Smith, Julia B (DFW)

From: Martha Hall <pondfrog.mh@gmail.com>
Sent: Tuesday, October 29, 2019 10:34 AM
To: SEPADesk2 (DFW)
Subject: Scoping Comments - Wolf EIS

I'd like to make this additional comment for scoping for the EIS on
Wolf Post-Recovery Planning and Management. I was assured by staff that
I could add additional comments to those I already submitted.

From:
Martha Hall
2617 16th Street
Anacortes, WA 98221
pondfrog.mh@gmail.com
360 293 7476

First, I want to say that I am an avid wildlife watcher and photographer. When I hike and camp, it is not a quality vacation if I do not
see wildlife. We always try to choose locations to visit that have wildlife. Hunting negatively impacts our vacationing in WA State in many
ways, direct and indirect. Bear hunts as early as Aug. 1 end my hiking around Mt. Baker, my nearest and one of my best hiking opportunities.
Hiking the Railroad Grade and seeing hunters, and actually witnessing them killing a cub after seeing a mother with 2 cubs ruin all of my
enjoyment of that whole side of Mt. Baker. A woman being shot in the head on Sauk Mt. by people hunting bear is a game changer for me.
In WA State, most animals flee in terror when they see humans. This is not normal or necessary - but it is what we get when these animals
are hunted. This also means that recreational uses have a huge impact on our wildlife species all over the state. Mt. Goat rightfully hide
on Mt Baker because of hunters - many of us would love to watch mt goats - or elk herds - or bears. We are denied quality opportunities
for wildlife watching and this is not even mentioned in WDFW's wildlife management of game species.

For this reason, we usually vacation in Yellowstone National Park and/or the national parks in the Canadian Rockies. This is important to
the EIS because one of the most exciting and life-changing experiences is hearing - yes HEARING wolves howl while camping and hiking.
And we witness this in these parks. Some have said wolves would not be watchable in WA State like in Yellowstone - this is incorrect
because it does not recognize the thrill of hearing wild wolves howl and of hearing packs and groups within packs answer each other.
I use to dream of visiting Algonquin Prov. Park in Canada because rangers had wolf howling sessions with visitors - visitors who did not
see wolves. This was extremely popular and drew many visitors. This could occur in many areas in WA State if wolves were managed

differently. And we do have some more open areas where wolves might also be seen - if they were not killed by humans. In Yellowstone
wolf watching is often through scopes with the wolves a mile or more in the distance and it is exciting. This happens because the wolves
carry on their normal lives even though people are watching from a hillside near the road. In WA animals cannot safely do this.

I've spent many 3 week sessions in the Pasayten Wilderness as a backpacker - and even there, I seldom saw wildlife except deer
around the salt licks put out by outfitters and horse campers. It was very depressing. I'd hear maybe one coyote a week. This is totally
the domain of hunters.

I am especially concerned about goals and actions in various alternatives that might change basic wolf and wolf pack behavior such as human lethal removal through hunting and/or predator control. I'm worried because WDFW
has traditionally managed most "game animals" using an old, outdated model taken from the livestock industry - sustainable numbers plus harvests, and since WDFW moved wolves to the game management division of
WDFW, it appears like WDFW intends to designate wolves as a "game animal" when it is delisted. WDFW's attempt to designate wolves as a "game animal" even when it was listed as endangered and its use of staff in the "game" department indicates that WDFW is only able to look at wolves in this way which is unfortunate.

I oppose this general attitude of WDFW for the following reasons:

1. The best science shows that human lethal removal does change wolf and wolf pack behavior as I said in my main comments.
Smaller pack sizes and wolves scrambling to find breeding partners and to reproduce and survive and raise pups when they are
being indiscriminately killed by either hunters or predator control changes wolves. This was clearly demonstrated with coyotes,
when comparing coyote natural behavior when they thrived in Yellowstone without wolves. Wolves changed Yellowstone coyote
behavior in the same way - small families struggling - but surviving. I visit Yellowstone as often as I can for a month or more and
I see lots of coyotes and coyote-wolf interactions. These coyotes are not like those Murie studied and reported on before wolves
were on the scene. Human lethal removal will do the same thing to wolves and wolf packs. They may survive - WDFW may be
able to say there is a sustainable population - as it has during "recovery" when it kills this endangered species, single wolves and
entire wolf packs. Maybe recovery will be slowed by WDFW's killing, and dispersal more limited, but it doesn't threaten the
numbers game WDFW uses. But this kind of indiscriminate killing does threaten the ability of wolves to maintain their natural
behavior. This behavior is the result of thousands of years of shaping by natural processes. These processes made wolves very
adaptable and fit. Should human management by WDFW change this? I don't think this is wise from a scientific and ecological
perspective. Instead, this means that we need areas in WA State where wolves are allowed to live in natural ecosystems where

natural processes determine their success and mold their behavior and adaptability, not WDFW and humans. Seems like there
is enough evidence that humans aren't too good at manipulating and managing wildlife populations, as seen in diseases that
are occurring in ungulate populations. These don't happen in Yellowstone.

2. WDFW seems to forget its responsibility under the the Public Trust Doctrine to manage wildlife as a public asset that is shared
by all residents of WA State. Of the 7 1/2 million people in our state, only the very few have a real seat at WDFW's table,
hunters and livestock producers. This is seen in the people chosen for the Wolf Advisory Group and the Game Management
Council/Committee and the Commission and in where Director Susekind chooses to visit and where the Commission chooses
to meet. I am so glad to finally see a Commission meeting in NW WA - in Bellingham. Every game species, including the
latest plans for hunts of black bear, and the Game Management Plan are totally based on sustainable numbers plus providing
quality recreational opportunities for hunters - that's 2.42% of WA residents. Meanwhile, the rest of us, the 97.58% are not
even mentioned or considered - those of us who enjoy wildlife watching, nature study, etc. Yes, I understand - follow the money-
and hunters pay money to WDFW to kill animals. But now WDFW is asking the public to chip in more of our tax dollars to WDFW,
without giving us any additional representation. We are very reluctant to give our tax dollars to an agency that has never been'
interested in what we think. We now pay for most of wolf management yet we have almost no seats on WAG - while hunters
dominate WAG and wolves are not even hunted - they are an endangered species.

I probably come across as very critical of WDFW's management of wildlife and that is true, I am, and I want you to know why.
I don't like to be part of the vast majority of the residents in WA State, part of the 97.58% who do not hunt, and part of the slightly]
over 50% who are women, and my voice is not heard by WDFW. Male hunters and ranchers are the only stakeholders WDFW
listens to when managing wildlife. Look at all of your advisory committees and game management plans.

Meanwhile I've spent a huge part of my life learning about wildlife, trying to watch wildlife, and teaching wildlife - I was a public
school teacher. I work hard to save habitat and protect species. I work on local habitat issues, wetlands, heron colonies, etc.
But WDFW fails to count me and my views and interests and values as important.

Thank you for reading this,
Martha

TO;
Washington Department of Fish and Wildlife

Lisa Wood

Scoping Comments

for the EIS on Wolf Post-Recovery Planning and Management

Submitted by:

Martha Hall
2617 16th Street
Anacortes, WA 98221
pondfrog.mh@gmail.com

Date submitted:
Monday, October 28, 2019

Section 1

This is the first of four sections that are being submitted.

Section 1:
The importance of Wolf Packs and Individual Wolves in the management of wolves

Science-based wolf management must consider the importance of both wolf packs and individual wolves. Wolves are social predators; both their behavior and success are closely tied to the social dynamics of their packs. Will the goals and alternatives in the EIS seek to maintain the social dynamics of natural wolf packs?

Science is proving that Rudyard Kipling was correct
when he wrote this in 1894:

"For the strength of the Wolf is the Pack,
and the strength of the Pack is the Wolf".
(The Jungle Book)

Section 1 uses a small sampling of research to raise issues for the EIS

Section 1 raises many issues relevant to the EIS as it reviews a small sample of the large body of research that shows the importance of both wolf packs and individual wolves.

Wolves and Wolf Packs; the two cannot be separated
when talking about wolf behavior, "overall fitness" and the ability to adapt.

This is why some believe that one of the goals of full "wolf recovery" must be "social recovery".

The size, social dynamics and functioning of natural wolf packs have been studied in Denali and Yellowstone National Parks. Natural processes shaped this social behavior. Science-based EIS must use this science when choosing goals and alternatives so these reflect the best available science.

Research shows again and again that for wolves, success in reproduction, hunting, and defense of resources/territories, and adequate levels of dispersal are determined by various characteristics of both the packs and of the individual wolves that make up these packs. The behavior of Individual wolves is entwined with pack behavior.

For wolves, science-based management must focus on maintaining
the social structure of natural packs that has evolved over thousands of years.

Studies comparing the behavior of both individual wolves and wolf packs in areas with and without hunting and/or predator control indicate that human lethal removal of wolves changes the wolf's and the wolf pack's natural behavior. Overall "fitness" as a species, and the ability to adapt to changes in their environment may be affected by human lethal removal. These ideas were explored in the 2009 Study by Rutledge, Patterson, Mills, Loveless, Murray and White, "*Protection from harvesting restores the natural social structure of eastern wolf packs*". The authors highlighted the importance of maintaining the "evolutionary potential" of wolves by maintaining natural packs.)

Section 1

Each of the first four parts focus on one important part of wolf survival and how both packs and individuals are important for success in each of these.

Part IA: Reproduction

A small sampling of research along with a discussion focused on the importance of both packs and the individual wolves in these packs. Both are factors that determine success in reproduction, often measured by litter size and pup survival through the first winter or the first year.

#1. Research: What characteristics of packs and of breeding females are linked to successful reproduction?

#1A. Daniel Stahler, Daniel MacNulty, Robert Wayne, Bridgett vonHoldt, and Douglas Smith, "***The adaptive value of morphological, behavioral and life-history traits in reproductive female wolves***.". Journal of Animal Ecology, October 2012. (1)

This study analyzed fourteen years of data on individually known females and their reproductive success. It identified factors affecting success and ranked these factors according their importance. Successful reproduction in this study was measured by litter size and litter survival through the first year in this study. The breeding female's health was determined by her approx. weight.

#1B. Daniel R,. Stahler, Douglas W. Smith, and Daniel R. MacNulty, ***"Motherhood of the Wolf".*** Yellowstone Science: Celebrating 20 Years of wolves, pages 13-16.

This article summarized findings of several studies in Yellowstone NP that focused on reproduction.

Results of these two studies:

Two factors were identified as the most important; 1. the breeding female's health, and 2. the size/composition of her pack.

Many other studies have also shown the relationship between pup survival the first year and pack size, with pup survival increasing with every increase in pack size. Other research has explained why. Larger packs have enough members to hunt and obtain enough food, to protect the pups from other wolves and predators when other members leave to hunt, and to defend the pack's territory, the resources it needs to survive. The median age of female wolves in this study was only 5 years.

Other factors: Age of the breeding female**.** This played a role only up to about age 5. The median age of the female wolves in the study was 5. Effects of aging then started to appear and litter size and pup survival both declined. Wolf density and disease**.** Both were also factors. Higher wolf density and disease outbreaks had negative effects on pup survival. Higher wolf density results in more strife between packs. During the time of this study, outbreaks of canine distemper virus were occurring. This decreased pup survival. Surprisingly, gray females had a 25% higher success rate than black females. However, when the effects of all of these factors were compared and ranked as to their relative importance for pup survival, the mother's body weight was most important, followed by pack size. These factors mitigated losses associated with high wolf population density and disease.

#2. Research: Which pack members are most likely to be "helpers" in caring for pups? Who helps more with younger pups and who with older pups? How much guarding of pups actually occurs at different times as pups grow up?

#2. David E Ausband, Michael S Mitchell, Sarah B. Bassing, Andrea Morehouse, Douglas W. Smith, Daniel Stahler and Jennifer Struthers, ***"Individual, Group, and Environmental Influences on Helping Behavior in a Social Carnivore.*** Ethology. .

This study was designed to look at "helping behavior". Helping behavior in a wolf pack includes activities like guarding pups when other members leave, bring food to the pups and helping with the social development of pups. Larger packs have more helpers which means pups are less likely to be left alone when packs hunt. Which individuals in a pack are most likely help?

Findings: Pack members who helped the most in guarding pups before the pups were weaned were the non-breeding females. After pups were weaned, non-breeding males started to do more of the guarding of pups. The ratio of helpers to pups did not influence guarding rates before pups were weaned but strongly influenced guarding rates after weaning.

Other factors: Prey density did not seem to effect this even though prey density varied widely between the areas. Wolf density was not a predictor either. The number of adults in each group was not correlated with prey density. Many might assume that when prey was scarce, there would be less guarding but this was not true. Age of helpers did not predict guarding rates before or after weaning.

Note: Data used in this study was from 92 GPS-collared wolves from 34 packs. These packs were studied for 123 summers, from 2001 to 2012. The four study areas were in Idaho, Montana, Yellowstone National Park and Alberta, Canada. Some areas overlapped with grizzly bears and all overlapped with black bears, other wolves, and cougars. Helping behavior, guarding the pups in the den or at the rendezvous site when the pack left to hunt was important.

