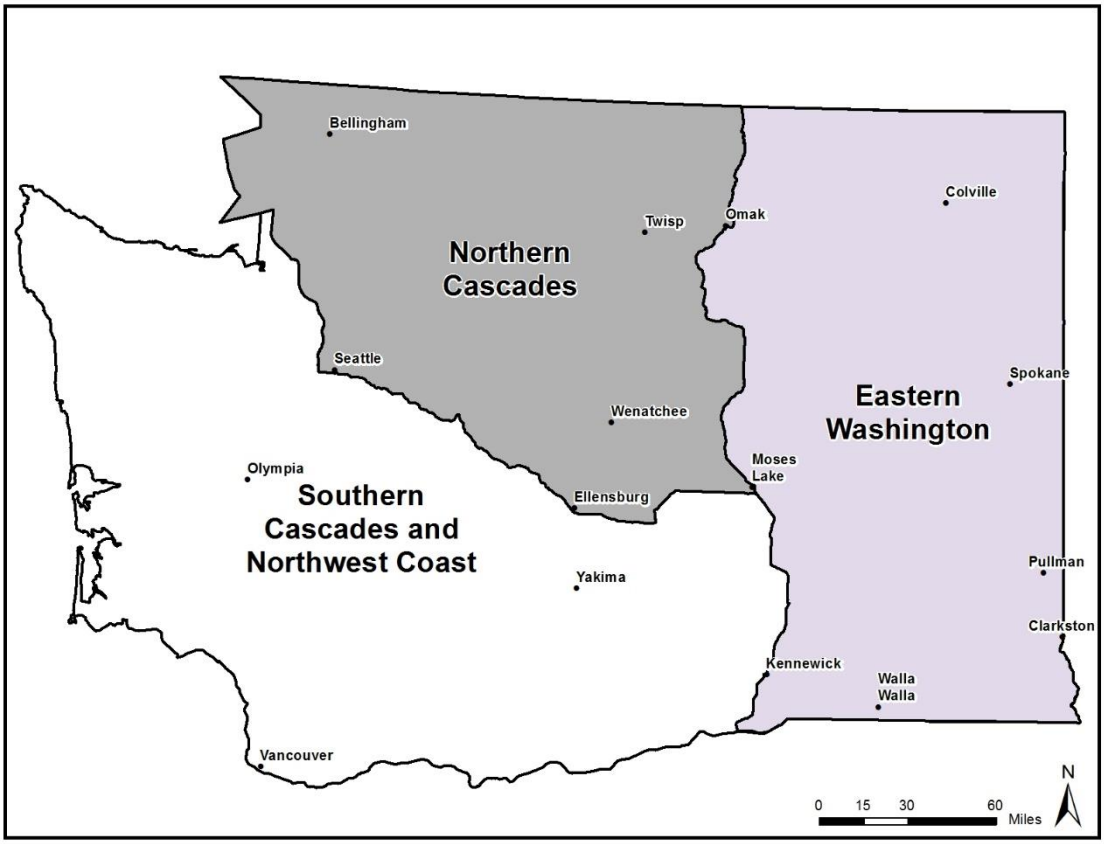

Figure 2. Washington wolf recovery regions as defined in the 2011 Wolf Conservation and Management Plan.

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). WDFW is the primary agency responsible for managing wolves in the Eastern Washington recovery region, and WDFW works as a designated agent of the USFWS under Section 6 of the federal ESA in the other two recovery regions. Tribal governments manage wolves that inhabit their tribal lands in the Eastern Washington recovery region.

WDFW periodically reviews its 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 the state of 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 anticipated 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 2019, WDFW spent a total of $1,518,659 on wolf management activities, including $134,937 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.), $251,100 for 11 contracted range riders, $8,773 to two producers for livestock losses caused by wolves, $30,103 to one producer for indirect losses, $128,613 for lethal removal operations in response to depredations on livestock, and $965,133 for wolf management and research activities.

The total includes funds for Damage Prevention Cooperative Agreements (DPCA-L), compensation for depredations, contracted range riders and other conflict prevention measures, and wolf surveying and monitoring. Funds came from additional fees for personalized license plates (65%), endangered species license plates (3%), state general fund apportionments (12%), unrestricted state wildlife funds (20%), wildlife compensation for livestock damage funds (<1%), 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 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.

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. 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. However, it is always possible that some wolves were present in surveyed areas but evaded detection.

WDFW and co-managers 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 actual number of wolves in Washington is likely higher.

On 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 they account for 10% to 15% of the known winter population (Mech and Boitani 2003[1]), WDFW multiplies the minimum documented count by 12.5% to account for solitary wolves on the landscape. If evidence collected during the most recent calendar year suggested 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. This means that numbers from past reports are subject to change and may differ from numbers in this report.

Population Status and Distribution

The state's minimum year-end wolf population increased for the 11th consecutive year. As of Dec. 31, 2019, WDFW counted 108 wolves and 21 packs. Ten of these were considered successful breeding pairs in 2019. These numbers compare with 97 wolves in 22 packs, and 11 breeding pairs one year earlier. The CTCR reported 37 wolves in five packs in 2019. This is an increase from 2018

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

minimum counts of 29 wolves and five packs. Because these are a minimum count, the actual number of wolves in Washington is likely higher.

Compared to 2018, the number of individual wolves on lands managed by WDFW (Fig. 3) increased by 11 (11%) and the number of packs (Table 1, Fig. 4) decreased by one (4%). Additionally, ten packs were confirmed to be successful breeding pairs as of the end of 2019 (Table 1, Fig. 5). Without thorough survey efforts to confirm denning and pup survival, the presence of successful breeding pairs in the CTCR packs could not be determined at the end of the year; however, pups were observed within the Whitestone pack and Nason pack territories in 2019. WDFW surveyed pack sizes ranged from two to nine individuals and averaged 4.5 wolves per pack ($SD \pm 2.1$, n=21).

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 2019, the North Cascades recovery region had five packs, two of which were considered successful breeding pairs. This region would need two additional successful breeding pairs and would need to maintain that number 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 2019 population survey include the following:

- A new pack, Sullivan Creek, was confirmed West of Okanogan and south of the area occupied by the Loup Loup pack.
- WDFW surveys indicated a single wolf maintaining a territory in the Diobsud Creek pack this winter, so it did not meet the definition of a pack for 2019.

Wolves continue to inhabit both public and private lands (Fig. 6), and 13 of the state's 26 packs (including CTCR packs) had at least one collared wolf during 2019. Data from these wolves were used to assist WDFW in defining pack territories. The average (mean) territory size was 314 square miles (812 square kilometers), ranging from an estimated 116 to 610 square miles (302 – 1581 square kilometers).

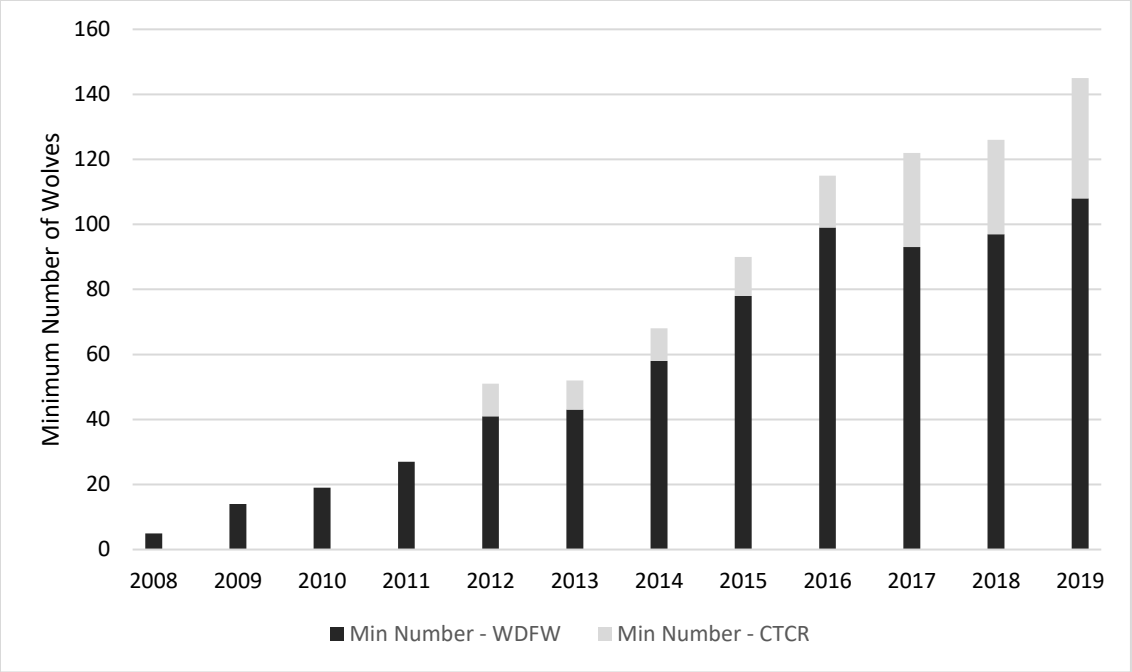

Figure 3. Minimum known number of wolves in Washington managed by Washington Department of Fish and Wildlife (WDFW), the Spokane Tribe, and the Confederated Tribes of the Colville Reservation (CTCR), 2008 – 2019. Numbers provided by CTCR reflect winter numbers incidentally gathered by biologists from hunters, trappers, and public observations rather than focused efforts to count wolves using year-end track, aerial, and camera surveys conducted by WDFW and other co-managers for 2019.

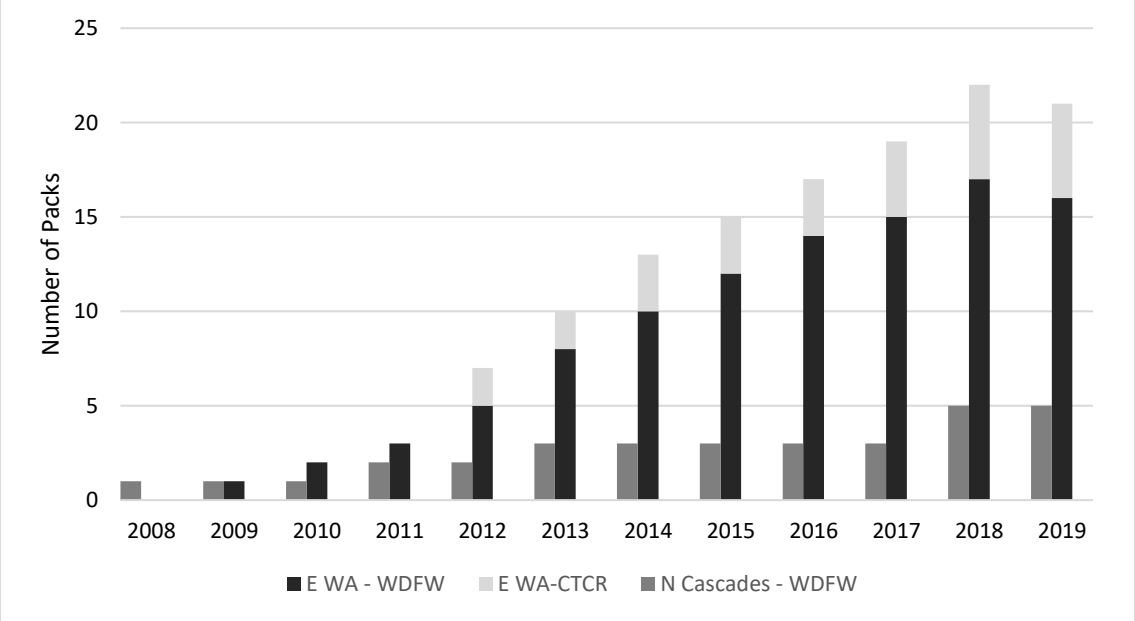

Figure 4. Minimum known number of packs by recovery region in Washington, 2008 – 2019. Wolf packs counted by Washington Department of Fish and Wildlife (WDFW), the Spokane Tribe, and Confederated Tribes of the Colville Reservation (CTCR) are displayed separately. There are no known packs in the Southern Cascades and Northwest Coast recovery region.

