

# WASHINGTON GRAY WOLF CONSERVATION AND MANAGEMENT 2017 ANNUAL REPORT

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



*Photo: Spokane Tribal Wildlife Program (Savanah Walker)*

*This report presents information on the status, distribution, and management of wolves in the State of Washington from January 1, 2017 through December 31, 2017.*

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## EXECUTIVE SUMMARY

Gray wolves (*Canis lupus*) were classified as an endangered species in Washington under the provisions of the Endangered Species Act (ESA) in 1973. In 2011, wolves in the eastern third of Washington were removed from federal protections under the ESA. Wolves in the western two-thirds of Washington continue to be protected under the ESA and are classified as an endangered species under federal law.

In December 2011, the Washington Fish and Wildlife Commission formally adopted the Wolf Conservation and Management Plan to guide recovery and management of gray wolves as they naturally recolonize the State of Washington. At present, wolves are classified as an endangered species under state law (WAC 220-610-010) throughout Washington regardless of federal status. Washington is composed of three recovery areas which include Eastern Washington, the Northern Cascades, and the Southern Cascades and Northwest Coast. The Washington Department of Fish and Wildlife (WDFW), acting on policies set by the Fish and Wildlife Commission, is the primary agency responsible for managing wolves in the Eastern Washington recovery area while WDFW works under a section 6 agreement with U.S. Fish and Wildlife Service (USFWS) in the federally listed portion of the state. Wolves that inhabit tribal lands in the Eastern Washington recovery area are managed by those specific tribal entities.

The minimum estimated wolf population in Washington increased by approximately 6% over the 2016 minimum count to at least 122 known wolves in 22 known packs including at least 14 breeding pairs. Pack sizes ranged from 2 to 13 wolves and averaged  $4.8 \pm 2.6$  wolves per pack. One collared wolf in the North Cascades in Skagit County has a defined territory, but no other wolves have been confirmed. State, federal, and tribal biologists captured 12 wolves (10 new wolves and 2 recaptures) from 12 different packs and monitored a total of 22 unique radio collared wolves from 15 different packs, plus one lone wolf with no pack affiliation, that existed in Washington at some point during 2017. WDFW documented 14 mortalities in Washington during the year including three due to agency removal actions, three legal harvest, two caught-in-the-act, two vehicle collisions, and four other human caused that are still under investigation.

Wolf populations were managed to ensure progress towards recovery goals while minimizing chronic loss of livestock caused by wolves. WDFW investigators confirmed 8 cattle as being killed by wolves and none as being probable wolf-kills. Five cattle were confirmed to have been injured by wolves. Five packs (23% of known packs that existed at some point during the year) were involved in at least one confirmed livestock mortality. Three wolves were removed through agency removal actions during 2017. WDFW processed two damage claims and paid a total of \$3,700.00 to compensate livestock producers who experienced losses caused by wolves during 2017.

## ACKNOWLEDGMENTS

Wolf management in Washington is a cooperative effort by the Washington Department of Fish and Wildlife (WDFW), Colville Confederated Tribes (CCT), 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 2017 include WDFW Director Jim Unsworth, Wildlife Program Assistant Director Eric Gardner, Deputy Assistant Director of Wildlife Mick Cope, Game Division Manager Anis Aoude, Carnivore Section Manager Stephanie Simek, Statewide Wolf Specialist Benjamin Maletzke, Wolf Biologist Trent Roussin, Conflict Section Manager Dan Brinson and Wolf Policy Lead Donny Martorello. Other WDFW personnel who assisted with wolf recovery and management efforts included Chris Anderson, David Anderson (retired), Mike Atamian, Dana Base (retired), Rich Beausoleil, Candace Bennett, Jeff Bernatowicz, Bruce Botka, Eric Boyd, Joe Bridges, James Brown, Cole Caldwell, Colleen Chandler, Dan Chistensen, Treg Christopher, John Cotton (retired), Jason Day, Paul DeBruyn, Jason Earl, Chris Erhardt, Severin Erickson, Scott Fitkin, Morgan Grant, Ellen Heilhecker, Jeff Heinlen, Eric Holman, Todd Jacobsen, Ryan John, Sandra Jonker, Brian Kertson, Sarah Kindschuh, Doug King, Keith Kirsch, Danyl Klump, Matt Konkle, Tony Leonetti, Russell Link, Mike Livingston, Carrie Lowe, Madonna Luers, Kristin Mansfield, Joey McCanna, Troy McCormick, Scott McCorquodale, Tara Meyer, Matt Monda, William Moore, Paul Mosman, Bryan Murphie, Rachael Nickerson, Eric Oswald, Nick Parkert, Matt Peterson, John Pierce, Steve Pozzanghera, Annemarie Prince, Dan Rahn, Scott Rasley, Kevin Robinette, Ralf Schreiner, Tucker Seitz, Nicole Stephens, Pam Taylor, Michelle Tirhi, Mark Vekasy, Dave Volson, Robert Waddell, Jeff Wade, Don Weatherman, Kile Westerman, Steve Wetzel, Paul Whelan, Paul Wik, Gary Wiles, and Fenner Yarborough.

Numerous other agencies and agency personnel also played a key role in wolf management efforts in Washington. In particular, we would like to thank personnel from the USFWS including Eric Rickerson, Jerry Cline, Manisa Kung, Gregg Kurz, Eric Marek, and Mike Munts; WS personnel including Mike Linnell, Terry Smith, Chad Heuser, and Wade Jones; CCT personnel including Randy Friedlander and Eric Krausz; STOI personnel including Billy Joe Kieffer and Savannah Walker; the U.S. Forest Service including Elizabeth Berkley, Mike Borysewicz, John Chatel, Travis Fletcher, Chris Loggers (retired), 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; 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 would also like to thank the many members of the public who provided wolf observation reports and the numerous private landowners in Washington for their cooperation.

Finally, we sincerely appreciate the safe piloting and aerial telemetry skills of Dave Parker of Northern Air (Bonners Ferry, ID), and Jess Hagerman of Northwest Helicopters (Olympia, WA).

Although we could not list every single person that was involved with wolf recovery and management efforts in Washington, for those not listed, we also thank you for your efforts and patience.

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# INTRODUCTION

## Definitions

Two terms often used when discussing gray wolves (*Canis lupus*) and wolf management are “pack” and “breeding pair.” Although similar, “pack” is primarily used to evaluate the number of wolves on the landscape while “breeding pair” is an estimate of reproductive success and recruitment. A pack is defined as two or more wolves traveling together in winter, and a breeding pair is defined as at least one adult male and one adult female wolf that raised at least two pups that survived until December 31 (Wiles et al. 2011). Thus, in any given year, the number of packs will always be greater than or equal to the number of breeding pairs.

## Background

Historically, gray wolves were common throughout much of Washington, but numbers began to decline as human populations increased in the latter half of the 1800s. 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. Sporadic reports of wolves were received over the next several decades, and increased during the 1990s to early 2000s, but no resident packs were documented during this time.