#3. Another study of helpers: Larger packs have more potential helpers than smaller packs. How does the number of helpers affect pack dynamics? Is having a larger pack an advantage when packs need to protect and care for pups as well as hunt and feed pups?

#3. Joel S. Ruprecht, David E. Ausband, Michael S. Mitchell, Edward O. Garton, and Peter Zager, ***"Homesite attendance based on sex, breeding status, and number of helpers in gray wolf packs".*** Journal of Mammology, 2012.

This study looked at homesite attendance rates using GPS locations of 17 GPS-radio collared wolves from 7 packs in Idaho.

Findings: Preweaning, the breeding status of the wolf was the dominant predictor of attendance. During post weaning, the number of helpers in the pack (pack size) was by far the strongest predictor of attendance. Before weaning, the number of helpers had little affect, probably because the breeding female usually cared for the pups. After weaning, the number of helpers (which is pack size) was a strong predictor of the attendance rates of individuals. Attendance by non-breeding wolves increased when pups began to emerge from the den and peaked slightly later in the summer. Non-breeders may learn skills doing this that they may use if they should become breeders. This meant that the individual wolves in larger packs attended the homesite less. More helpers meant specific individuals did not have to help as much. This allowed more time for pack members to hunt and bring back food. The time small packs spend on helping is at the expense of hunting. All breeding classes and sex classes showed a general decline in attendance throughout the pup rearing season.

Breeding females had the highest attendance rates over the entire pup-rearing season. However this attendance declined from 86.7% during the pre-weaning period to 21.6% post weaning. It is believed that she then spends more time on hunting. Hunting success may improve when the breeding female is involved since studies show higher success in hunting of breeders than non-breeders in packs. (Mech and Boitani 2003.) Significant differences were found between non-breeding females for how often they were helpers. Some took on pup-guarding far more often than others. This might have been a function of age, as has been found in marmosets, but in this study ages of the wolves were not studied

Note: Guards may be more important for pup survival when pups begin using rendezvous sites since these provide less protection for the pups than the dens did. Guards may also be more important for pup survival in habitats that include more species of predators and/or a greater number of predators. Wolf pups have been killed by cougar, bears, coyotes and other wolves.

#4. What happens to the pack after the death of one or both of the "breeders"? Does this affect pup survival? Do larger packs respond to this loss differently than smaller packs?

#4. Scott M. Brainerd, Henrik Andren, Edward E. Bangs and Liz Bradley, ***"The Effects of Breeder Loss on Wolves".*** Journal Animal Ecology, 2007.

For this study, data on 148 territorial breeding wolves was pooled to look at impacts of loss of a "breeder". .

Findings of this study: Pup survival was higher in larger packs with the loss of one or two breeders. Pups survived more frequently (90%) in groups of 6 wolves than in smaller packs. If the pack had adult non-breeders, pups surviving 92% of the time. Pup survival mostly depended on the number of remaining adults and the age of the pups when the breeder died. Packs dissolved and abandoned their territories after breeder loss in 38 % of the cases. When packs dissolved, wolves re-established territories in 53% of the cases and neighboring wolves took over the territory in 21 % of the cases. Smaller packs were more likely to dissolve than larger packs.

During the season following the death of the breeder, 47% of the packs reproduced and the year after that 56% reproduced if only one breeder was lost. When both breeders died, only 9% of the packs reproduced the next year. Smaller packs took longer to recover and reproduce. Larger packs were more likely to reproduce the next year than smaller packs.

#5. Another study on impacts of "breeder" loss. Again, how important are the breeding female and the breeding male for pack and pup survival?

#5. Bridget L. Borg, Scott M. Brainerd, Thomas J. Meier and Laura R Prugh, ***"Impacts of Breeder Loss on social structure and reproduction, and population growth in a social canid".*** Journal Animal Ecology, 2015.

Data used in this study was from 26 years on 387 collared wolves in Denali National Park and Preserve. About 10 to 20 packs are monitored each year. Wolves are protected in the park and preserve but are hunted and trapped when the leave park boundaries to follow migrating prey.

Findings: Pup survival was affected by pack size with the loss of breeders. When one or both breeders died, some packs dissolved. Packs were most likely to dissolve: 1.) if both "breeders" died, 2.) if the alpha female died, 3.) if the pack was small, and 4.) if the death happened just before or after the breeding season. The pack was less likely to dissolve if the death was natural rather than human caused. Of all of the packs that dissolved during this study, in 77% of the cases the dissolution happened
after the death of a "breeder".

The loss did not seem to affect population growth that year or the following year, perhaps because of "compensatory breeding mechanisms". This may be because some social carnivores suppress reproduction among others in the pack; other members are not allowed to breed. This suppression changes when an alpha dies, allowing a younger wolf to breed.

#6. Research: Do wolf pairs, breeding males and females, "break-up"? If so, what extrinsic or intrinsic factors cause these "break ups"?

#6. Cyril Milleret, Petter Wabakken, Olop Liberg, Mikael Akesson, Oystein Flagstad, Harry Peter Andreassen, Hakan Sand, "***Let's Stay Together? Intrinsic and extrinsic factors involved in pair bond dissolution in a recolonizing wolf population"***. Journal of Animal Ecology, August 25, 2016.

This study looked at 153 pairs of wolves recolonizing Scandinavia during 14 winters of snow tracking and DNA monitoring. In Scandinavia, management zones are used. Wolves moving outside of these zones are killed. . Scandinavian wolf populations suffer from severe inbreeding depression which reduces fitness but in this study it did not seem to affect pair bonds..

Results: This study in Scandinavia found that wolf pair dissolution was linked to a mortality event caused by an extrinsic event. Death of one or both of the partners was always involved**.**

Other findings: Medium time for the pair to be together was three consecutive winters. Dissolution was mostly human-related, caused by legal control (36.7%) verified poaching (9.2%) traffic-related causes (2.1%. Intrinsic factors such as disease and age accounted for only 7.7% of the dissolutions.

The remaining 44.3% were unknown, though poaching is suspected in many. No divorces where partners separated when both partners were still alive were recorded, though these might have happened but were not observed

Importance of Super-additive effects: These can be the result when extrinsic factors like hunting and predator control interact with intrinsic factors such as population self regulation that is found in social carnivores. Wolves have evolved with a complex social system that has a few dominant individuals monopolizing reproduction. Maintaining dominance is threatened by a number of factors. Direct impacts include human-caused mortality, hunting, poaching, predator control measures, and natural factors such as food availability. However, indirect impacts such as habitat fragmentation or loss, management boundaries, and natural factors such as intra-specific competition etc.

Part IB:
(Hunting success and prey choice of wolves)

A small sampling of research and a discussion
focused on the importance of both packs and individual wolves
as factors determing hunting success and prey choice
and how this raises relevant issues for the Post-Recovery EIS

#7. Research: How do wolves "learn" to kill a new species of prey?

This study looked at how wolves in Yellowstone "learned" to kill bison, a species that most of the wolves translocated to Yellowstone in 1995 and 1996 were not use to hunting. Might other wolves use the same process and learn to kill livestock?

#7. Douglas W. Smith, L. David Mech, Mary Meagher, Wendy E. Clark, Rosemary Jaffe, Michael K. Phillips and John A. Mack, ***"Wolf-Bison Interactions in Yellowstone National Park".*** Journal of Mammalogy, 2000.

Only 2 of the 41 wolves that were translocated to Yellowstone were had been exposed to bison before being moved to Yellowstone in 1995 and 1996. Elk had been their primary prey. Records were kept on all bison kills by wolves from April 1995 through March 1999. During that period of time, elk were far more plentiful than bison and elk are easier for wolves to kill. The study was looking for insight on how and why wolves may begin to kill a new species of prey.
Data in this study came from the first bison kills that were documented in Yellowstone after the translocated wolves were released from their acclimation pens. Data was collected on fourteen bison kills that could be documented as killed by wolves. If wolves were just seen feeding on a bison carcass and the cause of the death could not be documented as wolf-caused, it was not counted.

Findings: Yellowstone wolves first learned to kill bison when they came upon a easy opportunities: vulnerable bison, ones that were calves, or bison that were in poor condition or injured. The first bison was killed by a group of yearling wolves and this happened just 21 days after their release from the holding pens. The bison was a lone emaciated calf. All 14

bison kills were in late winter when bison were vulnerable because they were in poor condition or because they were injured or young. Most were calves or cows. The one bull had a broken leg. Wolves killed more bison in areas where the wolves' usual prey, elk, were either scarce or absent. Six different packs killed bison but 10 of the 14 kills were made by just two packs. These two packs lived where bison spent the winter. in the territories usually occupied by these two packs.

Bison-wolf interactions were also observed. When wolves approached bison, the vison usually stood their ground. Multiple bison usually formed a tight group. When bison stood their ground and faced the wolves rather than running most wolves lost interest. Bison increased from 1997 to 1999 suggesting that with experience wolves became more successful at killing bison.

The conclusion: wolves are adaptable and they are opportunistic hunters. They will kill prey species that is new to them if the opportunity in the form of a vulnerable animal is encountered or if the need arises. For Yellowstone wolves who were use to killing elk, the opportunity came in the form of bison who were very vulnerable and easy to kill. From these successes, wolves learned to kill bison.

Application:
Why are some wolves in WA State killing livestock?
Are they just "bad wolves? as some at WDFW have tried to claim.
What do the findings of this study suggest?

Do opportunities occur for wolves to kill domestic cattle, especially calves on the large, remote grazing allotments in the Kettle Range? Could it begin with an especially vulnerable calf, one that is under 200 lbs and less mature than the others? Or one that has become separated from its mother in a wooded area or an area with steep terrain? Wolves travel long distances and cover a lot of ground. What are the chances of a wolf finding a vulnerable calf on these allotments? Does it matter if All calves weigh 200 lbs when released onto allotments if this deterrent is used or will having MOST calves at 200 lbs work okay? If removal of carcasses is used as a non-lethal deterrent, does this work if carcasses are not removed before wolves feed on them? Does it work if some carcasses are not found at all? When do these carcasses "teach" wolves to prey on livestock? If range riders check on some or most livestock daily or several times a week is this an effective deterrent? Does it work if not all livestock are found and checked as long as most are found and checked?

OR

Do some WA wolves attack livestock because the need arises - wild prey is scarce while domestic cows and calves are plentiful and the pack has growing pups to feed?

Does the need to hunt easier prey, domestic cows and calves, increase if one or more of the members of the pack is killed? What if one or two of the best hunters are killed, maybe by WDFW in an attempt to stop wolf attacks on livestock?

#8 Research: Are wolves good hunters who are able to readily kill prey?

Or is their hunting ability limited which also limits the choices of prey?

How might the answer apply to the chances of wolves attacking livestock and use of non-lethal methods to prevent these attacks?

This article looked at studies that focused on the ability of wolves to hunt in Yellowstone National Park. The wolves in these studies hunted mostly elk even though other ungulates are found in this park; bison, moose, deer, pronghorn, mountain sheep, and mountain goats.

#8. Daniel R. MacNulty, Daniel R. Stahler and Douglas W. Smith, "***Understanding the Limits to Wolf Hunting Ability",*** Yellowstone Science: Celebrating 20 Years of Wolves, pages 34-36.

Findings: Many studies of overall success rates when wolves are hunting large prey show most attempts fail. This is why prey that are killed by wolves are usually vulnerable. Vulnerable prey included animals that were young, old, injured, or they made the wrong choices when attacked, or they are caught in difficult conditions such as deep snow or steep terrain. Basically the wolves were "opportunistic" hunters who focused on looking for the easier prey. This is happening when wolves "test" the prey they find and when they "select" prey during the hunt. Wolves can only kill some individuals.

Discussion: As explained in this article, wolves lack some of tools found on other large predators; retractile claws, supinating muscular forelimbs for grappling prey and jaws capable of applying immense pressure. Hunting ability and time it can devote to hunting is also related to the individual's age, body size, sex, breeding status, and, as one study showed, the individual wolf's interest in taking risk. The size and social dynamics of packs also influence hunting ability since hunting is usually done as a group. Many prey species such as elk and bison are many times larger than wolves. These prey species have evolved with wolves and have many effective defense mechanisms.This is why studies show that most prey leave an encounter with wolves unscathed, even when cornered by a dozen wolves. (Mech 1966 and Peterson, 1977.) This is why wolves can only catch some individuals.

Application to wolf - livestock interactions:

* From a wolf's perspective, how vulnerable are sheep? Cows? Calves?

* When the non-lethal deterrent of calves weighing at least 200 lbs is used by producers, how important is it that ALL calves weigh at least 200 lbs before being released onto allotments? Or will it work if just most calves weigh 200 lbs?

*When the non-lethal deterrent of removing carcasses is used by producers, how important is it to have carcasses removed before wolves feed on them? How important is it to leave some that too hard to remove? How important is it that some carcasses are never found?

*When range riders are used as a deterrent, how important is it to find and check every animal? Does it work if range riders just find and check some animals or most animals but not all animals?

#9. Research: How many wolves does it take to kill elk? What wolves are most often the best hunters? What makes some wolves better hunters? Does this change with prey size? If the best hunter and/or hunters are killed during predator control or hunting, might this change the prey the pack selects to hunt?