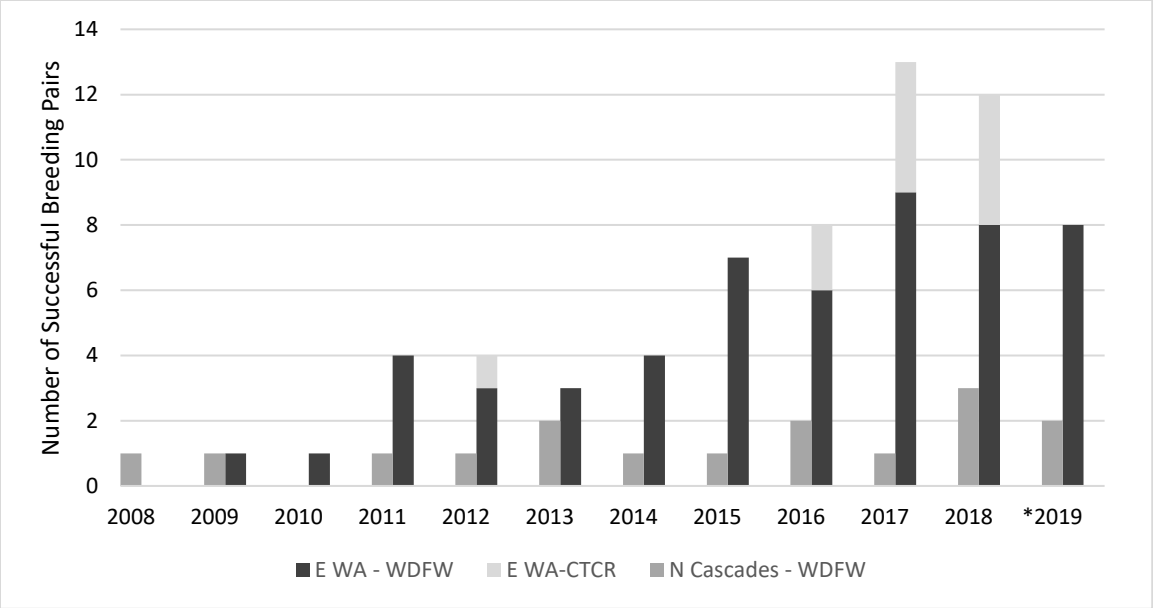

Figure 5. Minimum known number of successful breeding pairs by recovery region in Washington, 2008 – 2019. Wolf packs counted by Washington Department of Fish and Wildlife (WDFW), the Spokane Tribe, and Confederated Tribes of the Colville Reservation (CTCR) are displayed separately. There are no known packs in the Southern Cascades and Northwest Coast recovery region.
*CTCR did not report numbers on successful breeding pairs.

Table 1. Known wolf packs in Washington by recovery region, minimum pack size of known packs, documented mortalities, number of known wolves that dispersed, and number that went missing in 2019. 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 co-managers for 2019. CTCR and Spokane Tribe harvest numbers were documented by tribal biologists.

Wolf Pack	Recovery Area	Minimum Known Pack Size Dec 2019	Documented Mortalities					Known Dispersed	Missing
			Natural	Human	Unknown	Harvest	Control		
Beaver Creek	E. Wash	6		1	1				
Carpenter Ridge	E. Wash	9						1	2
Dirty Shirt	E. Wash	4	1	1					
Frosty (CTCR)	E. Wash	5							
Grouse Flats	E. Wash	3					1	1	
Goodman Meadows	E. Wash	7						1	
Huckleberry	E. Wash	2							
Lead Point	E. Wash	7							
Nason (CTCR)	E. Wash	6				1			
Nc'icn (CTCR)	E. Wash	7				2			
~~OPT~~	E. Wash	0					8		
Kettle	E. Wash	3							
Salmo	E. Wash	4							
~~Sherman~~	E. Wash	0							
Smackout	E. Wash	4							
Stranger	E. Wash	5		1		1		1	
Strawberry (CTCR)	E. Wash	9						1	
Togo	E. Wash	3							
Butte Creek	E. Wash	4							
Touchet	E. Wash	9							
Tucannon	E. Wash	3							
Wedge	E. Wash	3				1			
Whitestone (CTCR)	E. Wash	6				1			
~~Diobsud Creek~~	N Cascades	1							
Lookout	N Cascades	5							
Loup Loup	N Cascades	3						1	
Sullivan Creek	N Cascades	2							
Teanaway	N Cascades	6							
Naneum	N Cascades	3							
Misc/Lone Wolves	Statewide	16		1					
WASHINGTON TOTALS		145	1	4	1	6	9	6	2

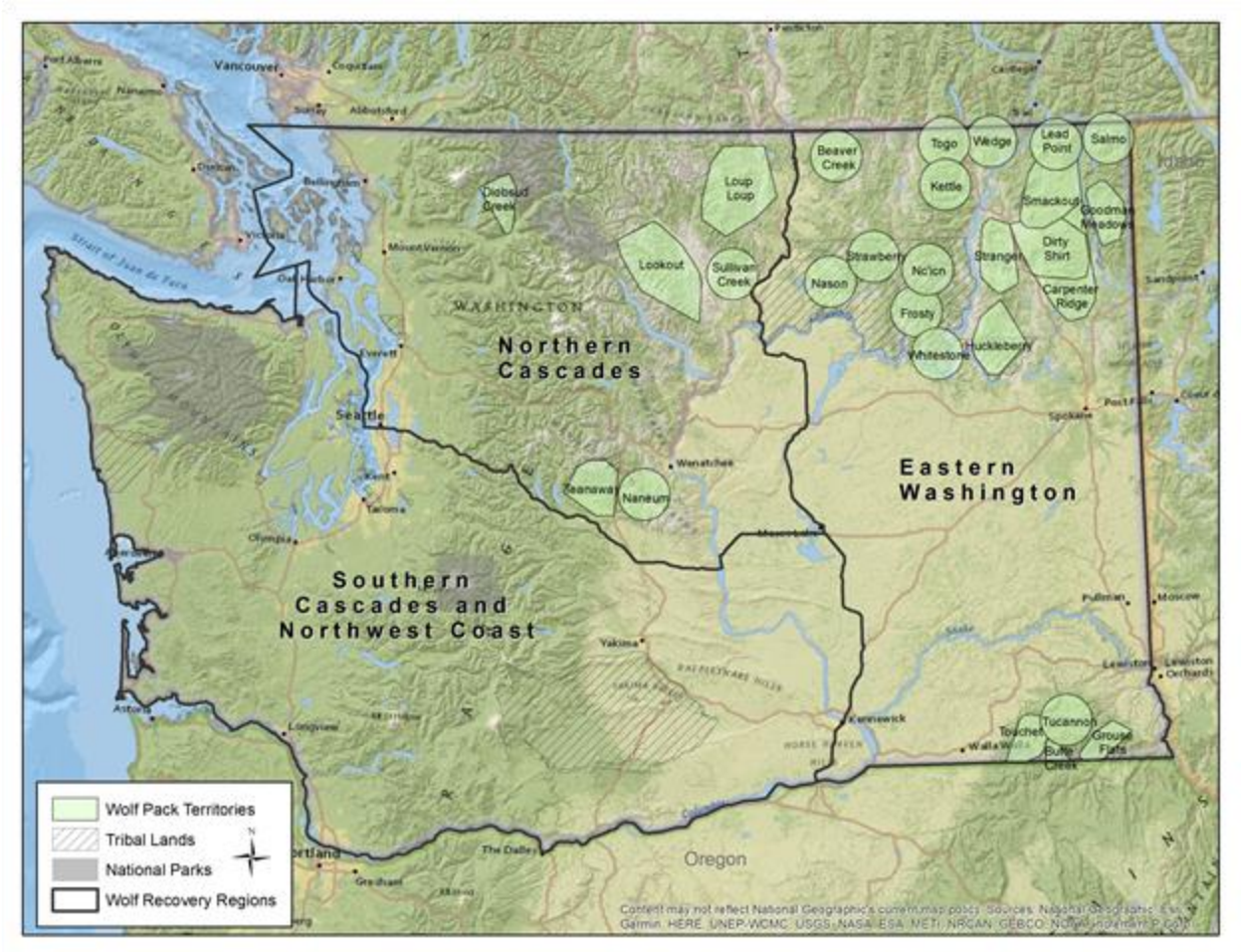

Figure 6. Known wolf packs and pack territories in Washington, 2019, not including unconfirmed or suspected packs or border packs from other states and provinces. The Butte Creek and Grouse Flats pack territory boundary is not displayed where it overlaps Oregon.

Wolf Captures and Monitoring

State, federal, and tribal biologists captured 19 wolves from 14 different packs in 2019. Ten (10) adults, seven yearlings and one pup were captured including 10 males and nine females. Two wolves had been captured and marked in previous years, one wolf was captured twice in 2019, and one pup was too small to be fitted with a collar. All captured wolves except the pup were fitted with either global positioning system (GPS) collars or very high frequency (VHF) radio collars.

Twenty-eight radio-collared wolves were monitored from 16 different packs. This represents 62% of the known packs in Washington. However, due to mortalities, dispersals, scheduled collar releases, and radio collar failures, by the end of the year, biologists were monitoring 12 radio-collared wolves (nine GPS, three VHF collars) which accounted for approximately eight percent of the minimum known population from 10 different packs (38% 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. Six wolves wearing GPS radio collars dispersed from their pack territories in 2019 (Table 1, Fig. 7).

1.) WA88M was collared in March 2019 in the Loup Loup pack. It dispersed west into the Pasayten Wilderness, mostly occupying an area in British Columbia, Canada.

2.) WA90M dispersed from the Grouse Flats pack in fall of 2019 and appears to have joined the Wenaha pack in Oregon.

3.) WA87M dispersed from the Carpenter Ridge pack in early October and traveled east of Helena, Montana to the Little Belt Mountains by mid-November. It was legally harvested in the Little Belt Mountains in Montana.

4.) WA91F dispersed from the Stranger pack and traveled south toward the Fairchild Airforce base in Spokane, Washington before returning to its natal pack territory. It then left again in December and traveled to the Little North Fork of the Coeur d'Alene in Idaho before it was legally harvested.