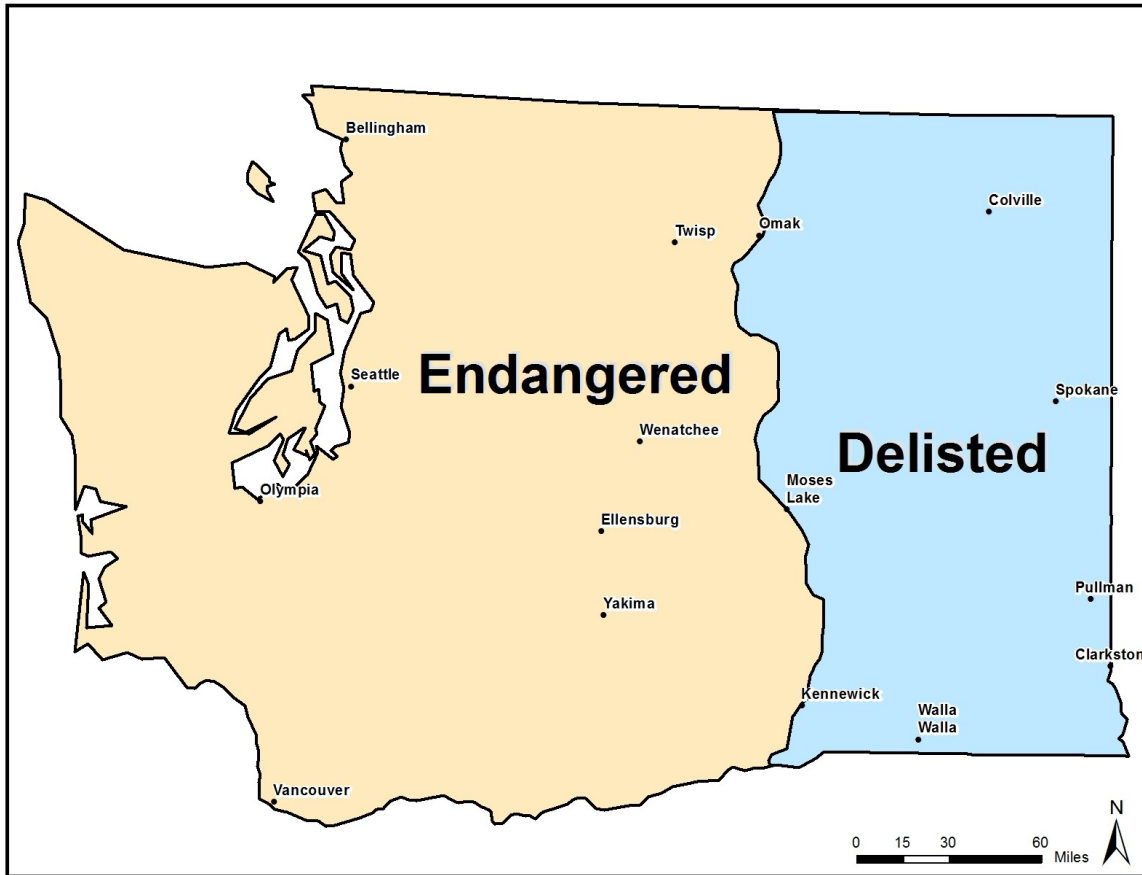
Dispersing wolves from increasing populations in Idaho, Montana, and British Columbia, Canada were likely responsible for the documented reports of wolves in northern Washington during the 1990s to early 2000s. It was not until 2008 that the first resident pack in the state since the 1930s was documented in Okanogan County in north-central Washington. Since that time, wolves have continued to naturally recolonize the state via dispersal from resident Washington packs and neighboring states and provinces.

## Federal Status

Gray wolves in Washington acquired federal protections under the Endangered Species Act (ESA) in 1973. When the U.S. Fish and Wildlife Service (USFWS) completed the Northern Rocky Mountain Wolf Recovery Plan in 1987, only the states of Idaho, Montana, and Wyoming were included. In 2007, the USFWS published a final rule designating the Northern Rocky Mountain population of gray wolves as a Distinct Population Segment (DPS). The eastern third of Washington was included in the DPS designation to account for dispersing wolves from populations in Idaho and Montana, although federal recovery requirements were only applicable to those states in the original Northern Rocky Mountain Wolf Recovery Plan. To date, no federal wolf recovery requirements have been developed for Washington, which was not part of that original designation.

In 2008, the USFWS published a final rule to remove wolves in the Northern Rocky Mountain DPS from ESA protection. This rule was later challenged in federal court and, consequently, wolves were placed back under federal protection. The USFWS again published a final rule to remove the Northern Rocky Mountain wolf population, excluding Wyoming, from the protections of the ESA in 2009, but the rule was vacated by a federal judge in 2010 which again

restored federal protections to wolves in the Northern Rocky Mountain DPS. In 2011, President Obama signed the Department of Defense and Full-



**Figure 1.** Federal classification of wolves in Washington State, 2017.

Year Appropriations Act, a section of which 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 protections.

Although wolves in the eastern third of Washington are no longer federally protected, wolves in the western two-thirds of the state continue to be listed under the provisions of the ESA and are presently classified as an endangered species under federal law (Figure 1). In 2013, the USFWS published a proposed rule to remove gray wolves from the list of endangered and threatened wildlife where they are currently federally protected (Federal register, Vol 78, No. 114). This rule also constituted the completion of a status review for gray wolves in the Pacific Northwest, proposed to maintain endangered status for the Mexican wolf (*Canis lupus baileyi*), and proposed to reclassify the Eastern wolf (*Canis lupus lycaon*) from a subspecies of the gray wolf to a species (*Canis lycaon*).

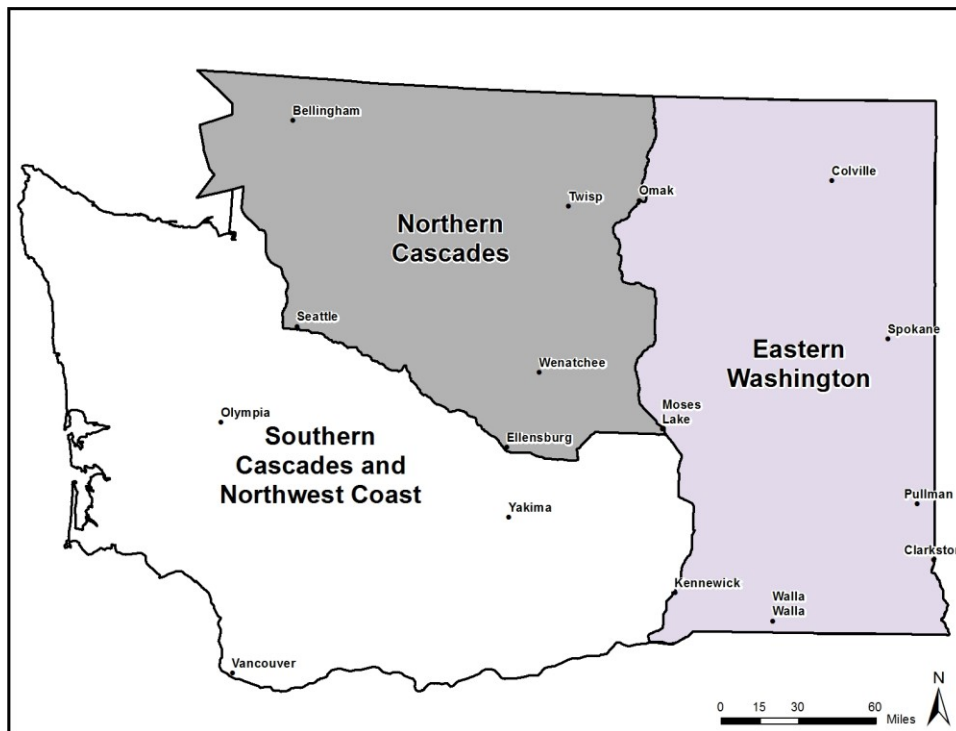


The USFWS subjected the proposed rule to an independent expert peer review that was managed by the National Center for Ecological Analysis and Synthesis. The purpose of the peer review was to evaluate the proposed rule and determine if the best available science was used to evaluate the status of gray wolves. Results of the peer review were published in early 2014. As a result, the USFWS reopened the public comment period for the proposed rule so the public may be allowed to provide additional comment based on the results of the peer reviewed document. To date, USFWS has not released a decision notice on the federal status of gray wolves.

## State Status

In response to the expected dispersal of wolves into Washington from populations in surrounding states and provinces and the likely formation of resident packs, the Washington Department of Fish and Wildlife (WDFW) initiated the development of the Wolf Conservation and Management Plan for Washington (Plan). In 2007, the Director of WDFW appointed an 18-member working group to advise WDFW during plan development. After nearly five years of work, WDFW Commission formally adopted the Plan in December 2011 to guide recovery and management of gray wolves as they naturally recolonize the state.

At present, wolves are classified as an endangered species under state law (WAC 220-610-010) throughout Washington regardless of federal classification. The Plan designates three recovery areas in the state that includes Eastern Washington, the Northern Cascades, and the Southern Cascades and Northwest Coast (Figure 2). WDFW is the primary agency responsible for



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

managing wolves in the Eastern Washington recovery area while WDFW works as a designated agent of the USFWS under a Section 6 agreement in the other two recovery areas. Wolves that inhabit tribal lands in the Eastern Washington recovery area are managed by those specific tribal entities.

The Plan allows for “down-listing” wolves from endangered to threatened status when 6 successful breeding pairs are present for three consecutive years, with 2 successful breeding pairs in each of the three recovery regions. To reclassify wolves from state threatened to state sensitive status, 12 successful breeding pairs must be present for 3 years, with 4 successful breeding pairs in each of the three recovery regions. The process of fully delisting wolves under state law will begin only when there are at least 4 successful breeding pairs in each recovery area, plus an additional 3 breeding pairs anywhere in the state for three consecutive years; or when there are at least 4 successful breeding pairs in each recovery area plus an additional 6 breeding pairs anywhere in the state for a single year.