#9. Daniel MacNulty, Douglas Smith, L. David Mech, John Vucetich, and Craig Packer, ***"Non-linear effects of group size on the success of wolves hunting elk"***. (2011) Behavioral Ecology September, 2011.

Yellowstone wolves have provided detailed information about how wolves hunt and the role of individual wolves in the hunt. This is because not only the pack, but the individuals within the pack are identified and well-known. This study was based on observations of 94 individual wolves in 5 wolf packs. Performance was looked at for breeding and non-breeding wolves. Non-breeders included mature and immature yearling from previous litters and adults not related to the breeders.

Findings: In this study, pack size for overall success in hunting elk peaked at about 4 wolves. This study also broke the hunt down into parts and tasks involved in hunting and looked at how many individuals were involved. The peak number was different for the first attempts at each part and tasks. The strength of the relationship between the number of members and success in their first attempts also varied with the various parts of the hunt and so did the participation by individual members of the pack. For instance, the threshold group size for first attempts at the less dangerous part of hunting was 4-7 wolves. The threshold group size for attacking was also 4-7 wolves. Attacking, as defined in this study, is the least dangerous part of the hunt. For selecting and killing combined, it was 2-6 wolves. For just killing it was 5. Because individual wolves could be identified, the study analyzed who in the pack was involved in different parts of the hunt. Breeding wolves were most likely to be involved in the most dangerous parts of the hunt. Non-breeders with no offspring in the pack were more likely to "hang back" (be "free-loaders") during riskier parts of the hunt. This study again showed that pack success is neither simple or only a game of numbers.

These findings raise interesting questions about the importance of pack size and the traits of the individual members of packs. Larger packs increases litter size and pup survival, but not overall success in hunting elk. Is this because pack members are needed for many tasks besides hunting? Other tasks include bringing food back to the pups, protecting the pups while others are hunting and bringing food back, and protecting the pack's territory. If there are not enough members to do all of these tasks, pack success will be lower? Consideration must also be given to the fact that wolves are frequently injured and even killed while hunting large prey like elk. When this happens, a larger pack becomes even more important. This study did not look at the importance of these tasks and the ability of the pack to take care of all of these tasks.

#10. Research: A similar study in Yellowstone that focused on pack size and success in hunting bison. Are wolves adaptable in the size of the hunting parties the use, adapting the size to the prey being hunted? Bison are much more difficult for wolves to kill.

#10. Daniel R MacNulty et al, ***Influence of Group Size on the Success of Wolves Hunting Bison"***. 2014

Findings: Success when hunting bison required more wolves. Success in killing elk leveled off at 2-6 wolves while success in killing bison success leveled off at 9-13 wolves. Evidence suggested that the size might continue to increase beyond 13 if more wolves were available. This suggests that wolves are adaptable in their decisions about pack size and hunting strategies and will tailor these to what is required to kill available prey. Bison are

usually far more difficult to kill than elk unless the bison are young, old, injured or otherwise unusually vulnerable

#11. Research: Is hunting success based on pack size or do traits of individual members make a difference too? What traits make some wolves better at hunting elk? How important is size/weight? Is size/weight an advantage during all parts of the hunt? Would this be true for all kinds of prey or just elk?

#11. Daniel MacNulty, Douglas Smith, L. David Mech and Lynn Eberly, *"**Body size and predatory performance in wolves: is bigger better**?"*. Journal of Animal Ecology, 2009.

Again, because individual wolves are known and observed in Yellowstone, this study looked at repeated observations of 94 individual wolves that observers could identify when they were seen hunting. Elk were the primary prey in these observations, 92%.

Findings: This study again showed that success in hunting elk was influenced by traits of the individual members of the pack. All wolves are not equal in their ability to hunt. Larger size did prove to give a net, overall predatory advantage when hunting elk despite substantial variation in its effect on performing the different tasks required to kill elk.
When different parts of the hunt were broken down, larger was especially helpful during the hunting tasks involving grappling and subduing elk, tasks where size and weight would offer an advantage. Wolves must use sheer mass to topple an adult elk that is 2 to 6 times larger because wolves lack claws and forearms for grabbing and grasping and the strong bite that cougars and bears have. It was no surprise that males, who are larger, outperformed females on these tasks. However larger size did not improve performance for "selecting prey". Selecting requires locomotor ability more than size . It could be argued that larger may not be an advantage when hunting all prey. Females and other wolves with a lighter build had an advantage when sprinting after elk. Again, success does not only depend on pack size. Individual characteristics of pack members also matter

Authors suggested that females and other wolves with lighter builds might have an advantage when hunting prey that is smaller and/or faster than elk. They also wondered if larger size could narrow prey choices for wolves, which could reduce overall hunting success of prey when large prey is less available.

#12. Research: As wolves age, is there a decline in their hunting ability?

#12. Daniel MacNulty, Douglas Smith, John Vucetich, L David Mech, Daniel Stahler, and Craig Packer, *"**Predatory Senescence in aging wolves**"*. Ecology Letters, 2009.

Findings: Like repeated observations of known wolves in Yellowstone showed that hunting skills declined with age, this study showed that hunting ability declines with age. Top performing hunters in the study were 2-3 years old. The span of time between being pups to reaching the age of decline in physical ability to hunt is short. This means that it is a huge advantage for packs, when hunting, to have individuals who are in their prime versus yearlings and older wolves.

This means that the age of the wolves in a pack may not only affect the level of hunting success, it may affect prey selection. Will packs with older wolves focus on hunting prey

that is easier to kill? Could this explain some attacks on livestock?

Implications for predator control and hunting

How often is this factor of age considered when wolves are killed during predator control or during hunting? Yet removing wolves in their prime may lower the pack's ability to successfully hunt. It could force a pack to select easier prey such as livestock.
The EIS needs to analyze and disclose data like this when addressing impacts of hunting and predator control.

Is WDFW's practice of indiscriminately shooting wolves from helicopters to reduce attacks on livestock based on the best available science? How might this practice "change pack behavior" which is usually one of WDFW's stated goals for shooting wolves?

Another reason given by WDFW for killing wolves is to lower the pack's caloric needs.
At the simplest level, this may make sense; fewer mouths to feed might mean fewer attacks on livestock. But does the best science show that individual wolf and pack behavior is this simple? Is it just a numbers game?

Part IC: Defending Resources/Territories

A sampling of research and a discussion
focused on wolf packs defending their territories
and
the importance of both packs and individuals for successful defense of resources/territories.

Studies like these show that intraspecific strife affects survival rates
for both wolf packs and for wolf populations.
In Yellowstone, intraspecific strife is the leading cause of natural mortality.
In "natural" and "complete" ecosystems are wolf populations "self-regulated"?

All of this information raises issues that should be addressed in the post-recovery EIS.

Many studies show wolves definitely prefer some areas over others when establishing territories as well as when locating den and rendezvous sites within these territories. With increasing wolf density, packs must compete more with neighbors and strife increases as packs try to claim new territory or hold on to the territory they have. This competition for territories can result in fights that may injure or kill individual wolves and/or cause packs to lose territory or completely dissolve. Strife increases with wolf density. Studies in Yellowstone where few wolves are killed by humans indicate that this strife is the leading cause of natural mortality. Thus, intraspecific strife affects wolves not only at the individual and pack level, but also at the population level. The theory that wolf populations are "self-regulated" in natural and complete ecosystems should be applied to issues related to wolf management such as management of core wolf habitat and decisions related to hunting and predator control.

#13. Research: Is some real estate really so much better that it is worth fighting over?

The Yellowstone Wolf Project has studied every wolf pack in the park for over 20 years documenting locations and changes in their territories as well as their battles to obtain or defend these territories.

#13. Erin Stahler, Douglas W. Smith and Daniel R Stahler, ***Wolf Turf: A Glimpse of 20 FYears of Wolf Spatial Ecology in Yellowstone".*** Yellowstone Science, pages 50-54.

Findings: Maps of wolf territories over 20 years show a strong preference for specific parts of the park as some packs dissolve and other packs are formed. Areas are usually preferred because of more available prey. However as wolf density increases, territories overlap and neighboring packs must be dealt with. Turf wars in areas with higher wolf density can lower individual wolf survival. In Yellowstone, the highest density of packs is in the Northern Range where prey is available all year. Wolf pack density is much less in the central and interior parts of the park where severe winters force most of the prey to leave the park leaving mainly bison. These wolf packs sometimes travel to the Northern Range during the winter to hunt. Another map showing the location where radio-collared wolves were killed by other wolves shows that these are concentrated in the Northern Range.

Life in the Northern Range comes with more turf wars - and disease. Both seem to be the result of high wolf density. Disease has been a major factor in the demise of 3 packs while this has not been seen in the interior. Packs in the interior have more space and experience less inter-pack competition. Dispersions are greater in the interior.

Studies show a relationship between overlap of wolf territories, conflict, and pack turnover. The area with the most overlapping of wolf territories also has the highest pack turnover, often due to the loss of individual pack members who died in the conflict.

Application to WA State and the scoping comments for the EIS: Wolf density in WA is highest in NE WA. Why? Is it because of the close proximity to two sources of new wolves, B.C. and Idaho? Why is so little dispersal happening out of NE WA? Is this because NE WA offer some of the best real estate in the state and this is why wolves stay there or because something goes wrong when they try to disperse? Yellowstone mapped territories over time and identified features in these territories that seemed to make them appealing to wolves. Has WDFW one this for WA State? Are specific features found in NE WA that wolves like?

#14 Three research projects: When wolves must defend their territory, does the pack with the most members win? OR Is winning also determined by who is on your team? Are older wolves an asset or a liability?

Using their ability to identify and document behavior of both individual wolves and wolf packs, researchers looked at aggressive encounters between wolf packs. The influence of various characteristics of both packs and of individuals was studied. Data was based on well-documented observations of 121 aggressive encounters between packs over 16 years that were observed and well-documented.

#14A. Kira A Cassidy, Daniel R. MacNulty, Daniel R Stahler, Douglas W. Smith, L. David Mech. *"**Group Composition effects on aggressive interpack interactions of gray wolves in Yellowstone National Park**"*. Sept-Oct. 2015, Behavioral Ecology.

#14B. Kira A. Cassidy, Douglas W. Smith, L. David Mech, Daniel R. MacNulty, Daniel R. Stahler and Mathew C. Metz, ***"Territorialilty and Inter-Pack Agression in Gray Wolves: Shaping a Social Carnivore's Life History".*** National Park Service, 2016.

#14C. Kira A. Cassidy, L. David Mech, Daniel R. MacNulty, Daniel R. Stahler, and Douglas W. Smith, ***Sexually dimorphic aggression indicates male gray wolves specialize in pack defense against conspecific groups".*** *2017*

Findings: As was expected, relative pack size did improve the odds for larger packs, however it was much more complicated than that. Pack composition moderated the effect of relative pack size. Individual characteristics of the pack's members also mattered. Surprisingly, packs with relatively more older members (6 years or older) and/or adult males had higher odds of winning despite pack size. Just one wolf made a big difference. A pack with one more wolf than its opponent had a 140% higher odds of winning. Age of pack members also mattered. A pack with one more older wolf than its opponent had 150% greater odds, making age more important than number. Perhaps this was due to experience. Older wolves had the experience and wisdom to avoid conflicts that cannot be won. The study showed that the loss of an old adult or an adult male reduces the pack's competitive strength and its ability to hold territory. During the 121 encounters, 71 escalated into a physical attack and 12 resulted in mortality. Altruistic behavior was seen in seven attacks where a pack member intervened to stop an attack on a packmate. Slightly smaller packs were most likely to have a pack member death.

Applications to the EIS

In discriminate lethal removal, hunting and predator control. Again, does it matter which individual wolves are killed? Are they all the same when it comes to a pack being able to protect its territory? What kind of wolves are needed most for positive outcomes during territorial disputes with other wolves? How will these direct and indirect impacts of indiscriminate lethal on wolf packs and wolf populations be analyzed and disclosed in the EIS? What population modeling will be used that factors in all of these details?

#15. Research: Two Studies: What regulates the size of wolf populations? Is it prey availability? Two studies looked at this question.

Using 13 years of data on 280 collared wolves in Yellowstone, the effect of wolf density, prey abundance and population structure, as well as winter severity on age-specific survival in 2 areas of the park, one that was prey-rich and one that was prey-poor. Cause-specific mortality was included in the study. During the study period, the size of the elk population decreased. Data on survival and the age and sex of the wolves was collected on the collared wolves.

#15A. Sarah Cubaynes, Daniel MacNulty, Daniel Stahler, Kira Quimby, Douglas Smith, and Tim Coulson, "***Density-dependent intraspecific aggression regulates survival in northern Yellowstone wolves***". Journal of Animal Ecology, April 21, 2014.

Findings: Overall survival rates decreased during the study. In the Northern Range, density dependence regulated adult survival through increased intraspecific aggression. This was not dependent on prey base. In the interior, where prey was more limited, adult survival was less variable and density-independent, despite reduced prey availability. Survival was similar for yearlings and adults but lower for wolves over age 6.