5.) CTCR610 dispersed from the Strawberry pack located on CTCR tribal lands to the Togo pack territory where it has settled since December.

6.) WA86F dispersed from Goodman Meadows in April north into British Columbia, Canada to the Radium Hot Springs area. The collar emitted a signal that the collar had stopped moving and the wolf was found dead from unknown causes in November.

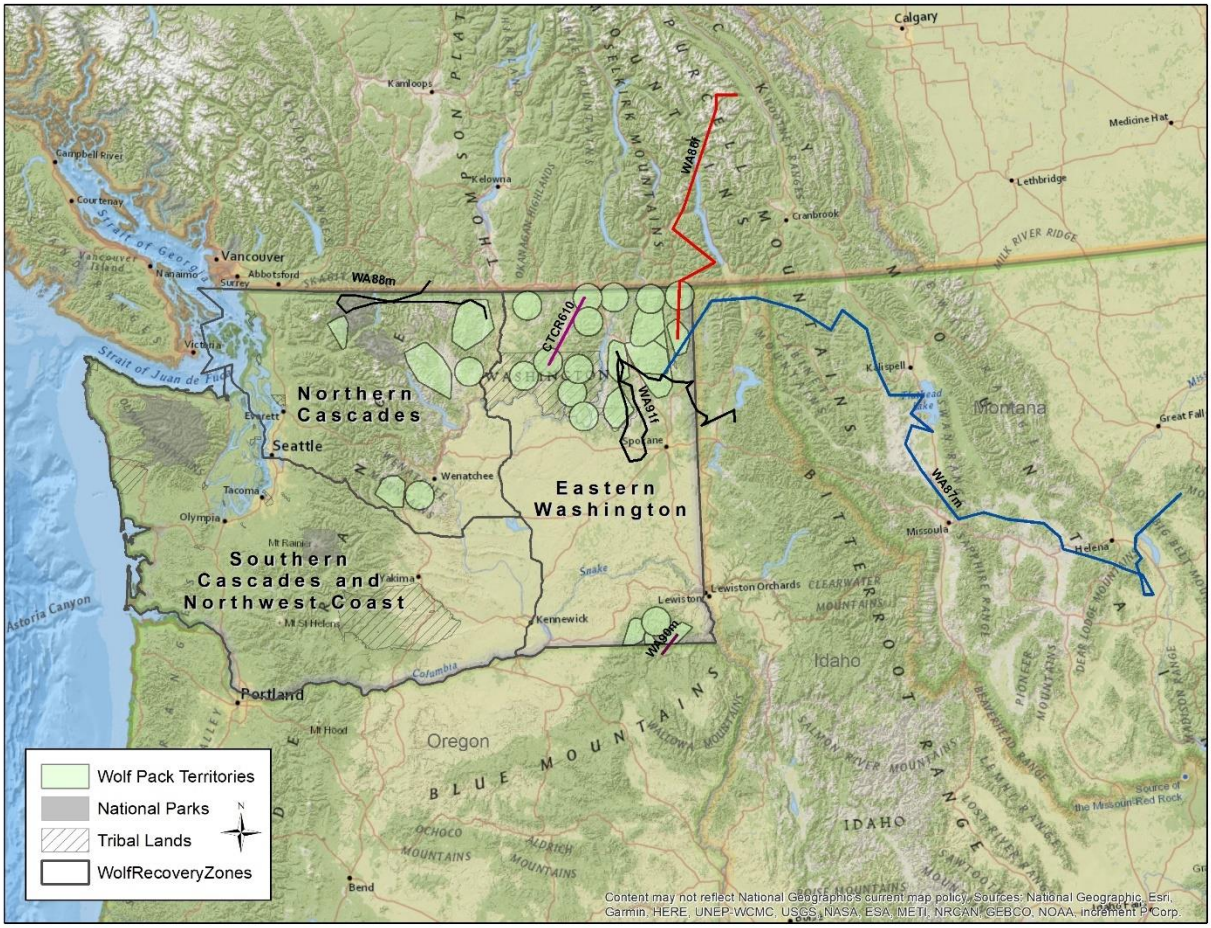

Figure 7. Generalized dispersal paths for six collared wolves that dispersed from known wolf packs in Washington in 2019.

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 around hunting season on wolves. The CTCR hunting regulations allow for the use of any legal weapon, either sex, and no daily or season limits. Trapping and snaring seasons run Nov.1 – Feb. 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 five wolves in 2019. Four of wolves were harvested on the south half, including three harvested using modern firearm and one trapped. One wolf was harvested by trapping 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 with a limit of one per tribal member. Trapping and/or snaring is allowed by special permit only with a season from Oct. 1 – Feb. 28. The Spokane Indian Tribe reported one wolf was legally harvested on the reservation (Table 1).

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

Mortalities

WDFW documented 21 wolf mortalities during 2019 (Table 1) including nine removed by the department in response to wolf-caused livestock deaths, six legally harvested by tribal hunters, one killed by a cougar, and one that died of unknown causes. Four other documented human-caused deaths included two wolves killed by landowners protecting livestock (caught in the act), one wolf killed by a landowner due to a perceived threat to human safety; and one mortality still under investigation. Two other wolves were reported to WDFW as being shot at by landowners protecting livestock; however, no carcasses were located during follow-up field investigations in either case.

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 2019, investigators confirmed that wolves were responsible for the death of 14 cattle (Fig. 8), and injuries to 11 cattle (Table 2). Additionally, one calf mortality was considered a probable wolf-caused depredation. Most mortalities occurred during the summer-fall grazing season from June through August (Fig. 9). Three livestock mortalities occurred during the month of January (outside the grazing season) when wolves killed three cows left behind on a U.S. Forest Service (USFS) public grazing allotment over winter.

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

Four of the 28 (14%) known packs that existed in Washington at some point during 2019 were involved in at least one confirmed livestock mortality or injury (Fig. 10). 85 percent of Washington's wolf packs were not involved in any known livestock depredations.

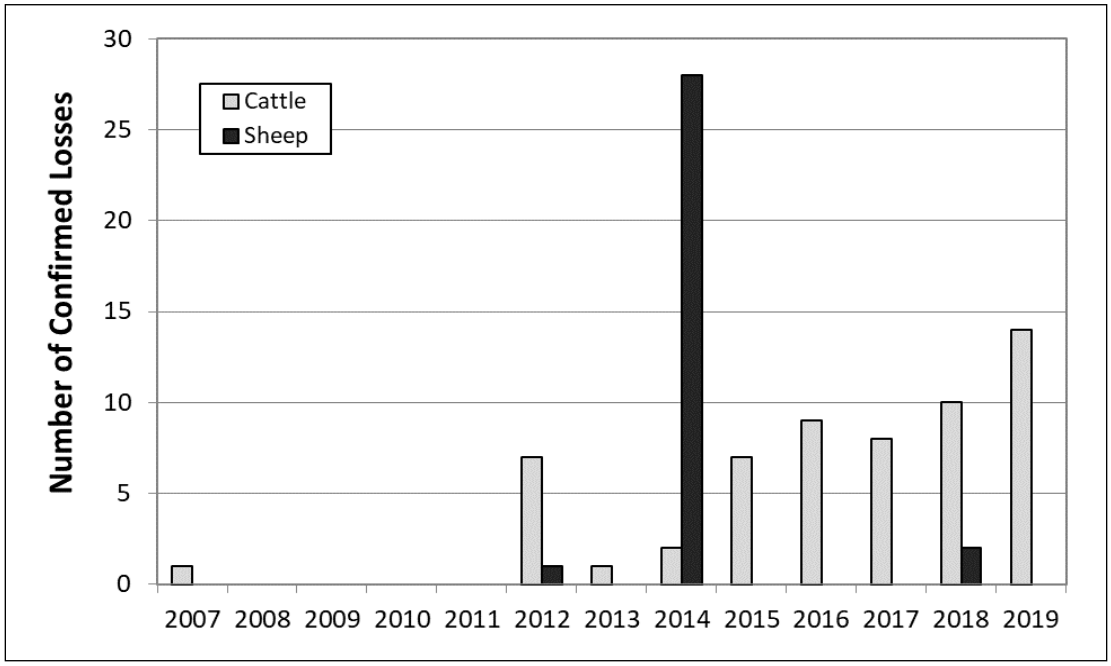

Figure 8. Total number of confirmed wolf-caused livestock mortalities in Washington, 2007-2019.

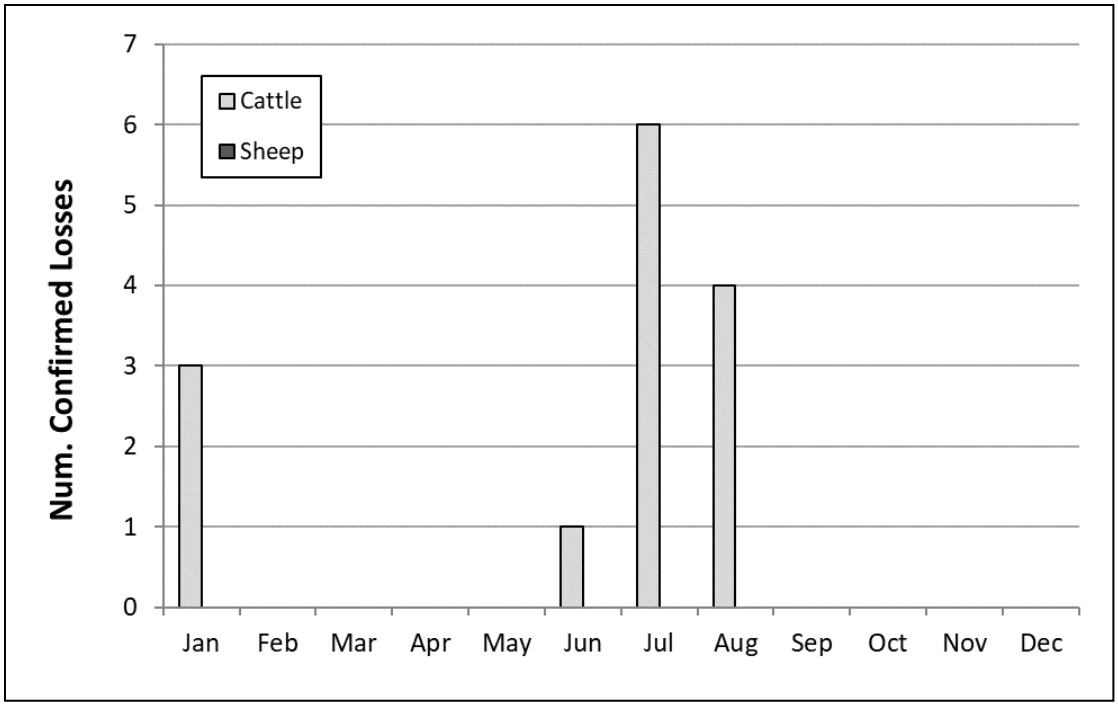

Figure 9. Number of confirmed wolf-caused livestock mortalities by month in Washington, 2019.