### **Funding**

During calendar year 2017, WDFW spent a total of \$1,272,314 on wolf recovery and management activities. This total includes monies paid for Damage Prevention Cooperative Agreements, compensation for depredations, contracted range riders and other conflict prevention measures, and wolf surveying and monitoring. The budget funds came from a combination of additional fees for the registration of personalized license plates (35%), endangered species license plates (5%), the state general fund (14%), unrestricted state wildlife funds (21%), wildlife compensation for livestock damage funds (5%), supplemental DPCA-L general funds (20%) and grants received from the United States Fish and Wildlife Service.

# POPULATION MONITORING

## Monitoring Techniques

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. It is always possible, however, that some wolves were present in areas that were surveyed, but avoided detection.

As with all wildlife, counting the total number of wolves on the landscape can be challenging, if not impossible, so biologists use a combination of the techniques described above to derive a minimum number 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 likely conservative and the actual number of wolves in Washington is likely higher.

The annual survey includes lone wolves when reliable information was available. However, because lone or dispersing wolves are difficult to document and they account for between 10-15% of the known winter population (Mech and Boitani 2003<sup>1</sup>, page 170), WDFW multiplied the minimum documented count by 12.5% to account for unknown 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 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 included in the most recent annual report.

## Population Status and Distribution

As of December 31, 2017, the minimum known number of wolves in Washington increased by approximately 6% above the 2016 minimum count and was composed of at least 122 wolves (Figure 3) in 22 known packs (Table 1, Figure 4). Pack sizes ranged from 2 to 13 members and averaged  $4.8 \pm 2.6$  wolves per pack ( $n = 22$ ). The Sherman pack, which was identified in previous years, still had one individual consistently using the area based on winter track survey, but did not meet the criteria to consider it a pack. Similarly, a wolf collared in Skagit County has demonstrated movements utilizing a territory, but no other individuals were confirmed during subsequent survey efforts this past year.

While reproduction was documented in 18 packs over the summer, only 14 of those packs were considered successful breeding pairs as of December 31, 2017 (Table 1; Figure 5). A minimum estimate of 33 pups survived to the end of the calendar year.

During 2017, wolves continued to inhabit a mix of both public and private lands from eastern Washington to the slopes of the Cascade Mountains (Figure 6). The estimated mean home range

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

size of 11 packs with known territories was approximately 359 square miles (930 square kilometers) and ranged from an estimated 121 square miles (314 square kilometers) to 1,164 square miles (3,015 square kilometers).

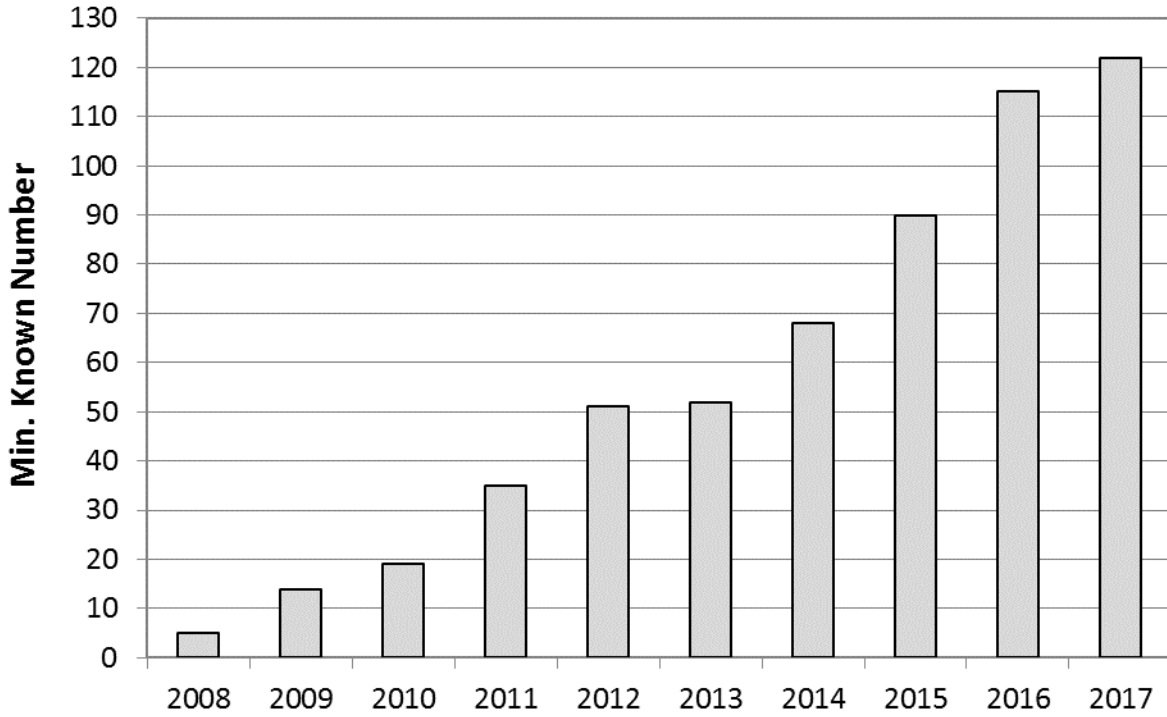
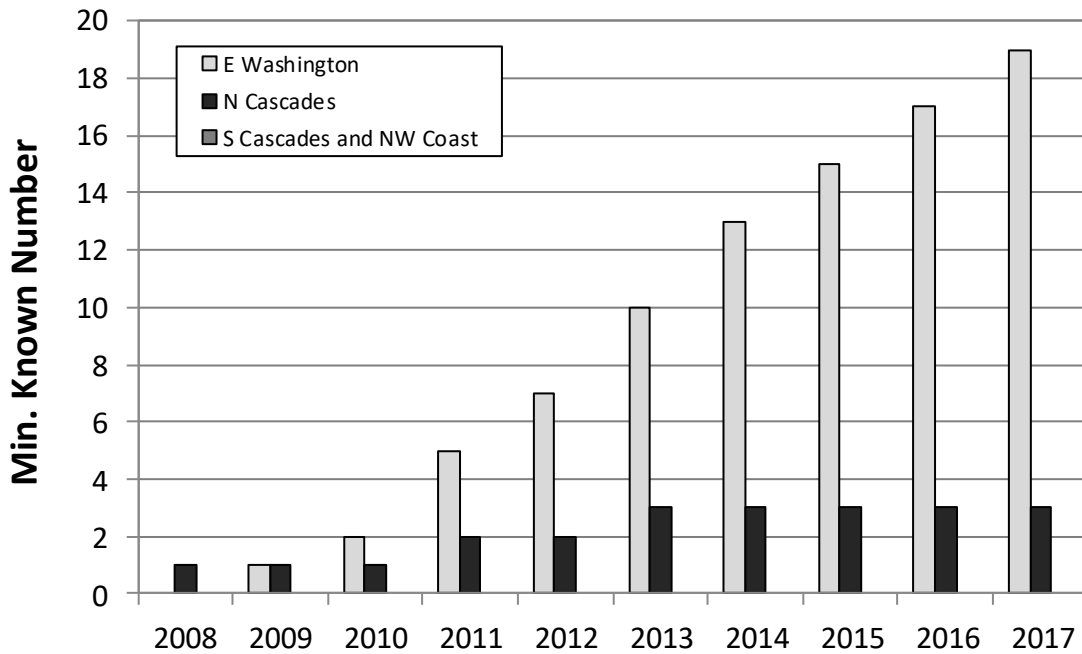
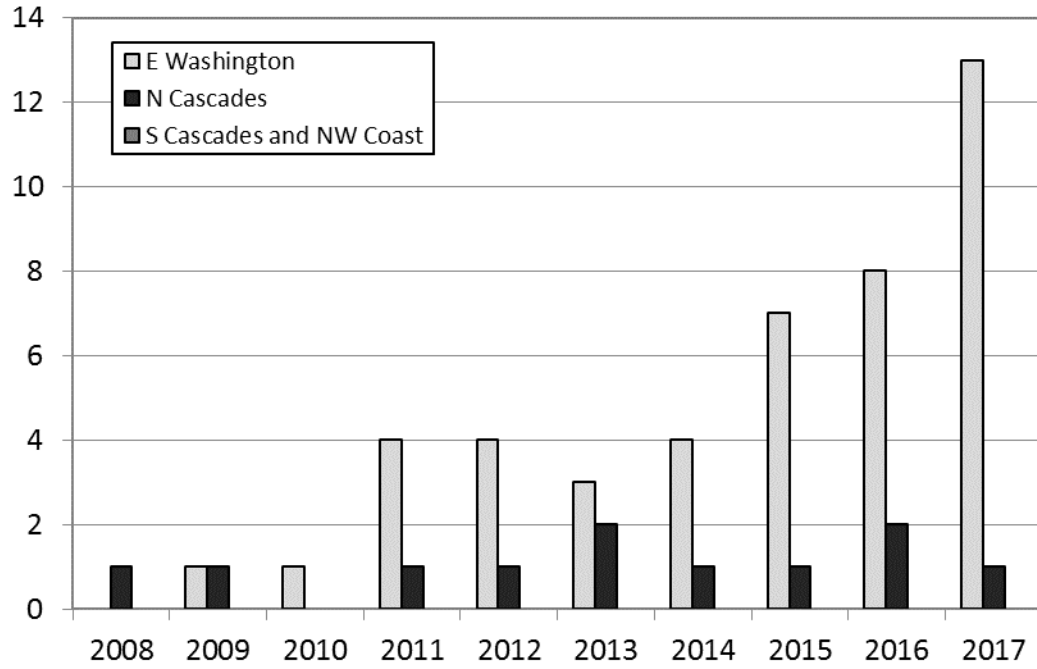