These findings suggest density-dependent intraspecific aggression is a major driver of adult wolf survival in the Northern Range where there is high ungulate densities.

#15B. .A. Cariappa, J. K. Oakleaf, W.B. Ballard, B. Warren S.W. Breck and W. STeward, ***"A Reappraisal of the Evidence for Regulation of Wolf Populations".*** 2011.

Findings: When data on exploited or expanding wolf populations were removed from another study of population dynamics, the results of that study changed. Findings supported those in Cariappa's 2014 study - described above. Prey availability was no longer the main factor. Density - regulated wolf populations, sometimes referred to as self-regulated populations, is still being explored in wolf populations that are not managed with lethal removal tools such as hunting and predator control.

Intrinsic density and space Self-Regulation

This study suggests there is an "intrinsic density" for wolf populations driven by wolf density, not prey density. Prey availability has long been considered the main factor in limiting wolf populations in natural ecosystems. Space appeared to be a significant factor because some wolves in the prey-rich area shifted pack territories away from the best hunting areas as overlaps in territories increased. Even though elk density decreased in Yellowstone during this time, it still remained higher than in many wolf habitats. Wolf density was the limiting factor for wolf populations even when prey was abundant.

Implications - Comments for the EIS about wolf management

Many people support having wildlife management that supports having "complete ecosystems" on some of our public lands. This requires a huge change away from human management of wildlife populations through hunting, trapping and predator control. Many national parks are managed this way including Yellowstone. Could the wildlife be managed this way on more of WA State? Humans have long been told that wildlife populations must be hunted to control their populations.
This may true for ecosystems that have had some of their predators removed. Will having wolves, and maybe grizzly bears make this possible in the North Cascades?

1D. Dispersal

A small sampling of research and discussion of the importance of both packs and individual wolves for successful dispersal and why dispersal is important and how these are relevant issues to the post-recovery EIS

Dispersal plays an important role in the spatial distribution, population regulation, colonization and genetic structure of wolves. Dispersal can influence population "viability. Dispersal influences population dynamics as well as the social organization for individual wolves. That's why understanding and managing wolves to ensure adequate levels of dispersal at all levels and through time is important. Hopefully this will be part of the goals and every alternative in the EIS.

What needs to be in a wolf management plan to ensure adequate dispersal?
The EIS should start with the best science.

#16. Research. How many wolves disperse? What wolves are most likely to disperse? How far do they go? After dispersing, how many reproduce?

#16. Michael D. Jimenez, Edward E. Bangs, Diane K boyd, Douglas W. Smith, Scott A Becker, David E Ausband, Susannah P Woodruff, Elizabeth H Bradley, Jim Holyan and Kent Laudon. ***"Wolf dispersal in the Rocky Mountains, Western United States: 1993-2008".*** Journal of Wildlife Management, March 2017.

This study of looked at 297 wolves that were documented to be "dispersers" out of a group of 1, 655 wolves in 217 packs that were collared and studied in the Northern Rocky Mts (NRM).

Results: About 10% of the known wolves in the population dispersed annually. More males dispersed than females. (169 M, 128 F) Fewer dispersed males reproduced than females. (M 28%, F42%) Yearlings were 37% of the dispersing wolves, 59% were adults and 4 % were pups. Mean age at dispersal for males (32 months) was not significantly different between males and females. Yellowstone National Park had a significant positive effect on dispersal rate. Pack density in the wolf's natal population had a negative effect when the entire NRM population was considered. The mean NRM pack size from 1993-2008 (6.9) was smaller than the mean size of packs from which wolves dispersed during that time (10.0). Dispersals occurred all year but generally increased in fall and peaked in January. The mean duration of all dispersals was 5.5 months. Radio-collared wolves dispersed between Montana, Idaho, and Wyoming to other adjacent states and between the U.S. and Canada throughout the study. Mean straight-line distance between beginning and ending points for dispersing males and females were similar. (M 98.1 km, F 87.7 km.) Ten 3.4%) dispersed over 300 km. Distances decreased later in the study. Wolves that formed new packs were 11 times more likely to reproduce than those that joined established packs. Surrounding pack density had a negative effect on successful dispersal.

#17. Research. What wolves disperse and when do they disperse?

Dispersal during wolf recovery in and near Glacier National Park (GNP) from 1979-1997 was the focus of this study. During this time 31 of 58 tagged wolves dispersed.

#17. Diane K. Boyd and Daniel H. Pletscher, ***Characteristics of Dispersal in a Colonizing Wolf Population in the Central Rocky Mountains".*** *Journal of Wildlife Management, 1999.*

Results: Mean dispersal distances were 113 km and the distance was not significantly different for males than females, except for one very long dispersal (840 km) of one yearling female. Wolves tended to disperse northerly to areas of higher wolf density.
Peak months for dispersal were January-February and May-June. Mean dispersal age was 28.7 months for males and 38.4 months for females. Sex ratios were the same for dispersers as for the overall population of collared wolves in the study.

#18. Research: Who disperses and when? After dispersing, how many wolves breed? Does every wolf disperse?

#18. Eric M. Gese and L. David Mech, ***"Dispersal of Wolves in northeastern Minnesota.*** Canadian Journal of Zoology, 1991.

Results: Both sexes dispersed equally. Dispersing wolves consisted of 8 % adults, 75 % yearlings and 16 % pups. Most dispersers left when they were 11-12 months old. Dispersal was mainly in February-April and October-November. Adults dispersed short distances into nearby territories while yearlings and pups dispersed both short and long distances. Yearling and pup dispersal was highest when the wolf population was increasing or decreasing and low when the population was stable.
Adults had the highest pairing and denning success after dispersing. Yearlings and pups that dispersed a short distance had a higher success of settling in a new territory, likely reflecting vacancies in neighboring territories. Two wolves were known to have stayed in their natal pack for more than 7 years while 35% of the known-age wolves remaind in their natal territory for more than 2 years.

#19: Paper: Why do wolves disperse?

#19. L. David Mech and Luigi Boitani, ***"Wolf Social Ecology"***. University of Nebraska, 2003, pages 11-16.

Findings: Most wolves disperse unless they can assume a breeding position in their natal pack. Why? The fact that wolves often disperse while beginning to mature sexually suggests this is a factor. (Howard, 1960.) Dispersal in spring and fall suggests social competition. Aggression related to breeding peaks in the spring. The pack's food needs peak in the fall which may increase competition for food. This may cause dispersal. In studies in Quebec, dispersal increased in packs living on a low prey base than in packs living on a high prey base. (Messier, 1985.) On Isle Royale, dispersal increased as food decreased. The relatively high amount of food that is available in northwest Alaska (Ballard et al. 1997) and Yellowstone probably explains the higher age of wolf dispersal in those areas. (D.W. Smith) The highest rates of dispersal in northwestern Alaska followed a rabies epzootic. (Ballard et al. 1997. Authors suggest it might be the result of the breakup of pack structure.

#20. Research: What can genetic testing tell us about dispersal?

To understand dispersal, wolf genetic structure was examined using noninvasive and invasively collected samples. Over 44 packs were sampled in British Columbia and Alberta.

#20. Catherine L Cullingham, Conrad D. Thiessen, Andrew E Derocher, Paul C. Paquet, Joshua M. Miller, Jill A. Hamilton, David W. Coltman, ***"Population structure and dispersal of wolves in the Canadian Rocky Mountains".*** Journal of Mammalogy, June 2016.

Results. Genetics in this study showed female relatedness was greater than males suggesting strong pack structure and female philopatry. Relatedness within packs was greater near major roads suggesting decreased dispersal from natal packs with proximity to roads. Two significantly differentiated genetic clusters were identified corresponding to a north/south split. Landcover distance was a significant correlate for 2 of 4 genetic distance

measures, where packs in the north were in areas of dense coniferous forests, while packs in the south were primarily in open coniferous forests. These landcover differences suggest natal association or could relate to prey distribution. .

#21. Research: When wolves disperse, do they move to areas that are similar to those they grew up in?

This study compared the habitats in territories that dispersing wolves left, natal habitats, with the habitats in the territories where the dispersing wolves ended up, their new territories. It makes sense that it would be easier for wolves to survive in an area with a similar habitat and similar prey to the one they grew up in. The habitats found in the natal and new territories of 271 wolves were compared to see how similar they were.

#21. Ana Sanz-Perez et al. , ***"No place like home? A test of the natal habitat-biased dispersal hypothesis in Scandinavian wolves.*** December 2018.

Results: Wolves with the shortes dispersal distances established in natal-like habitat types more than expected by chance, whereas wolves that dispersed longer distances did not show this tendency to choose a natal-like habitat. This pattern was consistent with males and females, with females showing more tendency to choose natal-like habitats. The tendancy increased with the size of the area identified as a natal-like habitat. Results may have been affected by the fact that long-dispersing wolves were less likely to find natal-like habitats. Short distance dispersers are more likely to find similar habitats.

Scandinavian wolves also chose natal-like habitats inhabited by other wolves but avoided steeper terrain, areas with higher human accessibility, and areas inhabited by bears when establishing their territories.

In this study, a larger number of female wolves dispersed shorter distances than males, a similar number of males and females dispersed medium distances, and a higher number of males dispersed longer distances.

This tendency suggests identifying habitats when planning translocations of wolves. It may also be useful when thinking about probable habitat choices of dispersing wolves in expanding populations and planning corridors to encourage dispersal.

#22. Research: Who disperses, when, and how far do they go?

This study looked at the dispersal of a peripheral wolf population of 160-180 wolves as it increased and expanded during 1998-2004. Researchers equipped 60 wolves from 8 neighboring wolf territories with radio collars. Data was also collected on the natal packs.

#22. Ilpo Kojola, Jouni Aspi, Antero Hakala, Samuli Heikkinen, Catrin Ilmoni and Seppo Ronkainen, ***"Dispersal in an Expanding Wolf Population in Finland".*** Journal of Mammalogy, 2006.

Findings: At least 30 of the collared wolves dispersed from their home territories (50%). Wolves usually departed from home territories As pups and yearlings in a unimodal season fashion. The distance of dispersal (median 98.5 km with a range of 35-445 km) did not differ between males and females. Long- distance dispersers, >200 km, were found only among wolves that departed at the age of 10-12 months. Survival of dispersers was linked to the direction of dispersal. All that dispersed into areas managed for zero wolves were shot before they could reproduce. However the majority dispersed elsewhere and and reproduced. Direction: wolves dispersed relatively evenly to different directions.

Researchers in this study observed high dispersal rates under conditions of low wolf density and relatively high food abundance. This is different from what Boyd and Pletscher (1999) presumed; that low prey abundance and high wolf density promotes early departure.

Dispersal rates in the Finland study were similar to a study of wolves colonizing the Rocky Mountains: Boyd and Pletscher - 53%, and higher than many other studies in North America where only 24% to 35% of the marked wolves dispersed. Could dispersal rates in various studies be influenced by the proportion of non-dispersing alpha wolves among marked animals?

Other studies in some expanding wolf populations have shown a trend toward a female-biased sex ratio in dispersers; Boyd and Pletscher (1999) Fritte and Mech (1981) and Wyweden et al. (1995). Other studies have shown a bias towards males but some of these were based on data collected from wolves that had been killed by humans. This study showed no difference for males or females.

Some studies have shown differences between males and females in the distance traveled when dispersing. This study did not. However, the 2 wolves in this study that traveled more than 400 km were both males.

#23. Research: How is genetics being used in wolf studies?

The complete population predigree that has been established for more than 350 wolves in Yellowstone is being used to understand many genetic factors that influence behavior and physiological traits. This research is providing new information that can be used in wolf management.

#23. Daniel R. Stahler, Bridgett M. vonHoldt, Rena M. Schweizer and Robert K. Wayne, "***Yellowstone Wolves at the Frontiers of Genetic Research".*** Yellowstone Science: Celebrating 20 Years of Wolves. Pages 18-24

Findings: This research discovered the source of the black versus the gray coat on wolves. This helped to explain the benefits of having the black coat. This research addressed the issue of genetic diversity and the importance of considering this when selecting the first wolves that were translocated to Yellowstone NP. Also discussed is the issue of "genetic connectivity" which was one of the primary stipulations for delisting wolves wolves in the Rocky Mountains.

So far, research in Yellowstone has found gene expression patterns related to age and disease. Wolves age rapidly and most individuals die by age 5 or 6. Diseases like mange may cause secondary effects on gene expression, in addition to the primary pathogen response.

Black coat color was found to be due to a single gene, a mutation believed to have origininated in domestic dogs in the Old World. The gene related to black coats is dominant over the one for gray coats. The same gene may be involved with immune function. Ongoing research is showing black wolves have greater survivorship during distemper outbreaks. Yellowstone wolves have undergone selection for this mutation to a greater extent than some other wolf populations. Gene research has not yet found similar patterns for complex behavioral traits.

Application to WA State and Translocating Wolves to SW WA State

The legislature asked WDFW to explore the possibility of moving some wolves from NE WA to SW WA State to speed up delisting. Why haven't wolves dispersed from other wolf populations into SW WA? Should that question be answered before artificially moving wolves? If wolves cannot make the trip on their own, how will moving wolves artificially address that problem? Will translocation establish a population in SW WA that is isolated physically - and genetically?