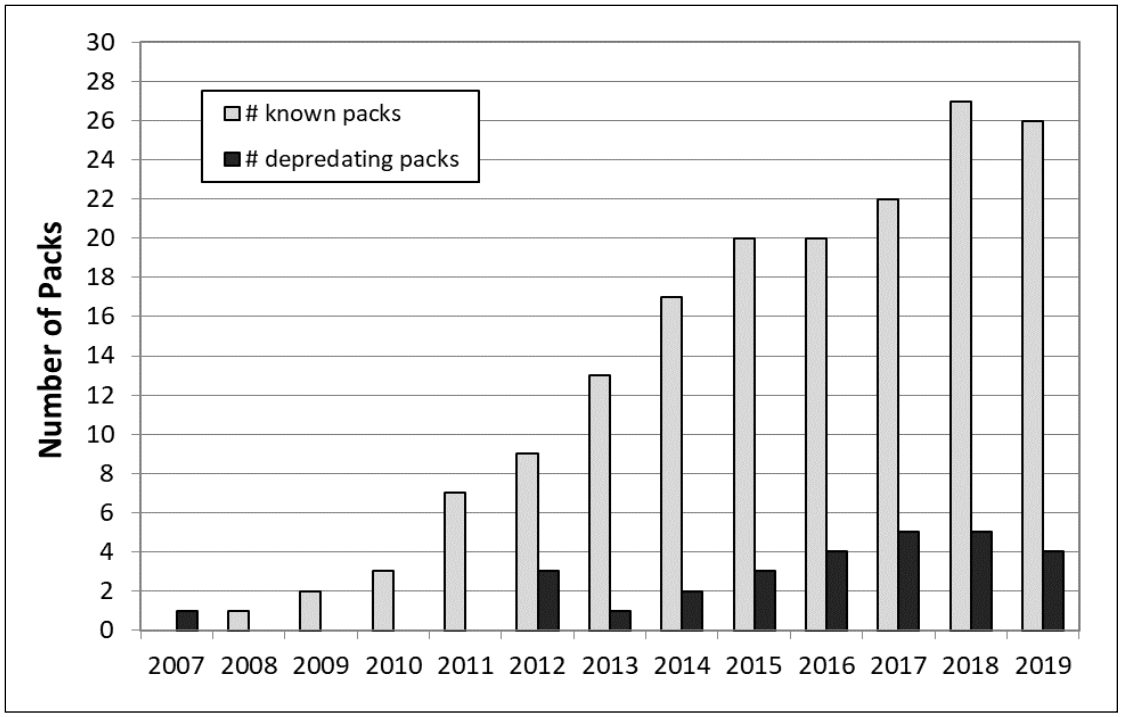

Figure 10. Minimum number of known packs that existed at some point during the calendar year and the number of confirmed depredating packs (on livestock) in Washington, 2007 – 2019.

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 2019, several preventative measures were used in an attempt to minimize livestock depredations as in previous years.

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), the use of 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 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 a pack in an attempt to change pack behavior after repeated depredations.

WDFW has management authority of wolves in the Eastern Washington recovery region (Fig. 2). 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 2019, nine wolves (eight in Old Profanity Territory (OPT) and one in Grouse Flats) were removed through agency lethal actions.

Table 2. Confirmed wolf-caused livestock and dog injuries and mortalities in Washington, 2013-2019.

	2013		2014		2015		2016		2017		2018		2019	
	Injuries	Mortalities	Injuries	Mortalities	Injuries	Mortalities	Injuries	Mortalities	Injuries	Mortalities	Injuries	Mortalities	Injuries	Mortalities
Cattle	0	1	2	2	0	7	6	9	5	8	19	10	11	14
Sheep	0	0	6	28	0	0	0	0	0	0	1	2	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dogs	3	0	1	0	1	0	0	0	0	0	0	0	0	0
Total	**3**	**1**	**9**	**30**	**1**	**7**	**6**	**9**	**5**	**8**	**20**	**12**	**11**	**14**

In the western two-thirds of Washington, where wolves remain classified as an endangered species under the ESA, the USFWS is the lead management agency (Fig. 2). The ESA prohibits 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 cannot be issued in the western two-thirds of the state where wolves remain federally listed. WDFW did not issue any permits to livestock producers in 2019.

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 applies only in the Eastern Washington recovery region where wolves are federally delisted; it does not apply in areas where wolves remain classified as endangered under the ESA. 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.

Landowners protecting livestock under the caught-in-the-act (CIA) rule for the Eastern Washington recovery region killed two wolves. One wolf was thought to be part of the Beaver Creek pack, and other was killed near Spraque, Washington not associated with a pack. Another landowner, due to a perceived threat to human safety, killed a wolf from the Stranger pack. Two other wolves were reported to WDFW as being shot at by landowners protecting livestock; however, no carcasses were located during follow-up field investigations in either case.

The number of CIA mortalities that occurred are relatively low in relation to the overall wolf population and should not affect the ability of wolves to recolonize Washington. After investigation by WDFW enforcement, all three mortalities and the two other reported cases were determined lawful in protecting livestock or human safety. No data from collared wolves was being shared with any of the people involved in these incidents.

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 that are suitable for each producer's operation. Interested producers may also enter into a DPCA-L with WDFW, which provides a cost-share for the implementation of conflict prevention measures.

During calendar year 2019, 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 the cost of each conflict prevention measure, 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). Producers received a total of $134,937 in reimbursements.

WDFW contracted with eight private organizations for range riding services. Under these contracts, WDFW employed 20 range riders at a total cost of $251,100. In addition, Northeast Washington Wolf-Cattle Collaborative (NEWWCC) supported four range riders 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.

Compensation is available 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 two direct claims and paid a total of $8,772.84 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 during the grazing season and $30,103.41 was paid in compensation.

State Grants for Non-lethal Conflict Prevention Activities

During 2019, 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 $224,080 and Cattle Producers of Washington (CPoW) was funded $171,000 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.

Wolf Interactions with Ungulates

The natural recolonization of any carnivore will have effects on other species inhabiting the area. WDFW recognizes the value of ungulate species for ecosystem function and recreational viewing and hunting. Through support from the 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 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. There is an additional study focused on ungulate-predator dynamics which focuses on causes of mortality and movement patterns of ungulates between areas occupied by wolves and those without wolves. See the research updates section below to learn more about these projects.

Research Updates

Projects completed in 2019 – information provided by researchers

Major Advisors: William Bean and Micaela Szykman Gunther, Department of Wildlife, Humboldt State University

ABSTRACT Since extirpation from almost the entirety of the continental United States in the early 20th century, gray wolves (*Canis lupus*) have begun to reestablish populations across their historical range. After reintroduction of wolves into the greater Yellowstone area and central Idaho in 1995, wolves have expanded their range to include a number of western states, moving into the Pacific Northwest from Idaho and British Columbia populations. As wolves continue to disperse into new areas it is important to identify likely dispersal pathways and areas of pack establishment. We used locations from global positioning system (GPS) collared wolves to identify such areas of interest in the Pacific Northwest. We used the spatial modeling program Maxent to identify areas of high quality wolf habitat throughout the study area, with distinction made between wolves within packs and those conducting long-distance dispersal. Wolves within packs selected habitat based on high ungulate density, high forest cover, and high slope while dispersing wolves selected habitat with high ungulate density and low to moderate anthropogenic impact. Using this information, we identified potential dispersal corridors using least cost path analysis with the aim to identify potential areas of future wolf dispersal and expansion, including areas that may incur conflict with humans. Identifying these key areas can assist managers in planning and preparation for wolf immigration into their regions.

Ongoing Projects:

Title: Predator-Prey Project

Principle Investigators: Melia Devivo & 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 are attempting to capture and radio-collar 50 elk and 65 white-tailed deer in NE Washington, 100 mule deer in the Okanogan, and 10 cougars in each study area. 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: Ungulate - Predator Dynamics in Northern Washington

Graduate Student (PhD): Taylor Ganz, University of Washington
Major Advisor: Laura Prugh, University of Washington
Cooperators: Melia DeVivo, Washington Department of Fish and Wildlife

Project Summary: As a component of the WDFW/UW Predator-Prey Project, we seek 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. We use GPS and radio- tracking collars to compare the rates and causes of mortality and movement patterns of ungulates between wolf occupied and wolf un-occupied areas. 2019 was the third of four years of fieldwork for this project. We collared 29 neonatal white-tailed deer, 23 juvenile white-tailed deer, 65 adult female white-tailed deer and four neonatal elk. Adult female mule deer and elk were collared in previous years of the project, and no additional collars were deployed in 2019. As of the end of 2019, we have deployed collars on 118 neonatal and juvenile white-tailed deer, 96 adult female white-tailed deer, 102 mule deer, 20 neonatal elk, and 56 adult female elk, with continued capture efforts underway. We also surveyed habitat structure and vegetation at 100 randomly selected sites in GMU 121 and 117 and 33 ungulate mortality sites to understand how habitat influences ungulate movement and vulnerability to predators. Collaring of white-tailed deer, mule deer and elk and vegetation surveys will continue in 2020.

Title: Spatial and Temporal Patterns of Non-Consumptive Predator-Prey Interactions

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

Major Advisor: Dr. Beth Gardner, University of Washington

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

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. Starting June 2018, we deployed 55 remote-sensing cameras in Pend Oreille and Stevens Counties and 65 cameras in Okanogan County. We placed cameras across a variety of habitats, elevations, and land-use and ownership types. The cameras collect data year-round and will remain deployed through spring 2021. We moved the cameras to new locations in June 2019, after a full year of data collection, and plan to move them once more in June 2020. To date, 46 University of Washington undergraduate volunteers classified and counted the species detected in more than 1,000,000 images. We are also collaborating with Microsoft AI for Earth, to use machine learning and image recognition to expedite image classification. We have detected all species of primary interest to the project on camera (i.e., white-tailed deer, mule deer, elk, moose, gray wolf, and cougar), as well as numerous other important species in the ecological community (e.g., black bear, coyote, and bobcat). We will use these photo-captures of animals to assess how co-occurring predators and prey influence habitat use of one another, and how deer and elk change their daily activity patterns in response to different predators. Results from our research will hopefully improve our 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: Brian Kertson, Washington Department of Fish and Wildlife

Project Summary: Wolves (*Canis lupus*) recolonized Washington in 2008 and have grown to an estimated population of at least 126 individuals across 27 confirmed packs. Cougars (*Puma concolor*) occupy a similar niche to wolves by hunting large prey and likely compete directly and indirectly for space and food resources. Working as part of the WDFW/UW multiple predator-multiple prey research project, we are examining the interactions between wolves and cougars in landscapes in northeast and north central Washington. 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, 65 cougars and 16 wolves (representing 5 packs) have been fitted with GPS collars, which has allowed visitation of 385 potential cougar feeding sites and 193 potential wolf feeding sites across two study areas totaling 10,000 sq. km. (3860 sq. mi) from 2017 to 2019. 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 52 cameras have been placed at cougar feeding sites. 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 will conclude in 2020. Dissertation completion is anticipated by May 2022. More information can be found on the "Wolf-Cougar Interactions" page of the Washington Predator-Prey Project website.