Figure 3. Minimum known number of wolves in Washington, 2008 – 2017.



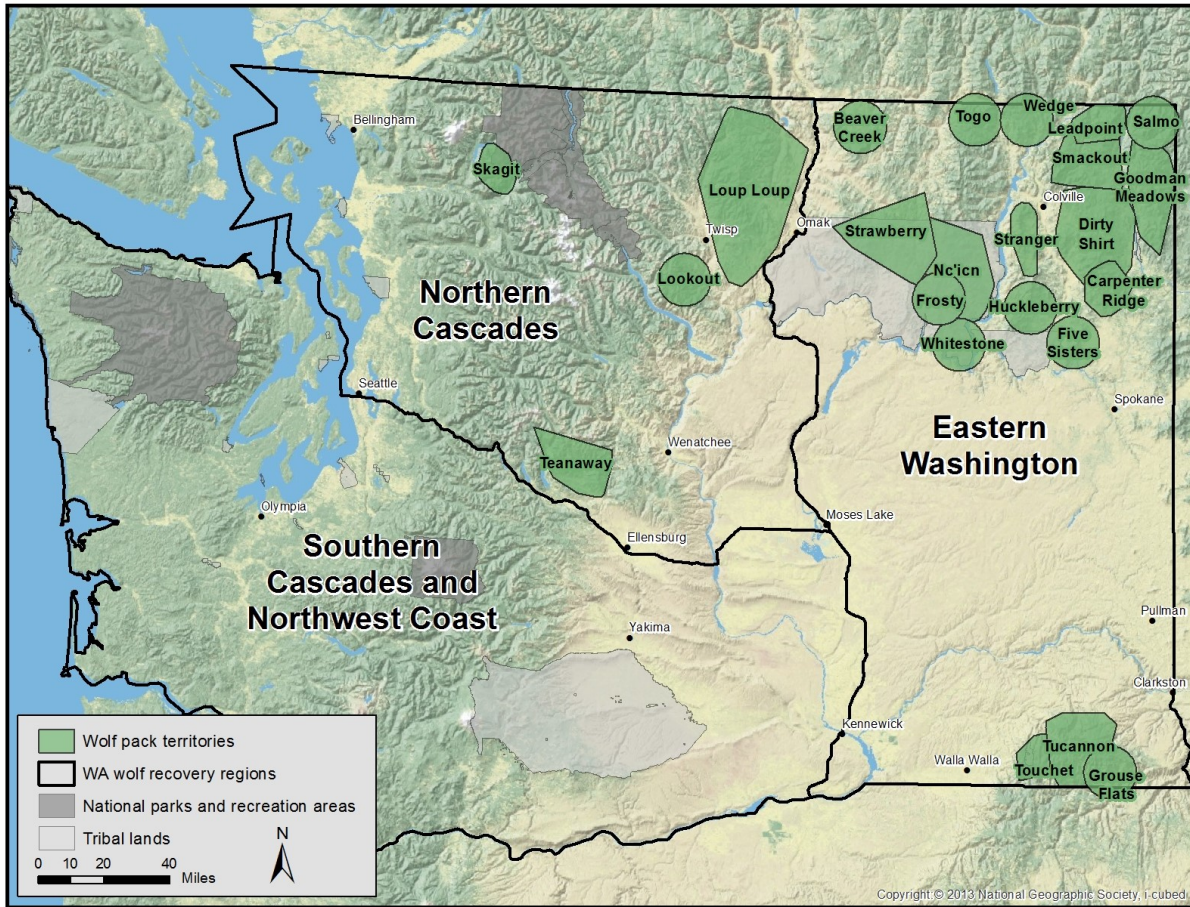
**Figure 4.** Minimum known number of packs by recovery area in Washington, 2008 – 2017.



**Figure 5.** Minimum known number of successful breeding pairs by recovery area in Washington, 2008 – 2017.

**Table 1.** Known wolf packs in Washington by recovery area, minimum estimated size of known packs, documented mortalities, number of known wolves that dispersed, and number that went missing in 2017. Underlined packs were counted as breeding pairs. Strikethrough packs did not meet the criteria of a pack in Washington at the end of the calendar year. CCT = Colville Confederated Tribes.

Wolf Pack	Recovery Area	Minimum Known Pack Size Dec 2017	Documented Mortalities					Known Dispersed	Missing
			Natural	Human	Unkn	Harvest	Control		
<u>Beaver Creek</u>	E. Wash	4							
<u>Carpenter Ridge</u>	E. Wash	13							
<u>Dirty Shirt</u>	E. Wash	7		2			3		
<u>Five Sisters</u>	E. Wash	4							
<u>Frosty (CCT)</u>	E. Wash	6				1			
Grouse Flats	E. Wash	3							
<u>Goodman Meadows</u>	E. Wash	5					2		
<u>Huckleberry</u>	E. Wash	4		1			1		
Leadpoint	E. Wash	2							
Lookout	N Cascades	3							
Loup Loup	N Cascades	2		1			1		
<u>Nc'icn (CCT)</u>	E. Wash	7		1					
<del>Profanity</del>	E. Wash	0		1			1		
<u>Salmo</u>	E. Wash	5							
<u>Sherman</u>	E. Wash	1		1			1		
<del>Skookum</del>	E. Wash	0							
<del>Skagit</del>	N Cascades	1							
<u>Smackout</u>	E. Wash	6		1			2	1	
Stranger	E. Wash	3							
<u>Strawberry (CCT)</u>	E. Wash	8				1			
<u>Teanaway</u>	N Cascades	8							
Togo	E. Wash	2							
<u>Touchet</u>	E. Wash	4							
Tucannon	E. Wash	2							
Wedge	E. Wash	3							
<u>Whitstone (CCT)</u>	E. Wash	5				1			
Misc/Lone Wolves	Statewide	14							
<b>WASHINGTON TOTALS</b>		<b>122</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>9</b>	<b>0</b>



**Figure 6.** Known wolf packs and pack territories in Washington, 2017. Packs known to den outside of Washington were not included

### Wolf Captures and Monitoring

In 2017, state, federal, and tribal biologists captured 12 wolves (10 new wolves and 2 recapture) from 12 different packs. Seven adults, 3 yearlings, and 2 pups were captured of which 5 were males and 7 were females. All captured wolves were fitted with either global positioning system collars or very high frequency (VHF) radio collars.

Over the past year, state, federal, and tribal biologists monitored 22 unique radio-collared wolves (approximately 18% of the minimum known population) from 15 different packs. This represents 68% of the known packs, plus one collared wolf in Skagit County with no pack affiliation. Although, due to known mortalities, dispersals, scheduled collar releases, and radio collar failures, by the December 31, 2017, biologists were only monitoring 16 radio-collared wolves (approximately 13% of the minimum known population) from 11 different packs (50% of known packs) in Washington.