Part 1 D:
Implications for the EIS:
This sampling of research in Section 1 is in these comments for this EIS because wildlife management should be science-based.
What does the best science tell us about wolves?
The goals and alternatives in this EIS should be based on this science.
When impacts are analyzed and disclosed, they should use the best science.

Shouldn't these two key concepts which are found in all of this research be the drivers of wolf management

1. The overall fitness and success of wolves is dependent on socially complicated and dynamic packs and the success of these packs is dependent on the individual members of their packs. When natural processes shape this social behavior , as is shown by studies in Yellowstone and Denali NPs, wolf packs are often large and contain members with close kinship ties and several generations. Researchers are still trying to understand how natural packs form and function when human interference is minimal. Wolf management that is based on allowing wolves to form and maintain wolf packs in response to natural processes without human interference?

2. The overall fitness and success we see in today's wolves and wolf packs are the result of thousands of years of natural processes in ecosystems that were not managed by humans. These natural processes shaped the behavior and fitness of wolves - and of all the prey species wolves depend on, and of all other species living in these ecosystems. Wouldn't the best management of wolves be based on based on allowing wolves to live and function in complete ecosystems that are managed not by humans but by natural processes? This has been referred to as "ecologically- relevant management".

Implications for Wolf Management as Proposed in this EIS

1. Addressing impacts of recreational hunting, trapping and predator control in the EIS.

1A. Direct and indirect impacts on Wolf Packs.

If recreational hunting and/or trapping and/or predator control is/are included in any of the alternatives, will all of the direct and indirect impacts of these practices on wolf packs and their ability to reproduce, hunt, defend territories and disperse, as well as impacts on local wolf populations in WA State and on the total wolf population in WA State? Will the impacts of "indiscriminate" lethal removal be removed as compared to
selective lethal removal be analyzed and disclosed?

1B. Direct and indirect impacts on the individual wolves that make up wolf packs.

Will the EIS analyze and disclose all of the possible indirect and direct impacts of loss of individual wolves if hunting and/or trapping, and/or predator control is included in any alternatives?
Each wolf offers something. Examples from the studies: a.) the loss of pups who are the future population and the future dispersers, parents and helpers, b.) loss of the breeding female who is often the glue that holds the pack together and is the producer of the pups and is sometimes one of the most committed hunters and defender of territories, c.) the breeding male who not only is breeding, but is also one of the most committed hunters and one of the best wolves to have on the team when territory must be defended, d.) yearlings who are helpers and who are training to be the future hunters, breeders, and defenders of territory and who are most likely to be the dispersers, e.) the non-breeding adults who are the hunters and the helpers and the defenders of territory and who sometimes become the breeder, and finally, f.) the older wolves who provide the wisdom to avoid battles with other packs when winning isn't very likely and pass on the lessons learned with age.

1C. Choice of Model for viability/sustainability for local and total wolf populations. Will the EIS use viability and sustainability models that include all direct and indirect factors that relate to the wolf pack's success in reproducing, hunting, defending territory and dispersal? Will this include all of the direct and indirect impacts on packs and individual wolves?

2. Importance of dispersal and wolf populations in B.C., Idaho and Oregon.

WA State now has wolves because wolf populations existed in B.C. and Idaho and these populations generated wolf dispersal into WA State. The close proximity to WA plus the existence of good wolf habitats that crossed state and national boundaries made this possible. Idaho was also the most direct source of wolves for Oregon for the same reasons. Now data suggests that wolves are traveling back and forth between B.C., Idaho and Oregon. In B.C., intensive lethal removal of wolves occurs through both hunting, trapping and predator control, and this has increased recently to support recovery of woodland caribou, an endangered species. In Idaho,
all three kinds of lethal removal are used and kill rates are high because wildlife management is focused on keeping elk numbers high for hunters.

2A. How might changes in management of wolves in B.C., Idaho and Oregon and the resulting changes in the number of wolves in these areas affect local and statewide wolf populations in WA?

2B. * Will any or all of these other areas (B.C., Idaho, Oregon) become "population sinks" for WA wolves or will any or all of these areas continue to be a reliable source of dispersal into WA State?

2C. Are some regional wolf populations in WA State more or less affected by these neighboring populations? Is the local wolf population in SE WA especially affected by management decisions in Oregon? How will the EIS address all of these questions?

2D. How will all of these issues be addressed when choosing viability models and when looking at sustainability in the EIS? How will these issues be addressed when choosing what to include in the alternatives in the EIS and when analyzing and disclosing impacts?

3. Core habitats for wolves. Value of complete, unmanaged ecosystems, ecosystem management rather than wildlife management.

There is a growing interest in having "complete ecosystems" that are left largely unmanaged so predator and prey species find their natural balance. The current trend is also towards "ecosystem management" rather than wildlife management that focuses on individual animals. Historically, wildlife has been managed like livestock, to produce animals "harvest". In 2018, only 2.42 % of the residents in WA State purchased hunting licenses. While interest in "harvesting" wildlife is at an all time low in WA State, recreation and wildlife watching is at an all time high and continues to increase. Studies are now showing that wolf populations living in these areas, such as those in Yellowstone National Park, "self-regulate" their populations. Wolves do not have to be "harvested" to control their population and to protect ecosystems. Instead, wolves improve conditions at an ecosystem level. To be successful, wolves do need an adequate food source, ungulates, which have typically been managed for maximum human harvest to keep hunters happy and provide a steady stream of revenue for WDFW.

3A. Will the EIS have alternatives that include establishment of "core habitats" for wolves that are managed for wolves rather than for human harvest of ungulates? be included in some of the alternatives? If so, will all wildlife species living in these core habitat's be managed with a hands-off approach so predator and prey populations can fluctuate naturally rather than be subjected to lethal removal that is often indiscriminate such as most hunting, trapping and most predator control?

3B. If "core habitats" like this are included in some alternatives, will all of the direct and indirect impacts of having these "core wolf habitats" both wolves and on humans be analyzed and disclosed? Will all costs, including management costs, of having these kinds of areas be analyzed and disclosed and compared to management costs of areas not managed this way? Will the differences in the kinds of management that would be needed in these core wolf areas be analyzed and disclosed?

3C. WDFW purchases and manages land, supposedly to benefit wildlife which is supposedly managed for all residents of WA State. However, much of this land is managed for hunters and the wildlife hunters want to hunt and WDFW allows grazing on some of its lands. Will the EIS look at the possibility of managing some WDFW land as core wolf habitat that does not allow either grazing or hunting? Will the EIS analyze and disclose direct and indirect impacts of grazing and hunting on WDFW lands on wolves, and on most of residents in WA State who do not graze livestock and do not hunt?

4. Translocation of wolves into SW WA and Dispersal.

The legislature asked WDFW to look into translocation, moving wolves from NE WA to SW WA. Translocation was added to this EIS. The discussion of dispersal raises issues relevant to translocation of wolves. Studies tell us a lot about dispersal, including identifying factors that might increase or decrease rates of dispersal such as pack size, prey density , lethal removal of potential dispersers, lethal removal of breeding wolves, esp. female wolves and how this is related to pack social dynamics and size and dispersal, distances usually traveled during dispersal, natural and man-made barriers such as mountains and highways, type of area usually chosen by dispersers, reproduction rates for dispersers and mortality rates for dispersers. How WDFW manages wolves, in the past and future, has and will affect factors influencing rates and success of dispersal. Will this science be used when looking at translocation in the EIS?

4A. Will the EIS analyze this issue when looking at translocation: inherent problems in the use of just 3 large recovery regions in the 2011 WA Wolf Plan? Is physical and genetic connectivity adequate between these 3 regions? If the 2011 Plan had designated many more regions / units and emphasized having better connectively between these, more natural dispersal be happening?

4B. Will the EIS look at this issue when looking at translocation: WDFW's management of wolves in the NE WA during wolf recovery? WDFW has managed the ample wolf population in NE WA as if that population does not affect dispersal to the parts of eastern WA and into other recovery regions, the Cascades and SW WA. Even though wolves in NE WA still are listed as "endangered" by WA State, each time WDFW kills wolves in NE WA, it claims that its lethal removal of wolves and entire packs will not impact recovery in the other regions and overall recovery in WA State. Is this really true? Will the EIS analyze and disclose if killing wolves in NE WA has indeed reduced dispersal? WDFW did not do this when it has killed wolves. In one of the best wolf habitats in NE WA, the Kettle Range, WDFW has killed every wolf pack that has tried to live there, including these successfully breeding packs, the Wedge, Profanity Peak and OPT Packs. Isn't the Kettle Range on obvious step along an obvious route dispersing wolves from NE WA might use to reach the large area of public land in the North Cascades, which then leads to SW WA?

4D. Why has natural dispersal into SE WA been slow? Will the reasons be analyzed and disclosed in the EIS? Is it just a matter of needing more time? Is it due to not enough dispersal out of NE WA and B.C. into the Cascade Mts, and into SE WA? Is it because corridors for safe and adequate dispersals do not exist from wolf populations in NE? Will the need for good corridors be discussion, as well as the adequacy or inadequacy of current corridors between the 3 recovery regions in the 2011 WA Wolf Plan? Will the problems associated with isolated wolf populations also be discussed? Will this discussion include the importance of characteristics found in both packs and individual wolves since both of these are related to the amount of dispersal and how successful this dispersal is, meaning the dispersing wolves survive to start or join other packs that reproduce?

4E. What does WDFW know about the wolf population in NE WA, and what does this data suggest for dispersal into other areas? Sometimes dispersal rates are influenced by one or more of these factors, which sometimes work together: wolf density, prey density, rates of wolf mortality, pack size, etc. Wolf density is often a factor of prey density as is seen in Yellowstone. While we often hear ranchers and hunters say that that there are too many wolves in WA, is this true? And what number is too many in NE WA - based on what? Could wolves in NE WA be

just reaching saturation and if nothing was done, more natural dispersal will occur making translocation unnecessary?

4E. Will translocation address the problems that have been limiting or preventing natural dispersal or is it a quick fix that will only hide the real problems and prevent WDFW from addressing and correcting these problems? Will one of the real problems that may surface be the creation of "isolated" wolf populations in WA State which lack adequate corridors for the rate of dispersal that is needed?

4F. What are the viable corridors between wolf populations in SW WA and other areas? Are there adequate corridors linking SW WA wolf habitats with those in Oregon? With those in SE WA? Or is dispersal expected to be mainly from the north and central Cascades?

4G. What are the viable corridors between wolf populations in NE WA and other wolf populations in WA, such as those in the blue Mts in SE WA and those in the Cascade Mts? Is the wolf population in NE WA dependent on dispersal between wolves in Idaho and B.C.? What about wolf populations in SE WA, in the Blue Mts? Is that dispersal mainly with Oregon wolves?

4H. What does WDFW know so far about wolf dispersal in WA? What data has been collected and analyzed on rates, direction and success of dispersing wolves from known wolf populations? How often have dispersers successfully formed or joined breeding packs? What has been the mortality rate for dispersers?

4I. Will the EIS analyze and disclose other impacts of translocation such as impacts on wolf populations in NE, impacts on the possibility of resolving problems that might exist with corridors, impacts on individual wolves and wolf packs that are translocated including survival rates?

4J. How much would artificial translocation to SE WA cost the tax payer compared to allowing more time to allow natural dispersal to work? Would this money be better spent on addressing the problems that are limiting natural dispersal?

Summary of Section 1

I urge you to consider the following research and issues when writing the draft EIS:

A large and still growing body of research shows that both wolf packs and the individual wolves within wolf packs are important factors determining their success when reproducing and raising pups, when hunting and making prey choices and when defending territories / resources. Both are also factors in wolf dispersal. This research shows that both the characteristics of the pack and of the characteristics of the individuals shape the wolf's behavior, the wolf's overall fitness, and the wolf's ability to adapt to change. When choosing the goals and alternatives in the draft EIS, it is important that these focus on maintaining natural packs in Washington State. Management practices chosen for the different alternatives should not disrupt or change basic wolf and wolf pack behavior which was shaped by thousands of years of natural processes. Research shows that indiscriminate lethal removal of wolves by humans, from either predator control practices or recreational hunting, may result in significant changes in wolf and pack behavior. The research suggests that for wolves and wolf packs to retain their natural behaviors, they need large areas of habitat where predator and prey species are shaped by natural processes rather than humans. These areas need to be connected by safe corridors for dispersal. Wolf management practices in Idaho, Oregon and British Columbia must also be considered by managers in Washington State since these may become either population sinks or sources of new wolves for our state. When looking at translocation of wolves, the EIS must ask whether this is a good way to address the failure of wolves to disperse adequately to the

west and south, throughout the Cascade Mountains. Might it be wiser to look at why this dispersal has been slow and address the possible problems?

Sampling of Research in Section 1

1A. Reproduction

#1A. Daniel Stahler, Daniel MacNulty, Robert Wayne, Bridgett vonHoldt, and Douglas Smith, "***The adaptive value of morphological, behavioral and life-history traits in reproductive female wolves***." Journal of Animal Ecology, October 2012. (1)

#1B. Daniel R,. Stahler, Douglas W. Smith, and Daniel R. MacNulty, ***"Motherhood of the Wolf".*** Yellowstone Science: Celebrating 20 Years of wolves, pages 13-16.