Title: Interactions among Large and Small Carnivores in Washington

Graduate Student (PhD): *Becca Windell, University of Washington*

Principle Investigator: Laura Prugh, University of Washington

Cooperators: Brian Kertson, Washington Department of Fish and Wildlife

Project Summary: Our 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). Specifically, we have three primary objectives: 1) installing remote wildlife

cameras at a variety of ungulate mortality sites to investigate mesocarnivore scavenging behavior; 2) deploying GPS collars on mesocarnivores to track patterns of avoidance and attraction in response to large carnivores; and 3) collecting 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 2019 was the mesocarnivore team's second field season. At the conclusion of the 2019 field season, we had deployed a total of 18 bobcat collars and 22 coyote collars and collected 1357 scats. Together with WDFW, the wolf-cougar (Lauren Satterfield), and ungulate (Taylor Ganz) teams, we have deployed 151 cameras on ungulate carcasses to monitor scavenging.

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

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 km^2 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. We will conduct a multi-species evaluation 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: Wolves have been rapidly recolonizing Washington state since 2008. To date, the majority of this recolonization has occurred north of the Interstate-90 highway, although it is just a matter of time before the wolves cross I-90 and begin spreading south. This raises the question: How will wolf recolonization of Central WA impact the predator-prey community as well as the extent of human-wildlife conflict in this area? We are addressing this longitudinal question by first acquiring baseline measures of the distribution and diets of the medium to large carnivores, prior to wolf recolonization, including any early signs of wolf presence, along the east side of the Cascade Mountain Range, from I-90 south to the Columbia River. Continued monitoring will then enable us to determine how these measures change as wolf recolonization proceeds. In 2018,

detection dogs comprehensively sampled an 8,300 km^2 area for carnivore scat covering state, federal, tribal, private and municipal land across the Eastern Cascade Region of Central WA that has high variation in human land use. The Yakama Reservation was added to our sampling area in 2019, for a total of 11,000 km^2. Dog teams collected 1182 georeferenced carnivore scat samples between September and December in 2018 and 1215 georeferenced scat samples between July and November in 2019. DNA extracted from these 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 the genetic markers used in this analysis are unable to reliably distinguish wolves from domestic dogs, we developed and published a new method using single nucleotide polymorphisms (SNPs) that is able to reliably make these discriminations (Reese et al. 2020. *Conservation Genet Resour*. https://doi.org/10.1007/s12686-020-01130-2.). All "wolf" samples are also being analyzed by this latter method to exclude domestic dogs from our analyses. Identified wolf samples, including those collected in northeast Washington during 2015-2017, are also being genotyped for individual identity using a panel of 15 microsatellite DNA loci to determine the number and distribution of unique wolves. 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. 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, we are using camera traps and bioacoustic monitors to develop more efficient methods to accurately monitor Washington's expanding wolf population. We will use these tools 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 2019, we worked with other members of the Washington predator prey project and WDFW to deploy cameras and bioacoustic recorders at 120 random sites across roughly 10,000km^2 in northeastern and northcentral Washington. We also placed bioacoustic recorders near five known wolf rendezvous sites in Northeastern Washington. In total we collected roughly 80,000 hours of acoustic data and roughly 1,000,000 images in 2019. The audio data from the rendezvous recorders is being used to train machine learning algorithms to identify wolf howls, which will then be used to efficiently process the data from the 120 random sites. 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 2020 we anticipate redeploying cameras and bioacoustic recorders at 120 new random locations in northeastern and northcentral Washington while also deploying bioacoustic recorders at 10-15 known wolf rendezvous sites across the state. Data from these deployments will be processed and analyzed during the winter and spring of 2020 / 2021. Results from our research will improve the ability to accurately and efficiently monitor and estimate wolf population metrics in Washington.

Title: Summer Habitat Selection and Demography of Moose in Northeast Washington: Forage, Temperature, and Predation

Graduate Student (MS): James Goerz***,*** University of Montana

Major Advisor: Dr. Mike Mitchell, University of Montana

Cooperators: Dr. Richard Harris, Washington Department of Fish and Wildlife

Project Summary: In December 2013, Washington Department of Fish and Wildlife (WDFW) partnered with The University of Montana (UM) and began a five-year study on the demography and behavior of moose in the northeast region of the state. The objectives of this project were to 1) determine the summer habitat selection patterns of moose in Northeast Washington, 2) estimate the relative influence of forage, predation risk and thermal stress on moose habitat selection and 3) assess the current demographic trends of the moose population as well as variation in survival and reproduction attributable to habitat selection patterns. We are finalizing results from fieldwork conducted from 2014 to 2019 regarding moose habitat selection and demography. The data presented here, however, are preliminary and descriptive in nature intended as an update on this progress. We collected 26,084 GPS locations transmitted and stored onboard radio-collars from 59 adult female moose (171 moose-years). We compared these used locations to 130,420 available locations sampled from within moose summer home ranges (95% kernel density estimates). We included field-sampled and remotely sensed covariates for shrub density, forest canopy density, probability of encountering predators (mountain lions, black bears, wolves) and habitat-mediated temperature as predictors of moose habitat selection in resource selection probability functions. We estimated pregnancy, adult survival, calf production, calf survival and cause of mortality for radio-collared moose using data collected at capture, during 1,400+ monitoring attempts and investigations of mortality locations. We captured 68 adult female moose during this study (59 analyzed for summer habitat selection) and these 68 moose provided 195 years of survival and reproduction data. Patterns of adult cause-specific mortality differed greatly between study areas. Causes were more diverse in the northern study area with many occurring due to health or predation-related causes. Most mortality in the southern study area was due to hunter harvest. A detailed write-up of the analysis will be available by May 1, 2020. This project is currently funded through WDFW, UM, The Boone and Crockett Club (B&C), The Montana Cooperative Wildlife Research Unit (USGS), The Upper Columbia United Tribes (UCUT), and The National Science Foundation (NSF)

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 2019, in addition to numerous, daily interactions with the public (i.e. phone calls, emails, and personal communications), department personnel were also 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 also 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 2019. This included sharing media articles via WDFW's Facebook, Twitter, Instagram and YouTube accounts, as well as providing links to new information posted on the WDFW website, and broadcasting wolf presentations and other events using Facebook Live.

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 the director who serve three-year terms, with the members representing a broad spectrum of stakeholder interests – livestock producers, conservation groups, hunters, outdoor recreationists, and others.

The WAG met four times, held three conference calls, and hosted open-house-style public comment periods before each WAG work session in 2019. 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 initiated 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 website.

At the end of 2019, there were four vacancies on the WAG, providing opportunities for new members to join. WDFW collectively received over 20 new nominations to fill the vacancies. A team of WDFW staff implemented a comprehensive candidate assessment and selection process, which

was underway at the end of the year. The candidate recruitment process will be complete and new members announced in 2020.

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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 the nearest USFWS special agent or 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. 2019 – Wolf Removal Operation Survey

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 three wolf packs during the 2019 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 2019: OPT (Old Profanity Territory), Grouse Flats, and Togo. The lethal removal operations resulted in WDFW staff lethally removing eight wolves from the OPT pack. In Grouse Flats, WDFW lethally removed one wolf. Lethal removal operations in Togo did not result in the removal of any wolves. For OPT and Grouse Flats, the lethal removal operations are described in below.

OPT (Old Profanity Pack) Pack

Background

WDFW confirmed wolf activity in the historic Profanity pack area during May 2018 and notified the public on June 1. The wolves were referenced as the Old Profanity Territory (OPT) pack during the 2018 grazing season and officially named in this report. The new pack's name reflects the fact that part of its range in northeast Washington overlaps some of the range used by the former Profanity Peak pack, most of whose members were lethally removed by the department in 2016 after repeatedly preying on livestock and failing to respond to non-lethal deterrents.

Timeline: Spring 2018 – December 2019

In April 2018, range riders started patrolling the allotments where cattle were going to be turned out, checking for carnivore sign.

On June 2, 2018, WDFW staff captured and placed a GPS collar on an adult male wolf in the OPT pack. By utilizing the GPS point locations during June and most of July, WDFW determined a possible den location north and adjacent to the USFS grazing allotment.

Little wolf sign was present in this grazing allotment prior to cattle turnout on July 10. Range riders began receiving location data from the collared male wolf starting around July 23 and utilized this information to check for wolf activity. GPS location data from the collared male wolf suggested a possible rendezvous site had been established by the pack about two and a half miles northwest of the den location during the first two weeks of August.

By mid-August, the GPS locations from the collared male suggested a high use area, most likely a new rendezvous site, roughly five and a half miles southeast from the previous possible rendezvous site. This area is located in the grazing allotment where the livestock had been turned out in July. Based upon this information, WDFW staff ramped up coordination with the producer and contract range riders to manage the potential for wolf-livestock conflict. Range rider presence increased in this high use area checking cattle behavior (evening, night, and daily) and monitoring salting sites for cattle activity.

On Aug. 20, 2018, the Ferry/Stevens County wildlife specialist hiked to point locations of the collared OPT male wolf. He found a calf carcass, which was determined by WDFW staff to be an unknown cause of death. The August 20 depredation remains consisted of a portion of one leg bone, portion of lower spine and pelvic bones and one hoof. No meat remained and bones were chewed into smaller pieces. Remains of this calf were left on site.

On Aug. 21, 2018, the producer and range riders started to push livestock west towards adjacent grazing allotments.

On Aug. 26, 2018, a WDFW contracted range rider located the remains of two dead calves which, after investigation, were determined to have died of unknown causes. The remains of the first calf included chewed up rib bones, leg bones, small portions of hide and portions of head and jawbone. WDFW staff removed the remains from the allotment and soaked the hide in water for further investigation looking for bite marks or scoring consistent with injuries caused by wolves. No meat remained on the rib bones, head and jawbones so WDFW staff left them on site. The second calf remains consisted of portions of a skull and jaw. These remains were also left on site as no meat remained. In both cases, these carcasses were found by range riders actively following collar locations to ascertain if there was an increase in wolf-livestock overlap to be prepared to take action to reduce the likelihood of conflict. Because of the vast landscape, finding a dead calf is not easy, but smell can help guide a search, particularly after decomposition and scavenging by birds begins. However, a carcass can be reduced to a bone pile relatively swiftly.

After the August identification of dead calves and the GPS collar data locations demonstrating high wolf/livestock overlap, the producer and range riders responded by ramping up their presence, including range rider shifts throughout the day and during nighttime hours. The observed activity was in an area where the prior Profanity Peak pack (in 2016), and the prior Sherman pack (in 2017), previously depredated on cattle.

Salt licks were placed throughout the grazing allotments in approved locations by the USFS. Salt licks were present at the current location of the cattle and in multiple locations throughout the grazing allotments to assist in moving and holding cattle in new locations. Livestock have grazed these allotments for generations (75 years), with salt blocks in the same location every year to assist with cattle movements.

In conference with the producer, WDFW discussed whether salt blocks should be removed from locations with high wolf-livestock overlap as this has been a concern with past wolf depredations in this area. They concluded that this would likely be of little help in the present circumstances. Even when salt blocks are moved, cattle continue to visit and linger at these sites due to the amount of salt in the ground from years of salting. The herd memory of salt blocks also tends to home them to these sites, and if salt blocks are missing, the experience is that cattle actually linger while searching for the salt blocks.