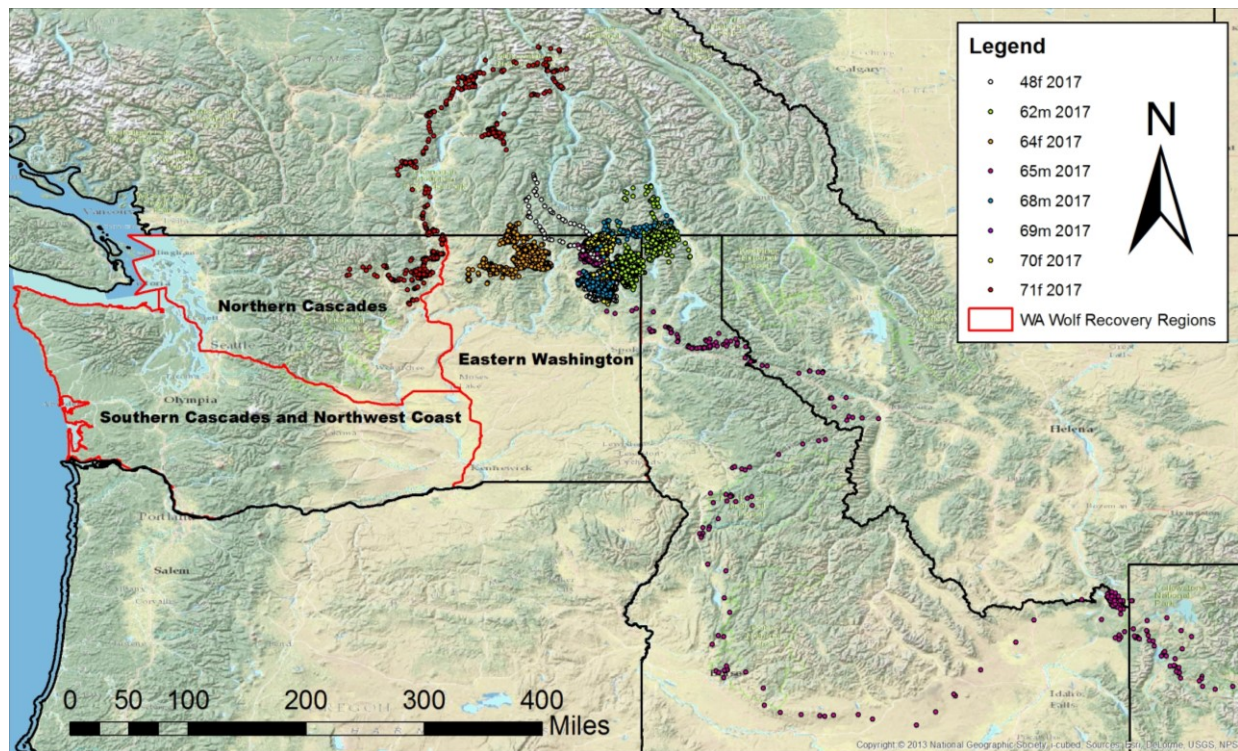
## Known Dispersals

A dispersal occurs when a wolf leaves the pack territory where they were born or where they had previously resided in search of a new pack or territory. Nine known Washington wolves dispersed from their packs in 2017 (Table 1: Figure 7).

The nine dispersing wolves, identified by their individual ID include:

- **Dirty Shirt pack:** Three members of the Dirty Shirt pack, first confirmed in 2013, dispersed in 2017. On April 17, an adult male (68m) dispersed from the pack and traveled over 100 miles before he was killed in southern British Columbia. On May 5, an adult female (48f) traveled north into British Columbia before returning to the Dirty Shirt pack eight days later, traveling more than 300 miles during that time. On May 20, another adult female (70f) dispersed and traveled roughly 30 miles north of the territory before establishing the new territory of the Leadpoint pack, northwest of the Smackout territory.
- **Smackout pack:** One member of the Smackout Pack (65m) that began to disperse in December of 2016 traveled a minimum of 1,700 miles before localizing in an area northwest of Yellowstone National Park in southwestern Montana in the spring of 2017.
- **Loup Loup pack:** A female member (71f) of the Loup Loup Pack dispersed in April 2017 and traveled a minimum of 542 miles into southcentral British Columbia, Canada, before contact with the collar was lost in July 2017.
- **Profanity Peak pack:** An adult female from the Profanity Peak pack (64f) left the pack territory in June of 2017, and dispersed into southern British Columbia and western Ferry County before she was killed in November 2017. The cause of death is still under investigation.
- **Goodman Meadows pack:** Two adult males (62m and 69m) from the Goodman Meadows Pack dispersed together in February 2017. One wolf (69m) was harvested in northern Idaho in March 2017, and the other (62m) localized in an area of northwest Idaho.
- **Huckleberry pack:** One previously collared member of the Huckleberry pack (52f) dispersed from that pack in the fall of 2017 and was recaptured as a member of the Stranger pack in February of 2018.





**Figure 7.** Collared wolves that dispersed from known Washington packs, 2017.

### Regulated Harvest

Regulated wolf harvest is allowed on Colville Confederated Tribal lands for tribal members only. The season runs from August 1 through February 28 with hunting and trapping as legal forms of take. For the season, a total quota of 3 wolves was set for the entirety of the south half of the reservation. On August 1, a quota of 3 wolves – inclusive of all harvest methods – was also set for the entirety of the north half of the reservation. Three wolves were legally harvested during the 2017 season on the South half of the Reservation, and no wolves were harvested on the north half (Table 1).

Regulated wolf harvest is also allowed on the Spokane Indian Reservation for tribal members only. Wolf seasons are open year-round or until a harvest quota of 10 wolves is reached within the calendar year, at which time the season will close. Trapping and/or snaring is allowed by special permit only. No wolves were legally harvested on the Spokane Indian Reservation in 2017 (Table 1). No regulated harvest occurred in Washington outside of the Colville and Spokane Indian Reservations in 2017.

### Mortalities

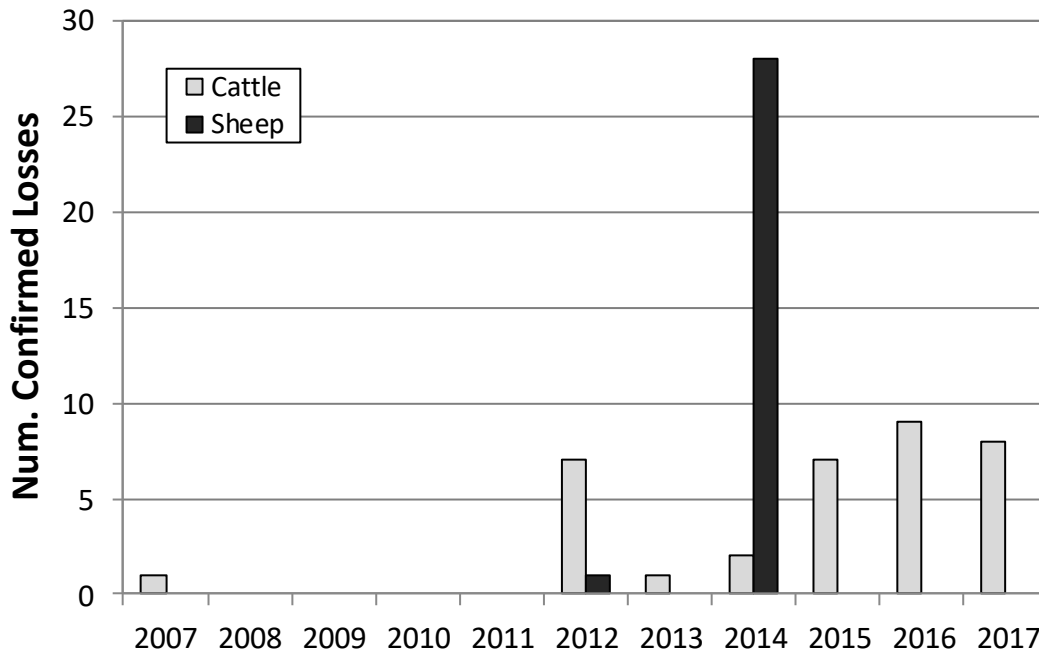
Fourteen wolves were known to have died in Washington state during 2017 (Table 1). Causes of mortality included three agency removal, three legal harvest, two vehicle collisions, two caught-in-the-act, and four other human caused that are still under investigation.

# MANAGEMENT

## Livestock Depredations

Potential livestock depredations in Washington were investigated by personnel from WDFW with some assistance by USFWS and deputies from local County Sheriff's Departments. Reported wolf-caused livestock depredations were classified as confirmed, probable, confirmed non-wild wolf, unconfirmed depredation, non-depredation, or unconfirmed cause of death based on specific criteria outlined in the Wolf Conservation and Management Plan for Washington (Plan).