#2. David E Ausband, Michael S Mitchell, Sarah B. Bassing, Andrea Morehouse, Douglas W. Smith, Daniel Stahler and Jennifer Struthers, ***"Individual, Group, and Environmental Influences on Helping Behavior in a Social Carnivore.*** Ethology. .

#3. Joel S. Ruprecht, David E. Ausband, Michael S. Mitchell, Edward O. Garton, and Peter Zager, ***"Homesite attendance based on sex, breeding status, and number of helpers in gray wolf packs".*** Journal of Mammology, 20112.

#4. Scott M. Brainerd, Henrik Andren, Edward E. Bangs and Liz Bradley, ***"The Effects of Breeder Loss on Wolves".*** Journal Animal Ecology, 2007.

#5. Bridget L. Borg, Scott M. Brainerd, Thomas J. Meier and Laura R Prugh, ***"Impacts of Breeder Loss on social structure and reproduction, and population growth in a social canid".*** Journal Animal Ecology, 2015.

#6. Cyril Milleret, Petter Wabakken, Olop Liberg, Mikael Akesson, Oystein Flagstad, Harry Peter Andreassen, Hakan Sand, "***Let's Stay Together? Intrinsic and extrinsic factors involved in pair bond dissolution in a recolonizing wolf population"***. Journal of Animal Ecology, August 25, 2016.

1B. Hunting

#7. Douglas W. Smith, L. David Mech, Mary Meagher, Wendy E. Clark, Rosemary Jaffe, Michael K. Phillips and John A. Mack, ***"Wolf-Bison Interactions in Yellowstone National Park".*** Journal of Mammalogy, 2000.

#8. Daniel R. MacNulty, Daniel R. Stahler and Douglas W. Smith, "***Understanding the Limits to Wolf Hunting Ability",*** Yellowstone Science: Celebrating 20 Years of Wolves, pages 34-36.

#9. Daniel MacNulty, Douglas Smith, L. David Mech, John Vucetich, and Craig Packer, ***"Non-linear effects of group size on the success of wolves hunting elk"***. (2011) Behavioral Ecology September, 2011.

#10. Daniel R MacNulty et al, ***Influence of Group Size on the Success of Wolves Hunting Bison***". 2014

#11. Daniel MacNulty, Douglas Smith, L. David Mech and Lynn Eberly, ***"Body size and predatory performance in wolves: is bigger better?"***. Journal of Animal Ecology, 2009.

#12. Daniel MacNulty, Douglas Smith, John Vucetich, L David Mech, Daniel Stahler, and Craig Packer, ***"Predatory Senescence in aging wolves"***. Ecology Letters, 2009.

1C. Defending Territories / Resources

#13. Erin Stahler, Douglas W. Smith and Daniel R Stahler, ***Wolf Turf: A Glimpse of 20 FYears of Wolf Spatial Ecology in Yellowstone".*** Yellowstone Science, pages 50-54.

#14A. Kira A Cassidy, Daniel R. MacNulty, Daniel R Stahler, Douglas W. Smith, L. David Mech. ***"Group Composition effects on aggressive interpack interactions of gray wolves in Yellowstone National Park".*** Sept-Oct. 2015, Behavioral Ecology.

#14B. Kira A. Cassidy, Douglas W. Smith, L. David Mech, Daniel R. MacNulty, Daniel R. Stahler and Mathew C. Metz, ***"Territorialilty and Inter-Pack Agression in Gray Wolves: Shaping a Social Carnivore's Life History".*** National Park Service, 2016.

#14C. Kira A. Cassidy, L. David Mech, Daniel R. MacNulty, Daniel R. Stahler, and Douglas W. Smith, ***Sexually dimorphic aggression indicates male gray wolves specialize in pack defense against conspecific groups".*** *2017*

#15A. Sarah Cubaynes, Daniel MacNulty, Daniel Stahler, Kira Quimby, Douglas Smith, and Tim Coulson, "***Density-dependent intraspecific aggression regulates survival in northern Yellowstone wolves".*** Journal of Animal Ecology, April 21, 2014.

#15B. C.A. Cariappa, J. K. Oakleaf, W.B. Ballard, B. Warren S.W. Breck and W. STeward, ***"A Reappraisal of the Evidence for Regulation of Wolf Populations".*** 2011.

1D. Dispersal and Translocation

#16. Michael D. Jimenez, Edward E. Bangs, Diane K boyd, Douglas W. Smith, Scott A Becker, David E Ausband, Susannah P Woodruff, Elizabeth H Bradley, Jim Holyan and Kent Laudon. ***"Wolf dispersal in the Rocky Mountains, Western United States: 1993-2008".*** Journal of Wildlife Management, March 2017.

#17. Diane K. Boyd and Daniel H. Pletscher, ***Characteristics of Dispersal in a Colonizing Wolf Population in the Central Rocky Mountains".*** *Journal of Wildlife Management, 1999.*

#18. Eric M. Gese and L. David Mech, ***"Dispersal of Wolves in northeastern Minnesota.*** Canadian Journal of Zoology, 1991.

#19. L. David Mech and Luigi Boitani, *"**Wolf Social Ecology**". University of Nebraska, 2003.*

#20. Catherine L Cullingham, Conrad D. Thiessen, Andrew E Derocher, Paul C. Paquet, Joshua M. Miller, Jill A. Hamilton, David W. Coltman, ***"Population structure and dispersal of wolves in the Canadian Rocky Mountains".*** Journal of Mammalogy, June 2016.

#21. Ana Sanz-Perez et al. , ***"No place like home? A test of the natal habitat-biased dispersal hypothesis in Scandinavian wolves.*** December 2018.

#22. Ilpo Kojola, Jouni Aspi, Antero Hakala, Samuli Heikkinen, Catrin Ilmoni and Seppo Ronkainen, ***"Dispersal in an Expanding Wolf Population in Finland".*** Journal of Mammalogy, 2006.

#23. Daniel R. Stahler, Bridgett M. vonHoldt, Rena M. Schweizer and Robert K. Wayne, "***Yellowstone Wolves at the Frontiers of Genetic Research".*** Yellowstone Science: Celebrating 20 Years of Wolves. Pages 18-24

Comments submitted for scoping
for the EIS on Wolf Post-Recovery Management

Submitted by:

Martha Hall
2617 16th Street
Anacortes, WA 98221
pondfrog.mh@gmail.com

Date submitted:
Monday, October 28, 2019

Section 2

This is the second of four sections that are being submitted.

Section 2:

Lethal Removal of wolves by Humans:
Predator Control, Hunting and Trapping

This section is focused on the most controversial and complicated topics that will be in WDFW's EIS on future management of wolves: the lethal removal (killing) of wolves by humans, from both predator control programs or recreational hunting and/or trapping.

EIS Issues relevant to human lethal removal of wolves

When addressing human lethal removal, will the EIS consider the following two basic concepts found in numerous studies of wolf and their role in healthy ecosystems?

Most predator is "indiscriminate killing" of wolves,
meaning wolves are killed without regard for who the wolf was,
or the role the wolf played in its wolf pack or in the ecosystem where it lived,
and
often without regard for whether the wolf was even responsible for the livestock depredation.

Most hunting is also "indiscriminate killing" of wolves,
meaning wolves are killed without regard for who the wolf was,
or the role the wolf played in its wolf pack or in the ecosystem where it lived,
and
it is done for recreation, for fun, and/or to obtain a trophy.

1. Human lethal removal can impact and even change basic wolf behavior and negatively impact the overall fitness of wolves and their ability to adapt to changes.

Many studies have shown that wolves and wolf packs subjected to heavy lethal removal by humans behave very differently than wolves and wolf packs that are not harvested / killed by humans and instead are left alone to respond to natural processes, Studies suggest that human lethal removal may lower overall fitness of wolf populations, wolf packs and individual wolves and may limit their ability to adapt and survive. (Covered in Sections 1 as well as in this section)

Many studies show the importance of both wolf packs and of individual wolves in these packs on the ability of wolves to survive and adapt - when reproducing and hunting and defending territories, and dispersal is affected. Human lethal removal affects wolves and wolf behavior at all levels. Most hunting and predator control is "indiscriminate". Indiscriminate killing implies that all wolves are the same and that the impacts on wolf packs do not matter. The best science does not support this. (Covered in Sections 1 and 2)

2. Human lethal removal can impact the important role wolves play in ecosystems, which in turn impacts the functioning of ecosystems and all of the other species in ecosystems.

Many studies show that wolves play an important role in healthy ecosystems. These studies

that loss of wolves may be felt throughout the ecosystem. They also show that human killing of wolves and their prey is not the same as the natural process that shape wildlife populations when human killing does not occur. This is true for both predator and prey species, as well as many other species including other predators, scavengers, etc. Human hunters do not choose the same individuals to kill as do the natural processes - when humans hunt wolves or their prey. Traditionally, WDFW has managed "game animals" using the old model taken from raising livestock, maintain a viable population and allow as much human harvest as much as possible to provide revenue and recreational opportunities for hunters. Times have changed and so have the residents of WA State. Most no longer hunt (2.42% purchased hunting licenses in 2018) while far more are interested in wildlife watching and other forms of outdoor recreation. Most are also interested in wildlife management that uses the best science and an ecosystem approach.

A third major factor in wildlife management

A third factor the EIS must consider is the change in human interests and values, especially in residents of WA State. These changes should be reflected in both the goals and alternatives and their impacts should be analyzed and disclosed.
(This factor is the subject of Section 4 of these comments.)

Shouldn't the EIS use these main concepts when thinking about wolf management?

If these concepts are applied to wolf management, won't wolves be managed very differently than many other species, such as species that are not social predators such as elk or deer?

Why does Section 2 include so many studies and statistics?

Section 2, like Section 1, uses a sampling of studies to raise issues relevant to the EIS because the EIS should be science-based in its choice of goals and alternatives and in its analysis of impacts. Section 2 also contains various statistics and this too is because the EIS should also consider these.

Contents of Section 2

2A

Human Lethal Removal of Wolves

A look at the issues related to Most Kinds of Human Lethal Removal of Wolves

A discussion of issues and studies relevant to most kinds of lethal removal of wolves by humans; predator control, hunting and trapping, and poaching.

The fact that these usually result in "indiscriminant killing" of wolves, also raises additional issues. Most of WDFW's lethal removal seems to be very "indiscriminate" as is most hunting, especially when considering the impacts.

#24. Research. Should the concept of "*evolutionary recovery and management*" of wolf populations be considered when choosing goals and alternatives in the EIS? Is this concept relevant when considering lethal removal of wolves by humans?

This and other studies show that wolf management, especially when hunting and predator control are allowed, can change the fundamental behavior of wolves to form large packs consisting of an extended family. This social structure developed after thousands of years of responses to natural processes. Should management practices alter this most basic behavior of a social carnivore?

This study showed what many other studies have shown; when wolf populations are subjected to human lethal removal, wolf packs change in their size and composition. This is easily seen when simply comparing pack sizes, however the changes are far reaching because the membership composition of packs also changes.

#24. Linda Y. Rutledge, Brent R. Patterson, Kenneth J. Mills, Karen M. Loveless, Dennis L. Murray, and Bradley N. White, ***Protection from harvesting restores the natural social structure of eastern wolf packs".*** Biological Conservation, 2009.

The implications for many wolf management issues in the EIS are far-reaching.

This study looked at the impacts on the social dynamics of lethal removal near the borders of Algonquin Provincial Park. Algonquin PP is one of the largest protected areas for eastern gray wolves with 7571 km sq km and 200-300 resident wolves. Wolf mortality was high from hunting and trapping outside the park where hybridization had occurred with coyotes. Hunting and trapping were banned when concerns were voiced about their impact on the long-term viability of wolves inside the park. The study combined ecological and genetic data before and after the ban to look for changes.

Findings: The study showed that reducing human lethal removal can restore the natural social structure of packs despite the absence of a marked changed in density When a harvest ban was implemented near the boundaries of Algonquin PP, the human-caused mortality decreased and was

off-set by natural mortality which kept wolf density at about the same level, However, there was a major change in the pack composition. Packs with unrelated adopted animals decreased from 80% to 6%. Incestuous matings remained rare. Even in a relatively large park, packs inside the park were impacted by lethal removal by humans outside the park.

Discussion: Implications for management of wolves are numerous as discussed by the authors of this study: Too often management just looks at numbers and the fact that wolf populations have a high propensity for compensatory demographic responses when human lethal removal is high. Shouldn't management also consider the changes to wolf populatoin social structure and self-regulation? Shouldn't management goals include not only maintaining a "viable population" but also a "naturally-functioning population" - "populations where fitness is likely to be optimized when evolutionary adaptation is driven by natural rather than artificial (human harvest) selection pressures?