The grazing pattern is to start cattle in the lower country and move to the higher country toward the end of summer and early fall. The producer and range riders continued to push cattle west towards the adjacent allotments with approximately 20 head of cattle remaining in the high wolf use area.

On Sept. 4, 2018, range riders contacted the Ferry/Stevens County wildlife specialist, who coordinated with WDFW staff about two injured calves in the OPT pack area. WDFW staff investigated on September 5 and confirmed the injuries on both calves were caused by wolves. That afternoon, a dead calf was located in the same vicinity of the other injured calves and an investigation by WDFW staff confirmed wolves had killed it.

- Depredation #1 – The calf suffered bite lacerations and puncture wounds to the right hindquarter, hamstring, and flank. Bite lacerations and puncture wounds were also present on the left flank and just above the left hock. Locations of injuries were consistent with wolf depredating on cattle. Based in the evidence and factors from the investigation, WDFW staff conducting the investigation classified the injured calf as a confirmed wolf depredation.

- Depredation #2 – The calf suffered bite lacerations and puncture wounds to the left hindquarter and the front shoulder under the leg. Locations of injuries were consistent with wolf depredating on cattle. Based in the evidence and factors from the investigation, WDFW staff conducting the investigation classified the injured calf as a confirmed wolf depredation.

- Depredation #3 – The dead calf had bite puncture wounds and hemorrhaging to rear right leg. Multiple sets of wolf tracks were present at the carcass. Multiple wolf-livestock interactions occurred near the carcass. Based on the evidence and factors from the investigation, WDFW staff conducting the investigation classified the dead calf as a confirmed wolf depredation. The calf remains were placed in the Department of Transportation Trout Lake carcass pit.

On Sept. 6, 2018, another injured calf was located and the subsequent investigation by WDFW staff confirmed that wolves had injured it. One injured calf was removed from the grazing allotment. Further medical attention was not needed for the remaining injured calves.

- Depredation #4 - The calf had bite lacerations and bite puncture wounds to both hindquarters and groin areas. On the right rear leg, there was hemorrhaging to the underlying tissue as indicated by swelling and limping. The location of injuries were consistent with wolf depredation on cattle. Based in the evidence and factors from the investigation, WDFW staff conducting the investigation classified the injured calf as a confirmed wolf depredation.

On Sept. 7, 2018, range riders located a fifth calf and WDFW staff confirmed the calf had been injured by wolves in the OPT pack.

- Depredation #5 - The calf had multiple bite lacerations to the rear legs with most of the injuries on the inside of the legs. The most severe injury was on the rear left leg. The calf had multiple puncture wounds and a large swollen lump on the leg. Necrotic muscle tissue caused by the bite was removed. Based on the evidence and factors from the investigation, WDFW staff conducting the investigation classified the injured calf as a confirmed wolf depredation.

Responsive deterrent measures were implemented after the first depredation. Measures included increasing range rider presence in the high wolf/livestock overlap area with an emphasis towards spending time at salting areas. Range riders continued their attempts at pushing cattle to different pastures within the allotment.

On Sept. 9, 2018, WDFW staff placed Foxlights at two salting areas. The following day, they set up Foxlights at a cattle-gathering site. Even though the majority of cattle were being pushed to neighboring allotments, Foxlights had not been tried at salting areas in the past, so WDFW staff considered this a responsive deterrent measure.

On Sept.12, 2018, WDFW Director Susewind authorized WDFW staff to lethally remove one to two wolves from the OPT pack. However, WDFW needed to provide one business day (eight court hours) advance public notice before initiating lethal action. Two organizations, the Center for Biological Diversity and Cascadia Wildlands, sought the injunction several hours after WDFW announced Susewind's authorization. The judge said the petitioners had not met the criteria for temporary injunctive relief under the state Administrative Procedures Act. However, the judge said the court would expedite a hearing on the merits of the petitioners' underlying complaint.

On Sept. 16, 2018, a WDFW marksman removed a juvenile wolf. The young wolf, weighing 50 pounds, was one of four pack members spotted that day by a WDFW helicopter crew.

One day after the juvenile wolf was removed, WDFW confirmed an adult cow was killed by wolves in the same general area. However, WDFW staff investigating the cow carcass determined that it was likely killed prior to the removal.

On Sept. 21, 2018, WDFW documented five additional livestock depredations by the OPT pack, bringing the total to 12 wolf depredations. These five most recent depredations were confirmed injuries to calves, which likely occurred five to seven days earlier.

On Sept. 28, 2018, a WDFW marksman killed an adult female. The wolf was one of two pack members spotted that day by a WDFW helicopter crew. The wolf was believed to be the breeding female. Following the removal of the second wolf from the OPT pack, WDFW began an evaluation period to determine if those actions changed the pack's behavior. WDFW documented three additional livestock depredations between October 5 and 11, bringing the total to 15 wolf depredations.

On Oct. 5, 2018, WDFW staff confirmed a calf was injured. The calf appeared to have been attacked on two separate occasions as some of the injures appeared to be approximately four to seven days old and other injuries appeared to be within the last 24 hours. The injuries to the calf included multiple bite lacerations, bite puncture wounds, and underlying tissue damage adjacent to the injuries. The locations and the types of injuries observed were confirmed to have been inflicted by a wolf.

On Oct. 7, 2018, department staff documented another injured calf as a probable wolf depredation. The calf had older, healed bite lacerations and wounds to the outer right hindquarter, right flank and outer left hindquarters. The injuries were consistent with a wolf depredation.

On Oct. 11, 2018, a producer contacted WDFW staff about an injured calf found in the same drainage as the previous depredation. The tissue damage and associated bite lacerations were consistent with a wolf depredation. Based on healing, the depredation occurred more than two weeks earlier.

WDFW determined that the Oct. 5, 2018, depredation by the OPT pack was new and not one that likely occurred during or before the removal period. Due to the complexities of the situation, the Director did not make an immediate decision regarding any new action, and WDFW remained in the evaluation period.

On Oct. 23, 2018, WDFW documented a confirmed livestock depredation, which resulted in the death of a calf. This incident brought the total to 16 depredations since September 4. During the examination of the dead calf, WDFW staff documented bite lacerations and associated hemorrhaging along the tail and on both rear legs. The bite lacerations and locations were consistent with a wolf depredation. WDFW staff estimated the incident occurred 2-4 days before the carcass was located. The location data from the collared male wolf indicated it was in the area of the depredation at the estimated time of the incident. WDFW staff also found wolf tracks and scat in the area.

The producer was scheduled to remove his livestock from the USFS allotment by Oct.15. In practice, about 90 percent of the livestock are usually removed by that date. Due to the dense timber and rugged terrain, it may take several weeks past the turnoff date to round up the remaining cattle. The producer was transporting a portion of his cattle to private grazing lands west of the Kettle Crest and another portion out of state. The private grazing lands were on the periphery of the OPT

pack territory and at a lower elevation, which may reduce the likelihood of depredations during the winter.

On Oct. 26, 2018, WDFW Director Susewind reauthorized department staff to lethally remove the remaining two wolves that had repeatedly preyed on cattle. Using aircraft, WDFW staff attempted to remove a collared adult male and an uncollared juvenile wolf multiple times over a two-week period. Staff were unable to locate the uncollared wolf due to the dense forest canopy.

On Nov. 13, 2018, WDFW Director Susewind paused lethal removal actions for the two remaining wolves. However, the agency did not move into a formal evaluation period.

On Jan. 4, 2019, WDFW staff were informed of dead livestock by the Stevens-Ferry County Wildlife Specialist on a USFS grazing allotment in Ferry County. The livestock producer and ranch staff were actively looking for a few cow-calf pairs remaining on the allotment along the Kettle Crest. The carcasses were discovered through investigation of wolf location information provided to the livestock producer by the County Wildlife Specialist. The carcasses were within the OPT pack territory. The producer who owns the depredated livestock is the same producer that experienced wolf depredations by the OPT pack in 2018. The carcasses were discovered northwest of the allotment where the 2018 depredations occurred.

On Jan. 3, the producer searched the area of the reported wolf location information and discovered one live cow and two calf carcasses. The live cow was removed from the area by the producer and was reported to have no injuries. Due to the remote location of the carcasses and lack of daylight, WDFW staff could not reach the area to investigate the dead livestock until Jan. 5. During the investigation of the carcasses initially reported, department staff found and conducted an investigation on an additional cow carcass discovered in close proximity to the others. In total, staff investigated and confirmed three wolf depredations. The three carcasses (two calves and one cow) were within approximately half a mile (850 meters) of one another.

Investigation of the first calf revealed partial consumption of the internal organs and back half of the carcass. External examination of the hide indicated bite lacerations and puncture wounds on the right and left hindquarter. Lacerations and puncture wounds were present on the inner and outer portion of both legs. Skinning the carcass on the left and right hindquarters revealed hemorrhaging of the muscle tissue.

The remains of the second calf included the vertebral column and two front legs attached to a piece of hide. All soft tissue except the remaining hide had been consumed or removed, and the ribs and one of the long bones had been chewed and broken. There was evidence on the hide of significant hemorrhaging in the left armpit of the calf.

The investigation of the cow carcass revealed significant wounds and consumption of the soft tissues of the head and puncture wounds above the hock on the left rear leg. Skinning the leg revealed significant hemorrhaging and tissue damage immediately underlying those wounds.

The damage to all three of the carcasses investigated was indicative of wolf depredation and wolf tracks were documented at each site. In addition, GPS data from the radio-collared wolf in the OPT

pack showed he was in the immediate vicinity during the time of the incidents. The data were also consistent with the age of tracks found at the site during the investigation. The locations and sign further suggest that the wolves involved in the depredations remained in the immediate vicinity for about a week.

No proactive wolf deterrents were in place because some of the producer's cattle remained on the allotment outside the grazing season and the department assumed they had been removed. The vast majority of the livestock had been removed almost two months earlier. Deep snow (24-40 inches), avalanche conditions, and the distance from vehicles (more than 10 miles away) prevented WDFW staff or the livestock producer from removing the carcasses or deploying other responsive deterrents. No other livestock were detected in the area.

On July 6, 2019, WDFW staff discovered a dead adult cow while monitoring livestock in areas of recent wolf activity from OPT pack members. The owner of the cow is the same livestock producer who experienced wolf depredations by the OPT pack in 2018.

Investigation of the carcass by WDFW staff revealed bite lacerations and puncture wounds on the base of the tail, nose, inside of the right rear leg, left hamstring area, left flank, left front leg, right upper neck, and the chest area. Hemorrhaging accompanied the puncture wounds on the nose, tail, inside right rear leg, and the right upper neck. The carcass was mostly consumed.

The damage to the carcass was indicative of wolf depredation. Wolf tracks were also documented at the site. In addition, location data from the GPS-collared wolves in the OPT pack showed they were in the vicinity during the estimated time the cow died. Based on the combination of bite wounds with associated hemorrhaging, wolf locations, and sign in the area, WDFW staff classified this event as a confirmed wolf depredation.