The following livestock depredation statistics were based on reported livestock injuries and mortalities and do not reflect lost or missing livestock. In 2017, confirmed livestock mortalities caused by wolves in Washington included at least 8 cattle (Figure 8); investigators also confirmed 5 cattle as being injured by wolves (Table 2). Most livestock mortalities occurred during the summer grazing season from June through October (Figure 9).

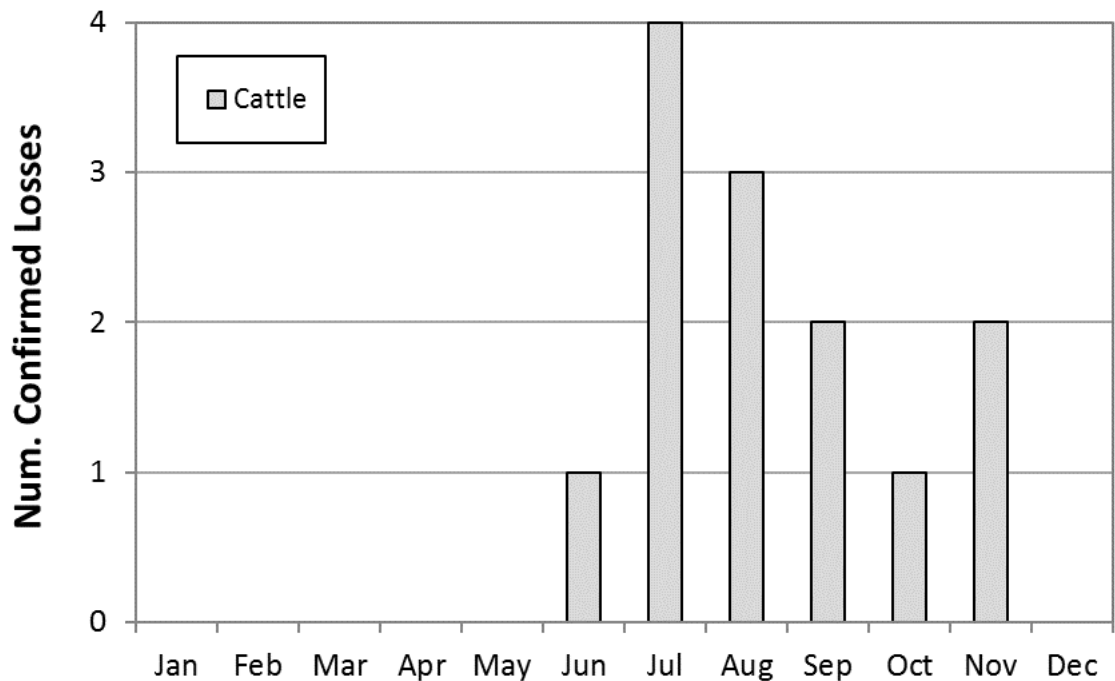


**Figure 8.** Total number of confirmed wolf-caused livestock losses in Washington, 2007-17.

**Table 2.** Confirmed wolf-caused livestock and dog injuries and mortalities in Washington, 2013-17.

	2013		2014		2015	
	Injuries	Mortalities	Injuries	Mortalities	Injuries	Mortalities
Cattle	0	1	2	2	0	7
Sheep	0	0	6	28	0	0
Other	0	0	0	0	0	0
Dogs	3	0	1	0	1	0
<b>Total</b>	<b>3</b>	<b>1</b>	<b>9</b>	<b>30</b>	<b>1</b>	<b>7</b>

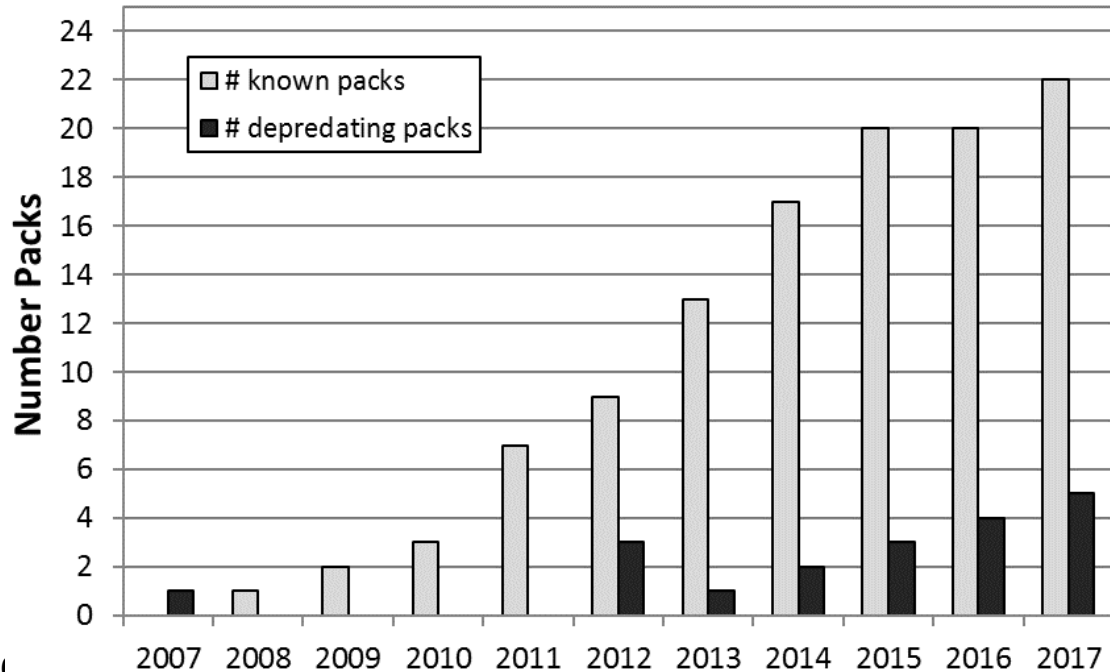
2016		2017	
Injuries	Mortalities	Injuries	Mortalities
6	9	5	8
0	0	0	0
0	0	0	0
0	0	0	0
<b>6</b>	<b>9</b>	<b>5</b>	<b>8</b>



**Figure 9.** Washington

**Number of Packs Involved in Livestock Depredations**

Five of the 22 (23%) known packs that existed in Washington at some point during 2017 were involved in at least one confirmed livestock mortality (Figure 10).



**Figure 10** and the number of confirmed depredate packs (livestock only) in Washington, 2007 – 2017.

### Minimizing Wolf Conflicts with Livestock

One goal of the state’s Wolf Conservation and Management Plan for Washington (Plan) is to manage wolf-livestock conflicts in a way that minimizes livestock losses while not affecting the recovery and long-term perpetuation of a sustainable wolf population. In 2017, varieties of preventative measures were used to minimize the potential for livestock depredations caused by wolves. These methods included providing livestock producers with fladry and electrified fladry, RAG boxes, fox lights, livestock guard dogs, and range riders. WDFW also supported livestock producers by providing them with wolf location data, deterring wolves from livestock and human residences, penning animals, and removing of injured and/or dead livestock from grazing sites. Other techniques that may be used to minimize livestock depredations include relocation and lethal removal of depredate wolves.

WDFW has full management authority of wolves in the Eastern Washington recovery area (Figure 2) and, under state law RCW 77.12.240, can implement lethal measures to attempt to change pack behavior of depredate wolves when it is deemed necessary to deter repeated livestock depredations. In 2017, three wolves were removed through lethal actions (Table 2).

In the western two-thirds of Washington, where wolves remain classified as an endangered species under the federal ESA, the U.S. Fish and Wildlife Service (USFWS) is the lead

management agency (Figure 2). Lethal removal is not authorized in this part of the state, therefore, capture and relocation has been identified as a potential management option when responding to repeated livestock depredations. No wolves were captured or relocated through USFWS actions in 2017.

Under state law (WAC 220-440-060) and the provisions of the Plan, WDFW may issue a permit to livestock producers and their authorized employees to lethally remove a specified number of wolves caught in the act of attacking livestock (defined as biting, wounding, or killing) 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. No permits were issued to livestock producers in 2017.

Furthermore, under state law (WAC 220-440-080), owners of domestic animals (defined as any animal that is lawfully possessed and controlled by a person), their immediate family members, or their authorized agents have the right to kill one gray wolf without a permit if the wolf is attacking their domestic animals. This rule applies only to the Eastern Washington recovery area where wolves are federally delisted; it does not apply to those areas of the state where wolves remain classified as endangered under federal law. Any wolf removed under this rule must be reported to WDFW within 24 hours and the owner of the domestic animals must surrender the carcass and cooperate with WDFW during an investigation. Two wolves were removed under the provisions of this rule in 2017. In both instances, the events were reported to WDFW, investigated and found to be legal.