An obvious finding was that impacts were felt well outside the area of human lethal removal. But just as important or maybe more important was the fact that pack composition and wolf behavior were changed by lethal removal by humans and that wolves "self-regulated" their population density when not killed by humans. Changing social behavior is a far more fundamental impact than just changes in wolf numbers because wolves have evolved as social carnivores. This raises issues regarding "overall fitness", ability to adapt, prey choice, and maybe even how likely wolves are to attack livestock.

#25. Article. New goals for wolf recovery and management are becoming increasingly popular; goals based on "*social recovery and management*" and "ecologically- relevant recovery and management". This represents a major departure from historic game management that was based on viable populations and harvest numbers. Management for these goals requires maintaining the social dynamics of natural wolf packs and restoring wolves to their niche as apex predators in a naturally- functioning ecosystem.

#25. Justin H. Bohling, ***"All in the Family".*** International Wolf, Fall 2016.

Bohling summarizes some of the key concepts related to the importance of packs, referring to various studies. Like Douglas Smith has said about packs in Yellowstone NP, a North Carolina study of red wolves showed that when not hunted, packs became extended families with pups, yearlings, older wolves and the breeding pair. This enhanced survival. Offspring that hung around longer were more likely to survive and reproduce. Pups and breeding females are often the glue that keeps the pack together. Wolf populations that are hunted, trapped or killed through predator control efforts are less stable and smaller. Ended families are missing as are helpers and the culture and wisdom provided by older wolves. The territories of these packs are more likely to be taken over by neighboring packs and pup survival is lower. Packs increasingly become made up of members who are less related.

Management that is focused on maintaining total population often use studies that show the ability of wolf populations to rebound after harvest rates of 20% and 30%. While the populations may remain stable, individual packs are not and this changes the composition of the whole population. New dispersers do come in to replace wolves that are harvested, but the social dynamics are altered, which affects how wolves behavior and move across the landscape. Studies have shown that unstable packs are more likely to attack livestock. The same result has been seen in mountain lions when older males are killed by trophy hunters.

Adding social dynamics to the mix of factors to consider when managing wolves should change how wolves are managed. Bohling refers to this as "***social recovery* and management"**. Management successfully facilitates the natural development of wolf packs and these ebb and flow according to natural processes, not human interference. Individuals become important in this kind of management, as do stable packs. Each individual may have a different effect on pack behavior and success.

Conservationists are increasingly interested in "**ecosystem management**" and Bohling discusses "***ecologically- relevant recovery and management"***. This is defined not by the number of individuals but instead is a matter of whether the species has returned to play its role in ecosystems and its impact is part of the natural processes of natural ecosystems.

#26. Should wolves be managed for "*naturalness*" , as advocated by Dr. Douglas Smith, a lead scientist in Yellowstone NP? why?

This means less human hunting and predator control because these may bring unintended results, including destabilizing packs, reducing the size and relatedness and social complexity of packs, and losses in pack's knowledge and skills and overall fitness.

#26. Dr. Douglas Smith's Oral presentation to the Pacific Wolf Coalition, 2014.

Studies of "natural wolf packs" shaped by natural forces in Denali and Yellowstone National Park have shown that these packs are very different from the wolf packs studied in areas where human harvest occurs.

Summary: In this presentation, Dr. Smith suggested managing for "naturalness" in wolf populations. "Naturalness" means allowing natural processes to shape wolf behavior and wolf populations, not hunting and predator control. Dr. Smith said is important for a number of reasons.
Human hunting and predator control may destabilize packs which can have unintended results such as an increase in attacks on livestock. Human lethal removal sometimes results in "breeder loss" which may impact the behavior of the pack and its members and it may even mean the end of the pack. In Yellowstone, Dr. Smith has seen that wolves tend to form large, complex packs consisting of several generations of related wolves. Each individual wolf often plays an important but sometimes different role in the pack. Some are babysitters for pups, others are better hunters and some are needed when territorial disputes break out between packs.
Killing of wolf pups can cause stress in the pack, and packs whose pups are killed are more likely to disperse than to stay together. Killing wolves may reduce packs to sizes that cannot efficiently hunt game species which may cause them to resort to easy prey such as sheep, especially when there are pups to feed.

Application to WA State: WDFW has routinely used Indiscriminate lethal removal.
Where is the science to support this? What has WDFW learned from its wolf killing in the Kettle Range? WDFW has killed every pack that has tried to live on the Diamond M Ranch's allotments. First, WDFW indiscriminately kills a few members of the pack. Has that worked? Then WDFW ends up killing the whole pack. Has that ever worked - for the long-term? Doesn't the same problem reoccur in the next year or two? Meanwhile, during the current state we are in, " wolf recovery", the near perfect wolf habitat in the Kettle Range has consistently

been "a population sink", a place where dispersing wolves from other areas come to settle and are killed. During "wolf recovery" this is not usually the way wolves are managed.

Occasionally someone in WDFW comes up with the idea that killing pups is the answer. What science is this based on?? Or is this just an attempt to resolve a very complex issue by using a very simplistic solution, by reducing the number of pups to feed, adults won't kill cattle?

#27. Research. Will large carnivores like wolves fully perform their role in ecosystems as apex predators if they must always "look over their shoulders" for humans who may be trying to kill them?

The authors ask if the "fear factor" which is often discussed for prey species living with predators also applies to wolves when they are lethally removed by humans.

#27. Andres Ordiz, Richard Bischof and Jon E. Swenson,
Saving large carnivores, but losing the apex predator?". *Biological Conservation,* 2013.

Even if lethal removal is numerically "sustainable" based on populations models for viability, this undermines the commonly expressed rational for their conservation, namely for the restoration and preservation of ecosystem functionality. Human lethal removal changes wolf behavior as wolves and packs adjust to "anthropomorphic risks" This requires an ecosystem management approach to wolf management, and management of prey species.

Wolves would need to be monitored at the eco-system level in protected areas, and if human lethal removal is allowed, in areas where this occurs, to determine impacts of lethal removal on both. This monitoring would go beyond just establishing if "sink populations" were being created in one or both areas. It would also need to look for impacts on how the ecosystems are functioning.

#28. Research on Positive and Negative Attitudes towards Wolves. When wolves are killed by the government for predator control or by recreational hunters, does this improve public attitudes towards wolves?

Sometimes one of the goals given for both government sponsored predator control and for recreational hunting is that these will improve acceptance of wolves and reduce illegal poaching.

#28. Adrian Treves, Lisa Naughton-Treves and Victoria Shelley,
"Longitudinal Analysis of Attitudes Towards Wolves". *Conservation Biology,* 2011.

Surveys were used to look for changes in attitudes towards wolves of hunters living nearest wolves over the time when there were policy shifts in wolf management. When wolves were delisted, the state allowed recreational hunting of wolves. More urban residents were not surveyed since the goal was to collect data on hunters who may kill wolves illegally or oppose protecting wolves. Survey returns were biased towards Euro-American hunters and male hunters. During this time period, there was a significant amount of media attention centered on wolf issues.

Findings: The study showed that over time residents living in the range of Wisconsin's gray wolf became less tolerant of wolves. Their fear of wolves increased, they felt more like wolves were

competing with them for deer, they showed more inclination to poach wolves and they were more supportive of predator control efforts to kill wolves who preyed on livestock and their support of regulated public hunting and trapping increased.

Results showed 37% of the respondents reported an increase in likelihood they would shoot a wolf if they saw it, while 44% reported increased agreement with the state that Wisconsin's wolf population threatened deer hunting opportunities and 46%-47% showed increased agreement to hunting wolves.

Their strongest inclination to poach was based on the feeling that wolves competed with them for deer, not fear or loss of livestock or pets to wolf attacks. Respondents believe that wolves threatened deer hunting did not necessarily stem from personal experience but could have reflected experiences of friends or family. There was little link between these increases and direct negative experiences with wolves. Individual tolerance of wolves showed a decline over time. While fear of seeing a wolf increased, there was no documented case of a wolf attacking anyone in Wisconsin. The topic triggered a disproportionate hunter interest resulting in a potential for biased results. The survey area also had a higher % of hunters than areas outside the survey. Authors predict an increase in illegal poaching as recreational hunting continues in Wisconsin.

#29. Research:

#29. Jamie Hogberg, Adrian Treves, Bret Shaw and Lisa Naughton-Treves,
"Changes in attitudes towards wolves before and after an inaugural public hunting and trapping season: early evidence from Wisconsin's wolf range." *2015.*

This study in 2013 was similar to the previous one. It re-sampled attitudes of respondents who were asked about their attitudes towards wolves in 2009 to look for changes in 2013. Between this period of time, recreational hunting and trapping of wolves was allowed.

Findings: It appeared that legalizing the killing of wolves devalued the wolf in the eye of the public in Wisconsin. Results indicated a negative trend in attitudes toward wolves among male respondents and hunters living in wolf range, both before and after the state's first legal hunt, suggesting hunting was not associated with an increase in tolerance for wolves. Tolerance levels for females respondents was stable throughout the study period. Holding wolf the hunt was supported by 66% of the respondents. Some found it interesting that this wasn't higher for a group of rural hunters.

30. Research: Do people in different regions of Michigan have different attitudes toward wolf management?

#30. Michelle L. Lute, Adam Bump, and Meredith L. Gore,
"Identity-Driven Differences in Stakeholder Concerns about Hunting Wolves".

The study's objective was to assess concerns about hunting as a tool to resolve conflict in Michigan, using "social identity theory" (SIT) as a framework. Survey questions focused on 12 concerns previously identified as associated with hunting as a management tool to resolve conflict.
All were said to "care greatly about wolves".

Findings: Respondents were divided over hunting wolves. Their highest ranked concerns were these: 1. wolf conflicts, 2. use of science in policy decisions, and 3.maintaining a wolf population. Concerns crystallized over justifications for hunting. General linear models revealed a lack of geographic influence on care, fear, and support of hunting wolves. These findings challenge assumptions about regional differences and suggest a strong role of social identity in driving differences in public conceptions of wildlife management.

#31. Research: Scientists and policy-makers usually agree that promoting human tolerance of large predators like wolves is critical to their survival, but what makes people more willing to live with large carnivores?

More research is needed to understand why people feel as they do about large carnivores and what can be done to increase public tolerance and support for these species.

This study looked at efforts to improve tolerance for large predators in Sweden, Kenya and Brazil to find out how successful they were in changing attitudes.

#31. Adrian Treves and Jeremy T. Bruskotter,
"Tolerance for Predatory Wildlife". *Science. 2014.*

Findings:

The government of Sweden tried economic incentives, paying villages that depend on reindeer to protect wolverines, brown bears, and lynxes. Villages were paid for each successful predator reproduction in communal grazing areas. Payment was accepted for these species but not wolves. Villages believe wolves will scare and scatter their reindeer widely.

In another area, the Swedish Government offered subsidies for predator-proof electric fencing and its installation paid for people living in wolf territories. Those who received subsidies tolerated wolves better than those who had not, regardless of the number of verified wolf attacks on sheep or dogs. Researchers could not rule out that this was because more tolerant farmers are more likely to accept government subsidies or that it was because less intolerant farmers chose to illegally kill wolves rather than receive these subsidies. During this time it was estimated that 51% of Sweden's wolves died of poaching and 69% of this poaching was hidden. So the incentives could not be called a huge success.

In an area of Kenya that has livestock herders who live with lions, herders were paid for their livestock losses. This decreased the number of lions killed by the herders. Lion killing decreased even further when trusted community members were paid to protect livestock, warn villagers of lions and monitor lion movements.

Peer influence was seen in attempts to protect jaguars in areas of cattle grazing. Jaguars were perceived to be a threat to livestock and humans. Ranchers on larger holders were more likely to kill jaguars and their attitudes were best explained by social norms. Ranchers who thought that others kill jaguars or expected such poaching were more intent to kill jaguars themselves. Where poaching is common and accepted, it is more likely to occur.

#32. Research: In rural Wisconsin, does compensating people for their losses to wolves usually increase their tolerance level for living with wolves? Which group/groups had the lowest level of tolerance towards wolves?

This study looked at whether people who had lost domestic animals to wolves or other predators were less tolerant of wolves than neighboring residents who had not and whether compensation payments improved attitudes of tolerance for wolves. Tolerance was measured by respondents' preferred wolf pop0ulation size for their state, Wisconsin and the likelihood that they would shoot a wolf. Most responders were small landowners living in small rural communities and were hunters. (73% had hunted in the past 2 years.) Most, 85%, reported having either seen or heard a wolf and 20% said they had a comestic animal injured or killed by a wolf.) Those with more land, more cattle and more education were more likely to have registered an official complaint when experiencing a loss to wolves.

#32. Lisa Naughton-Treves, Rebecca Grossberg and Adrian Treves,
"Paying for Tolerance: Rural Citizens Attitudes toward Wolf Depredation and Compensation." *Conservation Biology,* 2003.

Findings: The strongest predictor of tolerance was social group. Bear hunters were most concerned about losing valuable hounds to wolves and were more likely to approve lethal control and reducing wolf populations than were livestock producers. Livestock producers approved of lethal removal and smaller wolf populations less than bear hunters but more than the general public.

To a lesser degree, education level, experience of loss, and gender were also important.

Livestock producers and bear hunters who had been compensated for their losses to wolves were not more tolerant than their counterparts who alleged a loss but received no compensation. Yet all respondents approved of compensation payments as a management strategy.