The livestock producer had taken the following proactive, nonlethal measures:

- The producer calves outside of occupied wolf areas and cow-calf pairs are trucked to the grazing site. Calving outside occupied wolf areas protects calves when they are first born and most vulnerable to depredation.
- The turnout date for grazing on the USFS allotment is June 1; the producer delayed turnout of the livestock until June 15.
- As part of this producer's business model, the producer breeds cattle early, so calves are generally around 200 lbs. at turnout. Delayed turnout and early calving are considered proactive conflict mitigation measures because the calves are larger and more defensible. Additionally, deer fawns, elk calves, and moose calves become available as prey in mid-June.

Through coordination with the U.S. Forest Service, the grazing rotation on the allotment diverted cattle away from wolf rendezvous sites identified in previous years.

After turnout, the cattle remained in three main groups—two around salting sites and one around a watering site. The salting sites were predetermined by the U.S. Forest Service and had been used historically, so even if the salt was removed, the cattle had a strong fidelity to the site and

familiarity with the location from salt in the ground. Accordingly, WDFW wildlife conflict specialists deployed Fox lights to deter wolves from these areas on June 23, 2019.

In addition, starting on June 17, near daily patrols of the area were coordinated among the producer, the Ferry-Stevens County Wildlife Specialist, and Department staff. The Department also contracts with a range rider who works near daily with this producer's cattle. That range rider was working on the other side of the Kettle crest within the OPT territory, east of the allotment where the depredation occurred, during the time of the depredation. The Department shifted the contracted range rider to the portion of the OPT pack's territory and grazing area where the depredation took place.

On July 10, 2019, WDFW Director Kelly Susewind reauthorized WDFW staff to lethally remove wolves from the OPT pack. The OPT pack has repeatedly preyed on cattle on federal grazing lands in the Kettle River range of Ferry County.

On July 13, 2019, WDFW lethally removed a radio-collared adult male member of the OPT wolf pack in response to a pattern of livestock depredation on a federal grazing allotment in the OPT territory in Ferry County. WDFW's approach to incremental lethal removal consists of a period of active operations followed by an evaluation period to determine if those actions changed the pack's behavior. Since the removal, WDFW staff have investigated four livestock depredations in the same area.

On July 18, the Stevens/Ferry County Wildlife Specialist discovered two injured calves on a federal grazing allotment in the OPT wolf pack territory in Ferry County. The county specialist notified WDFW staff, who conducted an investigation of the injuries that day.

External examination of the first injured calf revealed bite lacerations and puncture wounds on both hind legs. Examination of the second injured calf showed bite lacerations and puncture wounds on both hind legs and the rump. The left hind leg was extremely swollen and there was an open, infected wound on the upper leg. The right hind leg had bite lacerations and puncture wounds present on the outer portion of the thigh as well as the rump. Both calves were removed from the range; the calf with the infected wound was later euthanized due to the severity of the injuries.

On July 20, WDFW staff examined a dead calf reported the previous day by a member of the public. The carcass had bite lacerations and puncture wounds on the inside and outside of both hindquarters and left flank. The investigation revealed hemorrhaging associated with the bite lacerations and puncture wounds to the left hindquarter. The calf likely died from these injuries. The carcass was removed from the range.

The damage to all of these calves was indicative of wolf depredation. In addition, location data from a GPS-collared wolf in the OPT pack showed he was in the area where the calves were discovered during the time of the incidents. The exact date the first two calves were injured could not be determined from the evidence present, but the calf examined July 20 likely died less than 24 hours prior to being discovered. Based on the evidence, WDFW staff confirmed these three depredations were caused by wolves.

On July 22, WDFW staff discovered and investigated a fourth dead calf while working in the area of the other depredations. The calf was mostly consumed and likely died less than 12 hours prior to being discovered. During the investigation, wolf tracks and blood indicative of an attack were discovered at the site. Based on the evidence and wolf presence in the area, the cause of death was probable wolf depredation.

Following the depredation confirmed on July 6, WDFW-contracted range riders were in the area for two days before pausing activity during lethal removal efforts. The WDFW-contracted range riders did not resume riding because the livestock producer prefers that contracted range riders not work with their cattle at this time.

The producer continued to remove or secure livestock carcasses (when discovered) to avoid attracting wolves to the rest of the herd, and to remove sick and injured livestock (when discovered) from the grazing area until they are healed. WDFW and county staff continued to coordinate patrols of the grazing area to increase human presence and use Fox lights at salting and watering locations to deter wolves. Other livestock producers with cattle on federal grazing allotments in the OPT pack territory had deployed range riders.

On July 26, 2019, the livestock producer who had been experiencing depredations discovered three injured calves while gathering and moving cattle. WDFW staff were alerted and investigated the injuries. All of the calves had bite lacerations and puncture wounds with swelling and hemorrhaging in the underlying tissue. The calves were treated and released back to the pasture.

The damage to each of these calves was indicative of wolf depredation. In addition, location data from a GPS-collared wolf in the OPT pack showed he was in the area where the calves were discovered. The exact date calves were injured could not be determined from the evidence present, but injuries on two of the calves were estimated to be four to five days old and injuries on the third calf were at least a week old. Based on the evidence, WDFW staff confirmed these injuries were caused by wolves.

On July 31, 2019, an injured calf was reported and investigated by WDFW staff. The calf had wounds on the outer left side of the rear leg. The injuries affected the underlying muscle with bite lacerations on the outer margins of the wound. The combination of bite wounds and lacerations with associated hemorrhaging were consistent with wolf depredation.

On the same day, WDFW Director Kelly Susewind reauthorized WDFW staff to lethally remove wolves from the OPT pack in response to repeated depredation of cattle on federal grazing lands in the Kettle River range of Ferry County under the guidance of the state's Wolf Conservation and Management Plan and the lethal removal provisions of the department's Wolf-Livestock Interaction Protocol.

On Aug. 2, 2019, A King County Superior Court Commissioner denied a motion for a temporary injunction that would have prohibited WDFW from lethally removing wolves from the OPT pack in Ferry County.

As a result, the department could remove wolves from the OPT pack as authorized July 31 by WDFW Director Kelly Susewind. Information about the authorization was provided in an online update.

Although it is not currently named as a petitioner, the Maryland-based Center for a Humane Economy took credit for seeking the injunction, through two Seattle plaintiffs, one day after the department announced Susewind's authorization.

On Aug. 1, 2019 the King County Superior Court Commissioner said the petitioners had not met the criteria for temporary injunctive relief.

On Aug. 5, 2019, a dead cow was reported to WDFW staff by the livestock producer. Staff conducted an investigation the same day. The investigation revealed bite lacerations and puncture wounds on the inside of the right rear leg, left side of the neck, the chest area, throat, top left shoulder, inside right hindquarter, inside back left leg, outside back left leg, center of the back, and the inside right front leg. There was hemorrhaging on the underlying tissue adjacent to some of the bite lacerations and puncture wounds. Staff classified this incident as a confirmed wolf depredation. The injuries appeared to be a week old and the cow had been deceased approximately two days. Due to the inaccessibility of the location and size of the cow, the carcass was left on the landscape.

Details of the OPT Pack depredation incidents are as follows:

Date of depredation	Depredation type	Proactive Non-lethal	10-month window
Sept 5, 2018	Confirmed Kill (calf)	Y	July 5, 2019
Sept 5, 2018	Confirmed Injury (calf)	Y	July 5, 2019
Sept 5, 2018	Confirmed Injury (calf)	Y	July 5, 2019
Sept 6, 2018	Confirmed Injury (calf)	Y	July 6, 2019
Sept 7, 2018	Confirmed Injury (calf)	Y	July 7, 2019
Sept 11, 2018	Confirmed Injury (calf)	Y	July 11, 2019
Sept 17, 2018	Confirmed Kill (cow)	Y	July 17, 2019
Sept 21, 2018	Confirmed Injury (calf)	Y	July 21, 2019
Sept 21, 2018	Confirmed Injury (calf)	Y	July 21, 2019
Sept 21, 2018	Confirmed Injury (calf)	Y	July 21, 2019
Sept 21, 2018	Confirmed Injury (calf)	Y	July 21, 2019
Sept 21, 2018	Confirmed Injury (calf)	Y	July 21, 2019
Oct 5, 2018	Confirmed injury (calf)	Y	Aug 5, 2019
Oct 7, 2018	Probable injury (calf)	Y	Aug 7, 2019

Oct 11, 2018	Confirmed injury (calf)	Y	Aug 11, 2019
Oct 23, 2018	Confirmed kill (calf)	Y	Aug 23, 2019
Jan 5, 2019	Confirmed kill (calf)	N	Nov 5, 2019
Jan 5, 2019	Confirmed kill (adt cow)	N	Nov 5, 2019
Jan 5, 2019	Probable kill (calf)	N	Nov 5, 2019
July 7, 2019	Confirmed kill (adt cow)	Y	May 7, 2020
July 18, 2019	Confirmed injury (calf)	N	May 18, 2020
July 18, 2019	Confirmed injury (calf)	N	May 18, 2020
July 20, 2019	Confirmed kill (calf)	N	May 20, 2020
July 22, 2019	Confirmed kill (calf)	N	May 22, 2020
July 26, 2019	Confirmed injury (calf)	N	May 26, 2020
July 26, 2019	Confirmed injury (calf)	N	May 26, 2020
July 26, 2019	Confirmed injury (calf)	N	May 26, 2020
July 29, 2019	Confirmed kill (calf)	N	May 29, 2020
August 5, 2019	Confirmed kill (cow)	N	June 5, 2020

On Aug. 8, 2019, WDFW staff trapped and collared a gray female juvenile wolf in the OPT pack.

The Department removed one juvenile male on Aug. 7, one juvenile male pup on Aug. 8, one adult female on Aug. 13, 2019 that was likely the breeding female of the pack.

On Aug. 16, 2019, WDFW staff lethally removed the four known remaining members of the OPT wolf pack including two adult males and two juvenile females. A series of WDFW investigations had shown the pack responsible for 29 depredation incidents. All updates are available online.

WDFW Lethal Removal Operation

Total expenditure for the lethal removal operation in 2019 (staff time, contractor time and aerial support) was $91,977.68 of Wildlife State Funds.

OPT Pack Lethal Operation			
Date	**Wolf**	**Sex**	**Age**
Sept 16, 2018	1	Female	Pup
Sept 28, 2018	1	Female	Adult
July 13, 2019	1	Male	Adult

Aug 7, 2019	1	Male	Juvenile
Aug 8, 2019	1	Male	Juvenile
Aug13, 2019	1	Female	Adult
Aug 16, 2019	4	2 Male, 2 Female	2 Adults, 2 Juveniles

Grouse Flats

Background

The Grouse Flats pack was confirmed in the summer of 2017 and had a minimum count of three individuals during the following winter survey effort. The minimum count after winter surveys in 2018-19 was eight individuals. In May 2019, a black yearling male wolf in the pack was fitted with a GPS collar. During the 2019 summer, WDFW biologists observed seven adult wolves (five black, two gray) and two pups (one gray, one black) utilizing remote cameras within the Grouse Flats territory.