### **Damage Prevention Cooperative Agreements**

Ranching and farming are essential components of Washington's economy, and the lands that foster this industry also provide critical habitat for a wide variety of wildlife. WDFW is responsible for protecting and managing wildlife and is committed to working with operators to minimize conflicts between wolves and livestock on both public and private lands. WDFW staff work directly with operators to provide assistance in selecting and implementing non-lethal conflict prevention measures that are suitable for each individual producer's operation. Interested producers may also enter into a Damage Prevention Cooperative Agreement (DPCA-L) with WDFW which provides a cost-share for the implementation of conflict prevention measures.

During calendar year 2017, WDFW had 37 active DPCA-Ls worth more than \$306,000 with livestock producers across Washington. Operators with an active DPCA-L received a specified cost-share percentage for each different conflict prevention measure up to a maximum amount of \$10,000. The most common non-lethal conflict prevention measures implemented during 2017 were range riders, improved sanitation (removal or treatment of injured or dead livestock), and fencing (e.g. fladry).

Additionally, WDFW contracted with eight private organizations with 15 range riders to provide services in 2017. Range riders were used to minimize wolf-livestock conflicts and to monitor livestock on open-range grazing allotments. Contractors were assigned to an area on an as needed basis and covered multiple grazing allotments during a single assignment, thereby offering assistance to multiple operators.

## **WDFW Livestock Depredation Compensation Program**

The Washington Wolf Conservation and Management Plan (Plan) expands compensation for wolf depredation beyond what is currently provided under Washington State laws RCW 77.36 and WAC 220-440 (see Plan: Appendix F). The Plan also expands the definition of livestock eligible for compensation from damage caused by wolves to include cattle, sheep, horses, swine, mules, llamas, goats, and actively working guarding/herding dogs. Currently, compensation is not allowed for domestic pets or hunting dogs that may be injured or killed by wolves. To receive compensation, the injury or mortality must be classified as confirmed or probable by WDFW personnel, or an authorized agent of WDFW, and operators must demonstrate that they are implementing methods that may minimize wolf damage.

Washington's payment plan is two-tiered, based on the size of the grazing site. For each confirmed depredation on grazing sites greater than or equal to 100 acres, WDFW will compensate producers for the full market value (defined as the value of an animal at the time it would have gone to market, plus full market value of one additional animal.

Payment for losses are reduced by the amount received from any other form of financial support the owner receives, including payments from insurances or partially salvaged carcass or other product. Additional payments do not apply if all livestock are accounted for at the end of the grazing season.

If a depredation is confirmed, but the grazing site is less than 100 acres – or if the depredation is classified as “probable” on a grazing site greater than or equal to 100 acres – WDFW will compensate a livestock producer for the full market value of the affected animal only. If the depredation is classified as probable and the grazing site is smaller than 100 acres, WDFW will compensate for half the current market value of livestock. WDFW also compensates producers for veterinary costs associated with treatment of livestock and guarding/herding dogs injured by wolves. Under the provisions of the Plan, compensation to individual operators who experience damage shall not exceed \$10,000 per claim without an appeals review.

In 2015, WDFW-Washington Fish and Wildlife Commission formally adopted revisions to WAC 220-440-180, regarding cash compensation for livestock damage or domestic animal. These revisions increased the period of time an operators have to notify WDFW of their intent to file a claim for compensation to 30 days and increased an operator's time to file the completed claims package to WDFW to 90 days. Additional revisions included provisions that allow an operator to comply with either a WDFW approved checklist, a damage prevention cooperative agreement, or a director's waiver in order to be considered for compensation.

WDFW processed two claims during 2017 and paid a total of \$3,700.00 to compensate livestock producers who experienced livestock losses or injuries caused by wolves.

## **Livestock Review Board**

The primary objective of the Livestock Review Boards (LRB) 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 provide recommendations to WDFW to pay or deny claims. The LRB is comprised of five citizen members with two representing the livestock industry, two representing conservation interests, and one at-large member. During 2017, no claims were filed to compensate livestock producers for indirect losses caused by wolves that occurred during the 2017 grazing season.

## RESEARCH

### Projects Completed 2016

**Title:** Forecasting livestock depredation risk by recolonizing gray wolves (*Canis lupus*) in Washington, USA

**Graduate Student (PhD):** Zoë Hanley, Washington State University

**Major advisor:** Robert Wielgus, Washington State University

**Cooperators:** Washington Department of Fish and Wildlife; US Fish and Wildlife Service; US Forest Service; Montana Fish, Wildlife, and Parks; Idaho Fish and Game

**Project Summary:** Preventing wolf-livestock conflicts requires identifying conditions placing livestock at risk and focusing outreach and adaptive management at a local scale. Historical (i.e. 1991 – 2008) data from Idaho and Montana were used to predict cattle depredation risk by gray wolves recolonizing Washington. Risk models were developed at two spatial scales, (1) wolf pack territory ( $n = 137$ ) and (2) cattle grazing allotment ( $n = 69$ ) to test hypotheses that cattle depredations by wolves were associated with wolf demographics, cattle and wild prey abundance, allotment characteristics, and land cover types. Within wolf pack territories, cattle depredation risk increased as cattle abundance and adult wolf removal increased and if the pack depredated the previous year. Adult wolf removal and pack size showed weaker evidence in their relationship with cattle depredation probability and the predicted number of cattle depredated. Similarly, cattle depredation risk increased for larger grazing allotments with more cattle, wolves, and grassland cover and decreased with pack reproduction and a later cattle turnout date. Wolf pack reproduction, cattle turnout date, and percent grassland cover indicated high variability in the direction of their relationship with cattle depredation probability and the predicted number of cattle depredated. Forecast maps for Washington identified hotspots of high (81 – 90%) depredation risk in Yakima, Kittitas, and Columbia counties. Cattle grazing allotments only occur east of the Cascade Mountains, and hotspots in Okanogan, Ferry, and Yakima counties were recognized as intermediate (61 – 80%) depredation risk. These risk models and maps provide locations to focus depredation prevention measures and a template for future analyses as wolves continue to recolonize Washington.

**Title: Wolf Predation on Livestock in Washington State.**

**Graduate Student (MS):** Gabriel Spence, Washington State University

**Major Advisor:** Dr. Robert Wielgus, Washington State University

**Cooperators:** Washington Department of Fish and Wildlife, Colville Confederated Tribes, U.S. Fish and Wildlife Service, U.S. Forest Service.

**Project Summary:** We collected empirical data on the extent of wolf predation on livestock by documenting kills found at Global Positioning System (GPS) location clusters from wolves in 10 different wolf packs that overlapped grazing areas of cattle (*Bos taurus*) or sheep (*Ovis aries*) from 2014 to 2016 (3 grazing seasons) in Washington state. We examined over 2,500 cluster locations and documented 444 kill sites. Statewide, livestock comprised 6% of the kills and 94% were wild prey. Of the wild prey, mule deer (*Odocoileus hemionus*) and white-tailed deer (*Odocoileus virginianus*) considered together were the most common prey at 50%, followed by



moose (*Alces alces*) at 27%, and elk (*Cervus elaphus*) at 9%. At the wolf pack level, livestock made up between 0% and 67% of the kills, however 9 out of the 15 pack years had 0 livestock kills and only 1 of 5 packs that killed cattle had > 5% of kills consist of cattle. Adjusted mean kill rate for all packs for all prey types was 0.43 kills/day/pack (k/d/p) (S.E.  $\pm$  0.04), or about 79 kills/pack (95% C.I. 58-99 kills) for the 184-day long summer season. Adjusted mean kill rate on cattle was 0.021 k/d/p (S.E  $\pm$  0.015), or 3.9 cattle kills/grazing season/pack (95% C.I. 0-9.8 kills). Kill rates on sheep for the two packs that killed sheep were 0.05 k/d/p and 0.15 k/d/p, which give estimates of 9.6 and 27.7 sheep kills/grazing season/pack respectively. Mean predation rate for cattle was 0.003 kills/cow/season (SE  $\pm$  0.001) or about 3 wolf killed cattle/1000 cattle in a wolf pack territory. Our results show that the majority (94%) of wolf prey in Washington is wild ungulates. Depredations on livestock by wolves were uncommon and could be characterized as localized and acute rather than widespread and common. Data collection and analysis are complete, thesis is available at Washington State University Library.

### **Ongoing Projects**

**Title:** Risk effects of wolves on livestock productivity in Washington.

**Graduate Student (PhD):** Azzurra Valerio, Washington State University

**Advisor:** Robert Wielgus (co-chair), and Mark Swanson (co-chair) Washington State University

**Cooperators:** Washington Department of Fish and Wildlife, Colville Confederated Tribes Fish and Wildlife Department, U.S. Fish and Wildlife Service, and U.S. Forest Service.

**Project Summary:** Presently, wolves are recolonizing Washington State and conflicts with livestock are likely to increase as the population of wolves grows throughout the State. Wolves can affect livestock not just through direct predation but also indirectly through risk effects altering cattle behavior. Our project seeks to understand and quantify the causes of risk effects of wolves on free-ranging livestock in Washington.

To achieve these goals the primary objectives are: a) to determine changes in cattle behavior (e.g., cattle space use, movements, foraging behavior) in relation to wolf proximity; and b) measure the underlying physiological mechanisms such as stress and nutrition that can mediate risk effects on livestock productivity (e.g., calf weaning weight and cow reproduction). During 3 successive years of field data collection (2014-2016), a total of 139 cows (in 22 livestock herds) and 22 wolves (in 15 wolf packs) were fit with GPS radio collars; movements and interspecies interactions were monitored daily via both GPS locations using a 2-hour fix rate and ground-based telemetry. In addition, within two pilot study areas during 2016, we fit GPS collars equipped with proximity sensors on both wolves and cows. When a wolf and a cow equipped with proximity sensors are within 128 meters from one another, the GPS switches to an alternate schedule of 65-seconds, thereby allowing finer resolution analysis of spatial-temporal variation in risk.

Every two weeks, and after any wolf-cow interaction, we collected fecal samples from cows and recorded videos of their grazing behavior. Livestock producers provided average and individual calf weaning weights, and reproductive status of mother cows.

All the laboratory analysis on cattle fecal samples were completed during 2017. The statistical analysis is presently underway, and will be analyzed at different spatial-temporal scales. A final report will be submitted by July 2018.

***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 WA 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 WA 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:*** 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 90 individuals across 19 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 WDFW/UW multiple predator-multiple prey research project, we will examine the interactions between wolves and cougars in wolf-occupied 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, 23 cougars and 6 wolves have been fitted with GPS collars, which has allowed visitation of 156 cougar feeding sites across two study areas totaling 10,000 sq. km. (3860 sq. mi) in 2017. Visitation of wolf feeding sites will begin in January 2018, and field investigations for both predators will record species, age, sex, condition, and location of prey. For approximately 10% of cougar feeding sites, camera traps were placed while cougars

are still active at the sites to assess prey handling times, kleptoparasitism, and scavenging by other predators. Location of cougar and wolf kills will be used to quantify both cougar and wolf space use (especially changes to cougar space use in relation to wolf density) and 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 dissertation completion is anticipated by May 2021.

**Title:** Interactions between top carnivores and mesocarnivores in eastern Washington State

**Graduate Student (PhD):** Kate Orlofsky, University of Washington

**Major Advisor:** Laura Prugh, University of Washington

**Cooperators:** Brian Kertson, Washington Department of Fish and Wildlife

Gray wolves (*Canis lupus*) are naturally recolonizing Washington state. This has sparked interest in the ecological impacts of wolf recovery on ungulate, mesocarnivore, and top carnivore species and has provided the impetus for a collaborative project between the Washington Department of Fish and Wildlife (WDFW) and University of Washington (Washington Department of Wildlife et al. 2017). As part of this project, our research will examine how mesocarnivore (bobcat and coyote) populations are affected by top carnivores (wolves and cougars) in north-central and northeastern Washington. Mesocarnivores are key components of ecosystems that are subject to strong indirect or cascading ecological effects from top carnivores through 1) suppression by direct killing, resource competition, and behavioral effects, and 2) facilitation by gaining resource subsidies in the form of carrion. The degree of facilitation and suppression, however, is unknown and precludes science-based management of these populations. We will use a combination of animal-borne GPS technology, monitoring of carcasses, scat analysis, stable isotope analysis, estimates of small prey availability, and modeling to develop a framework for predicting the strength and direction of interactions between meso- and top carnivores.

**Title:** Spatiotemporal dynamics of predator-prey interactions as wolves recolonize Washington

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

**Major Advisor:** Beth Gardner, University of Washington

**Cooperators:** Brian Kertson, Washington Department of Fish and Wildlife

Gray wolves (*Canis lupus*) began naturally recolonizing eastern Washington in 2008. As the population grows, wolf distribution is likely to expand and continue to overlap with other large predator and ungulate species. Critical to addressing questions posed by the larger WDFW/UW predator-prey project, is the need to understand how prey (e.g., deer and elk) and competing predators (e.g., cougars, bears, coyotes) respond to wolf presence across the landscape. We plan to examine the spatial and temporal interactions of multiple predator and prey species across several scales to assess processes that influence co-occurrence, activity, and habitat-use patterns. We plan to deploy approximately 50 remote-sensing cameras in each study area and use photo-captures of animals to address how environmental factors and interspecific interactions influence species co-occurrence. In addition, we hope to evaluate how temporal overlap, attraction, and

avoidance behaviors are influenced by the occurrence of wolves, and how and at what scales wolves select territories. Results from our research will hopefully improve our understanding of how recolonization of wolves influences the broader ecological community in eastern Washington and may help inform a monitoring program for wolves across the state. We will begin deploying cameras spring 2018 and collect data through 2020.

## OUTREACH

In addition to numerous, daily interactions (i.e. phone calls, emails, personal communications) with the general public concerning wolves and wolf management in Washington, WDFW personnel also provided various formal presentations to school groups, universities, wildlife symposiums, state and federal management agencies, livestock association meetings, state legislature committees, Washington's Fish and Wildlife Commission, local interest groups, professional conferences and conservation groups. Department personnel were also interviewed by local radio, newspaper, and television outlets on many occasions.

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 archives of Plan development, WDFW news releases related to wolves, weekly and monthly updates of wolf management activities. The website also has a wolf observation reporting system where members of the public can report information regarding wolf sightings, or evidence of wolf sign, which assists WDFW personnel with monitoring existing packs and documenting potential wolf activity in new areas. The website also provides telephone numbers to report suspected livestock depredations.

### **Wolf Advisory Group**

In 2013, WDFW created the Wolf Advisory Group (WAG) to advise WDFW on implementation of the Wolf Conservation and Management Plan (Plan). The WAG is composed of citizen members appointed by the director that serve a two-year term with each member representing a different stakeholder interest.

During 2017, the WAG met on 2 occasions and implemented an open-house style public comment period prior to the WAG work session. Core to the transformation of deep-rooted conflict is reconciling and building resilient relationships between stakeholder groups, including WDFW. As such, the 18-member WAG spent time developing relationships that foster respect, honest dialogue, and mutual learning. The WAG provided advice to WDFW on preventative and non-lethal measures to minimize wolf-livestock conflicts and potential agency management actions to address reoccurring depredations. All WAG meeting agendas, notes, handouts, and meeting minutes are posted on WDFW website (<https://wdfw.wa.gov/about/advisory/wag/>).

This past year, several members of the WAG vacated their seats, thus opening opportunities for new members to join. WDFW received over 40 nominations to fill the vacancies. A team of WDFW staff designed and implemented a comprehensive candidate assessment and selection process. After reviewing all of the applications, WDFW Director Unsworth appointed 5 individuals which brought WAG back to full capacity (18-members). The new members bring perspectives from three new geographic areas in Washington that were not represented on the WAG including: Okanogan region, Klickitat County / Southwest Washington, and Southeast Washington. They represent a variety of communities and organizations, including recreationists and general members at large, and will provide new outreach opportunities for WAG and WDFW. The five new members began serving their three-year term in January, 2018.

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- To report a suspected livestock depredation, a dead wolf in the Eastern Washington recovery area, 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, please visit: [http://wdfw.wa.gov/conservation/gray\\_wolf/](http://wdfw.wa.gov/conservation/gray_wolf/)
- For information about wolf management on lands owned by the Colville Confederated Tribes and to report a wolf sighting on tribal lands, please visit: <http://www.colvilletribes.com/>
- For information about wolf recovery in the Northern Rocky Mountains, please visit: <http://www.westerngraywolf.fws.gov/>