The first confirmed depredation occurred on Aug. 23, 2018 in a fenced private pasture within the Grouse Flats pack territory and resulted in severe injuries to a 200-pound heifer calf. The calf had a puncture and tooth scrape on its front shoulder. On the rear flank, there was another puncture wound and adjacent tooth scrape. On the calf's rear extending into the groin area, there were two large tears leaving an open wound with torn hide and exposed muscle tissue. Because of the nature of the wounds and their location on the calf, WDFW staff determined the injuries were caused by a wolf.

The second confirmed depredation occurred on Sept. 2, 2018 and involved a 600-pound calf that was chased out of a USFS allotment onto an adjacent private pasture where it was killed and partially consumed. The calf had severe tissue loss and damage including hemorrhaging on the lower side of both hindquarters continuing into the groin area. The hide from the lower hindquarters showed hemorrhaging and puncture wounds. There was also hemorrhaging behind the front left shoulder. The lower 6-8 inches of the hide on the tail were split and removed from the tail bone, accompanied by hemorrhaging and tooth scrapes at the base of the tail. WDFW staff investigated the depredation site and conducted a full necropsy on the carcass. The damage to the calf was consistent with a wolf depredation. Staff located multiple fresh wolf tracks near the carcass as well. WDFW staff determined the kill was caused by a wolf or wolves with evidence present.

On Oct. 28, 2018, a livestock producer found an injured cow on a USFS grazing allotment in the Grouse Flats wolf pack territory. WDFW staff investigated the injuries and confirmed they were caused by one or more wolves from the Grouse Flats pack. This was the third confirmed wolf depredation in four months by the Grouse Flats pack. In this incident, the cow was limping and favoring its right front shoulder and leg. There were fresh puncture marks to the shoulder accompanied by hemorrhaging and swelling. There were bite wounds to the right rear high on the quarter and inside of the leg. The lower inside of the right front leg showed signs of trauma. The injuries appeared to be less than a few days old.

Producer one grazes cattle solely on private, fenced pastures in the Grouse Flats area and used the following proactive wolf deterrence measures:

1. Deployed range riders on a semi-daily basis to monitor cattle in fenced private pastures.
2. Increased human presence in areas with reported wolf activity or sign.
3. Moved cattle to avoid core wolf areas.
4. Removed sick or injured livestock from the pastures.
5. Maintained sanitation by removing livestock carcasses from the pastures.

Producer two grazes cattle on a USFS grazing allotment in the Grouse Flats area and used the following proactive wolf deterrence measures:

1. Deployed range riders on a semi-daily basis to monitor cattle on the grazing allotment.
2. Increased human presence in areas with reported wolf activity or sign.
3. Delayed turnout of cattle to avoid core wolf use areas (the original turnout was scheduled for June 23, 2018 but was delayed until July 13, 2018).
4. Removed sick or injured livestock from the allotment.
5. Maintained sanitation by removing livestock carcasses from the allotment.

Producer three grazes cattle on a USFS grazing allotment in the Grouse Flats area and used the following proactive wolf deterrence measures:

1. Deployed range riders on a semi-daily basis to monitor cattle on his USFS allotment.
2. Increased human presence in areas with reported wolf activity or sign.
3. Removed sick or injured livestock from the allotment.
4. Maintained sanitation by removing livestock carcasses from the allotment.

On July 8, 2019, WDFW staff discovered a dead 400-450 lb. calf in a 160-acre fenced pasture while working on WDFW's 4-O Ranch Wildlife Area. WDFW conflict staff contacted the livestock producer (who has authorization to graze livestock on the wildlife area through a permitted lease with WDFW) and conducted an investigation on site.

WDFW staff's investigation of the carcass revealed hemorrhaging and tissue damage on the calf's left side, including the chest and lower neck area, front and back of the front leg, lower portion of the rear leg, and tooth puncture and scrapes on the inside of the lower leg and groin. WDFW also documented hemorrhaging and tissue damage on the calf's right side, including the chest and lower neck area, rear side of the front leg continuing into surrounding tissue behind the leg, area in front of the rear leg, and the lower half of the rear leg. Most of the hindquarters were consumed. The carcass was removed from the area and buried immediately after the investigation.

The damage to the carcass was indicative of a wolf depredation. In addition, location data from the collared wolf in the Grouse Flats pack showed at least one member of the pack in the vicinity during the approximate time the calf died. Based on the combination of tissue damage with associated hemorrhaging and wolf locations, WDFW staff classified this event as a confirmed wolf depredation.

The livestock producer who owned the affected livestock monitored the herd by range riding at least every other day, maintained regular human presence in the area, removed or secured

livestock carcasses to avoid attracting wolves to the rest of the herd, and avoided known wolf high activity areas. Since the depredation occurred, the producer deployed Fox lights in the grazing area and increased the frequency of range riding until cattle could be moved to a different pasture.

On July 22, 2019, a range rider spotted a wolf feeding on a dead 400-450 lb. calf in a 4,500-acre fenced pasture on private land. Livestock producers reported the sighting to WDFW staff, who conducted an investigation on site.

At the site, WDFW staff noted disturbed ground, unidentifiable tracks, and a blood trail leading to the carcass, along with evidence the carcass had been dragged while fed upon. WDFW staff's investigation of the carcass revealed hemorrhaging, tissue loss and damage, and tooth punctures through the groin on both legs extending to the hindquarters. Staff also documented hemorrhaging on the rear side of the right front leg. The hindquarters, flank, intestines, and organs were partially consumed. The carcass was removed from the area and buried after the investigation.

The damage to the carcass was indicative of wolf depredation. In addition, location data from the collared wolf in the Grouse Flats pack showed at least one member of the pack in the vicinity during the approximate time the calf died. Based on the combination of tissue damage with associated hemorrhaging and wolf locations, WDFW staff classified this event as a confirmed wolf depredation.

The livestock producer who owned the affected livestock monitored the herd by range riding at least every other day, maintained regular human presence in the area, removed sick and injured livestock from the grazing area until they are healed, removed or secured livestock carcasses to avoid attracting wolves to the rest of the herd, and avoided known wolf high activity areas.

On Aug. 30, 2019, a range rider reported a dead 450 lb. calf in a fenced pasture on private land. Livestock producers reported the calf to WDFW staff, who conducted an investigation on site. At the site, WDFW staff noted multiple wolf tracks along with evidence the carcass had been dragged while fed upon. WDFW staff's investigation of the carcass revealed hemorrhaging, tissue loss and damage, and dislocation and chewing of bone joints. The rear half of the calf was mostly consumed. The carcass was removed from the area and buried after the investigation.

The damage to the carcass was indicative of wolf depredation. In addition, location data from the collared wolf in the Grouse Flats pack showed at least one member of the pack in the vicinity during the approximate time the calf died. Based on the combination of tissue damage with associated hemorrhaging, wolf tracks, and wolf locations, WDFW staff classified this event as a confirmed wolf depredation.

The livestock producer who owned the affected livestock monitored the herd by range riding five days a week, maintained regular human presence in the area, used Fox lights in their pastures, removed sick and injured livestock from the grazing area until they were healed, removed or secured livestock carcasses to avoid attracting wolves to the rest of the herd, and calved away from known wolf high activity areas. Calves were typically at least 200 lbs. before turnout.

On Sept. 11, 2019, a livestock producer reported an injured adult cow on private pasture to WDFW staff, who conducted an investigation on Sept. 12. The cow remained mobile after being injured, so the exact depredation location is unknown.

The investigation revealed multiple lacerations, puncture wounds, swelling, and hemorrhaging on the hindquarters extending into the groin and udder area. The cow was removed to the producer's private ranch for treatment and healing, along with her calf so it would not be unaccompanied.

These injuries were indicative of wolf depredation. In addition, location data from the collared wolf in the Grouse Flats pack showed at least one member of the pack in the vicinity during the approximate time of the depredation. Based on the combination of tissue damage with associated hemorrhaging and wolf locations, WDFW staff classified this event as a confirmed wolf depredation.

The livestock producer who owned the affected livestock monitored the herd by range riding five to six days a week, maintained regular human presence in the area, used Fox lights in their pastures, removed sick and injured livestock from the grazing area until they were healed, removed or secured livestock carcasses to avoid attracting wolves to the rest of the herd, and calved away from known wolf high activity areas. Calves were typically at least 200 lbs. before turnout.

Details of the Grouse Flats Pack depredation incidents are as follows:

Date of Depredation	Depredation type	Proactive non-lethal	10-month window
8/23/2018	Confirmed Injury of calf	Y	6/23/2019
9/2/2018	Confirmed Kill of Calf	Y	7/2/2019
10/28/2018	Confirmed Injury of cow	Y	8/28/2019
7/8/2019	Confirmed kill of calf	Y	5/8/2020
7/22/2019	Confirmed kill of calf	Y	5/22/2020
8/30/2019	Confirmed kill of calf	Y	6/30/2020
9/12/2019	Confirmed injury of cow	Y	7/12/2020

On September 24, 2019, WDFW Director Kelly Susewind authorized the incremental removal of wolves from the Grouse Flats pack in response to repeated depredations of cattle on grazing lands in southeast Washington. The Grouse Flats pack had been involved in two depredations in the last 30 days and four in the last 10 months.

Proactive nonlethal deterrents (described below) used by livestock producers in the area had not influenced pack behavior to reduce the potential for continued depredations on livestock. Director

Susewind's decision was consistent with the guidance of the state's Wolf Conservation and Management Plan and the provisions of the Department's Wolf-Livestock Interaction Protocol.

WDFW's approach to incremental lethal removal consisted of a period of active lethal removal operations followed by an evaluation period to determine if those actions changed the pack's behavior.

The goal of lethal removal, as described in the Wolf Conservation and Management Plan, is to manage wolf-livestock conflicts to minimize livestock losses without undermining the recovery of a sustainable wolf population. The purpose of the lethal action (and nonlethal tools) in the Grouse Flats pack was to influence or change pack behavior to reduce the potential for continued depredations on livestock while continuing to promote wolf recovery.

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

- WDFW documented ongoing depredations on livestock by the pack since Aug. 23, 2018 (seven total, four within the last 10 months and two in the last 30 days). Notifications of depredations were shared with the public in a timely manner, as described in the protocol.
- At least two proactive deterrence measures and responsive deterrence measures (if applicable) were implemented and did not meet the goal of influencing/changing pack behavior. During the 2019 grazing season, the following nonlethal deterrents were implemented:

On Sept. 25, the Washington Department of Fish and Wildlife (WDFW) lethally removed an adult female member of the Grouse Flats wolf pack. The wolf removed was believed to be the breeding female. This pack had repeatedly preyed on cattle on grazing lands in southeast Washington. After the removal, no other depredations were documented by the Grouse Flats pack through the end of the year.

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 reducing the caloric intake needs for the pack). The department continues to be in an evaluation period. All updates are available online.

WDFW Lethal Removal Operation

Total expenditure for the lethal removal operation (staff time, contractor time and aerial support) was $36,635.36 of Wildlife State Funds.

Grouse Flats Pack Lethal Operation			
Date	**Wolf**	**Sex**	**Age**
Sept 25, 2019	1	Female	Adult