Results showed that a deep-rooted social identity and occupation were more powerful predictors of tolerance of wolves than individual encounters with wolves.

#. 33. Research. In 1996, Gordon Haber challenged wildlife managers to think differently when managing wolves, that impacts of lethal removal are much more complicated than just counting the number of wolves that are killed. Some of this complexity is the result of the fact that wolves depend on packs for survival and packs depend on the contributions of each individual wolf, as discussed in Section 1.

#33. Gordon Haber, *Biological, Conservation, and Ethical Implications of Exploiting and Controlling Wolves".* August 1996.

Most important are the issues Haber brought up about lethal removal:

Haber challenged claims that wolf populations can withstand lethal removal rates of 25 % to 50 % each year and can recover within a few years when removal is reduced. He suggested that impacts of removal linger and continue to effect the size, number, stability and persistence of the wolf family, the pack. These, in turn, have a negative effect that continues to reduce reproduction, hunting ability and defense of territories.

Haber said the role of learning and traditions are negatively impacted within and between packs, and that genetic variation and overall mortality rates are effected. He noted that wolf harvests are sometimes 4 to 8 times that
of ungulate harvests. Too often, he said, this was based on the perceived ability of wolves to reproduce quickly without considering differences in wolves in their social organization and related behavior. True sustained-yield management, Haber maintained, must emphasize "qualitative biological features" and the evolutionary histories of wolves as predators. Haber argued that management tools and models used for wolves are too often based on those used on ungulates, modes that came from the livestock industry. He also suggested that wildlife managers should consider the "high sentience of wolves" which means wolf management should address both biological and ethical concerns.

34. Research. Is human removal additive? Are there indirect impacts as well as the direct impact of killing wolves?

Impacts of "harvesting" were studied in three populations of wolves; Yellowstone where there was very little loss due to harvesting, Idaho that had a significant loss to hunting, and Alberta, Canada where loss was the highest due to both hunting and predator control. Only packs that were reproducing were in the study which probably resulted in an underestimate of effect of hunting since packs that did not reproduce at all after hunting were not included. Non-invasive monitoring approach that was used. Wolf scat at key locations were collected and analyzed using genetic testing.

#34. David Ausband, Michael Mitchell, Carisa Stansbury, Jennifer Stenglein and Lisette Waits, ***"Harvest and group effects on pup survival in a cooperative breeder***". The Royal Society, 2017.

Findings:

Impact on pup-survival: The number of pups surviving to 15 months in Idaho declined from 3.69 before wolves were delisted and hunted to 1.65 after hunting started. During the years of the study 2008 to 2014, hunting was associated with a greater than 6 times decrease in the probability of pups surviving to 15 months of age. The probability of pup survival doubled with each additional breeder that survived in the pups' pack. Adult non-breeding males older than 2 years decreased
the probability of pup survival. During years of hunting, the average effect of one additional adult when pups were 3 months old increased the probability of survival by 1.14 times. Turnover of breeding males resulted in a more than 3 times decrease in pup survival during years of hunting. Again during hunting, additional males greater or equal to 2 years when pups reached 15 months was associated with nearly a 3 times decrease while the increase of each breeder that was present at 15 months was associated with nearly a 4 times increase. Pups in groups with two breeders and only two adult male helpers had a 0.12 probability of surviving to 15 months while pups in groups with two breeders and only two adult female helpers had a 0.33 probability of surviving as long.

Impact on pack members who were helpers. Of helpers who stayed with their natal packs for at least 3 years, 29% were males and 71 % were females. Some of the possible reasons for these results are that adult males more often disperse and disperse at a younger age than adult females and adult non-breeding females are more likely to fill the vacancy left by the death of the breeding female. Non-breeding males also may not care for pups as well as non-breeding female "helpers" during the pup-rearing stage because males are less likely to inherit a breeding position in their natal group as females commonly do. Female helpers obtained a breeding position in the pack in 10 cases, while male helpers bred in their pack only 4 times. Hunting left some groups too small to reproduce or they had completely disbanded after members were killed.

Was the impact additive? When hunting started in Idaho after delisting, the impact appeared to be at least partly "additive", not compensated for by immigration or increases in other vital rates. Both pup survival and pack sizes declined significantly. In Alberta, pup survival rates were much lower than Idaho and turnover within packs was high. Only 22% of the 41 wolves in the sample were available the following year and only 1 over three years. Most of the others probably dispersed or were killed since detection was high. The wolf population in Alberta appears to depend on immigration in order to persist. These results could be significant for population modeling. Responses to hunting were additive. Indirect impacts of hunting were reduced group size, breeder turnover and group composition. These are likely to reduce future survival of pups.

#. 35. Researh. Predicting impacts of lethal removal by humans involves not only looking at direct impacts, but also considering longer term indirect impacts and the relationship between mortalities caused by humans and natural mortality.

#35. Scott Creek and Jay Rotella, *"Meta-Anaysis of Relationships between Human Offtake, Total Mortality and Population Dynamics of Gray Wolves*." PLoS One 2010.

This study looked at mortality due to hunting to see if it was compensated by density-dependent reductions in non-harvest mortality factors. Is lethal removal of wolves from hunting compensatory or additive mortality. It has been argued that in wolves, hunting is largely compensatory until a large part of the population is killed because "natural mortality" decreases when hunting occurs. Some have said that "harvests" of 30% to 50 % are sustainable.

Background information. Post-recovery management in Montana and Idaho.
While wolves were federally protected by ESA, human-caused mortality exceeded 20% in some years through predator control allowed before wolves were delisted. Idaho and Montana took over the management of their wolves in 2009 after wolves were federal delisted in these states. Management is focused on providing hunting opportunity and reducing wolf populations to sizes that would avoid reclassification as endangered. In 2009, quotas of 20% of the population were set for the annual "harvest", meaning for lethal removal by hunting and/or predator control. That year, as wolves quickly changed from protected to heavily hunted, together, these two states killed 37.1% of their estimated wolf population. Meanwhile, in 2008 and 2009, Northern Rocky Mt (NRM) wolves (wolves in MT, ID, and WY) were responsible for 203 confirmed kills of cattle out of a population of about 5.9 million cattle. In 2008 and 2009 there were 538 confirmed kills of sheep.

Findings: Results showed a strong association between human "offtake" and total mortality rate. Human-caused mortality appeared to be highly "additive", even "super additive". Indirect effects such as effects on pup survival and on pack stability and size, and even on pack survival when a breeder is killed, study results suggested, must be added to the direct effects of the wolves being killed. In small packs, a high percent of the members are breeders, so social disruption is even more greater when even one pack members is killed. In 2008, 160 (69%) of the 173 packs in the NRM had 4 or fewer members. Indirect effects might not be seen right away because remaining members might try to breed the following year or the year after. "Harvest" is only compensatory if the rate of "offtake" is less than or equal to the rate of mortality in the absence of "harvest".

Human offtake does not share a compensatory interaction with natural mortality either because natural mortality did not decline with "harvesting".

If immigration is considered, this is fundamentally different and is only a movement from wolves from one place to another. Immigration does not really add more wolves to the total population of wolves, which may or may not be managed by the same state or country. Dispersing wolves may have a higher rate of mortality due to the added risks involved with dispersing.

Since delisting, states in the Northern Rockies have had plans that allowed 28% to 50%. Both concur that harvests up to 35% are sustainable. This study looked at population models for the NRM and data showed that population growth has declined across all observed levels of human-caused mortality. All three models showed a decline. The three were then averaged. Declines were seen three times in the past decade, in each case with human harvests of 23% to 24 %.
It appears that sustainable harvest levels are below the rate occurring in these states and it is probably lower than most models. The fact that many packs are small suggests that additive mortality is occurring in the NRM.

#36. Research: Wildlife managers must know how mortality rates from human causes affect animal population persistence. What factors raise the risks and how do these affect wolves at the population level?

This study looked at mortality patterns for radio-collared wolves between 1982-2004 from three populations ; northwestern Montana, the Greater Yellowstone area and central Idaho. They asked if the human caused mortality was additive vs. compensatory to natural demographic processes.

#36. Dennis L. Murray, Douglas W. Smith, Edward E. Bangs, Curtis Mack, John K Oakleaf et al., ***"Death from anthropogenic causes is partially compensatory in recovering wolf populations".*** *Biological Conservation,* 2010.

Findings: For expanding wolf popultions, anthropogenic mortality is largely additive to natural mortality but compensatory processes are also significant when high ves. low risk individuals are considered explicitly. Almost 80% of the wolves dying of known fates were killed by humans, predator control, illegal killing legal hunting (in Canada) , and vehicle collisions. The additive effects of human-caused mortality were most pronounced in northwestern Montana where wolf exposure to humans and livestock was high compared to the other two areas. The risks from natural hazareds was lover in northwestern Montana than the other areas, implying some degree of compensatory mortality from anthropogenic risk. Juvenile wolves as well as dispersers were at more risk of human-caused mortality. Results showed a partially-compensatory effects became increasingly additive with population density. Researchers concluded that demographic responses to mortality risk may be complex and more subtle than was previously thought, Findings challenge basic models of cause-specific mortality derived from harvested and recruitment-driven species and they recommended that future assessments of the role of anthropogenic mortality should include individual-based hazard estimation as a complement to traditional population-level approaches.

#37. How do "population sinks" work? How large an area is affected by a population sink?

#37. Thomas Gehring, Brucke Kohn, Joelle Gehring and Eric Anderson, *"Limits to Plasticity in Grey Wolf, Canis lupus, Pack Structure: Conservation Implications for Recovering Populations".* Canadian Field-Naturalist, 2003.

Background information on this study. Radio-collared wolves in the Five Corners Pack (FCP) in Minnesota- Wisconsin were monitored from 1992-1996 to study the effects of highway construction on wolf movements and population dynamics. The FCP lived in an area of low wolf density and high density of ungulate prey.

Findings: The important finding in this study was that the FCP's area operated as "a sink" in a wolf population that was recovering . Areas like this that are "population sinks" lead to slower population growths. As alpha females died, each was replaced by another female that dispersed into the FCP's territory. The FCP also lost a disperser to an adjacent area where predator control measures had eliminated the resident pack. Wolf populations are effected by control measures outside of their immediate areas, which can also turn them into "sinks" even though no control measures are taken in the "sinks". The researchers suggested that rather than reacting to depredations by killing wolves, managers might take a proactive approach and prevent depredations. Another important finding was that the pack instability finally led to the pack dissolving.

The story of the FCP may be the story of many wolf packs that are affected by human lethal removal of their members, legal and illegal. During this study the FCP's story was one of constant changing pack size and membership which destabilized the pack. Alpha females died; two were killed by poachers and one died of natural causes. A neighboring pack was eliminated by predator control efforts which affected the FCP. The FCP finally dissolved.

This pack consisted of one to seven wolves while it was being monitored. Alpha females changed. One dispersed to become alpha in another pack in 1991 and had 6 pups before her carcass was found beside the road in 1995 after being killed with a snare. A yearling dispersed from the FCP after the alpha was killed. In 1992, a second alpha female dispersed to the FCP traveling about 50 km to do so. She may have helped rear the first alpha's pups and then became the new alpha, producing four pups. In July of 1993 she was illegally killed near where the first alpha was later killed. That fall the FCP then had 3 yearling/adult wolves. It grew to seven members by winter of 1994.

In 1993, Wildlife Services killed five wolves in s neighboring pack, ending that pack. In spring of 1994 a male from the FCP dispersed to form a new pack with one other wolf in that pack's territory. In May of 1994 a lactating female in FCP was caught becoming alpha #3. She was from a pack 120 km away. She may have helped rear the pups of alpha #2. She produced at least one pup in 1994. That winter FCP appeared to only have two wolves. Another pack was using part of its territory. while another neighboring pack had grown to 8. In May of 1996, alpha female #3 was killed by by another pack. That summer four wolves in another pack were killed as part of a predator control effort. After the death of alpha #3, the pack disintegrated and adjacent packs occupied its territory. FCP was not seen in 1996-1998 and its territory was used by other packs.

It's important to note that the FCP lived in an area of low wolf density and high density of ungulate prey. In areas like this, other studies have shown successful rearing of pups by lone wolves and by alphas after their mates died. The FCP was unique because it successfully reared pups to ages ranging from 8 to 13 weeks over three consecutive years despite annual losses of the alpha female. Also, alpha females were rapidly replaced each year. However instability caused by two human caused deaths and one natural death led to the ultimate demise of this pack.

#38. Does predator control affect wolf dispersal as well as wolf survival? Is wolf dispersal affected in both the area of the predator control and in adjacent areas where wolves are protected?

#38. Joshua Schmidt, John Burch, Margaret MacCluskie, "***Effects of Control on the Dynamics of an Adjacent Protected Wolf Population in Interior Alaska****".* June 26, 2017. Wildlife Monograph.

This study in Alaska monitored wolf population dynamics for 22 years which included two periods of time when large-scale wolf control programs were implemented adjacent to an area where wolves were fully protected.

Findings: In areas where wolves are hunted, recruitment was needed to maintain wolf populations in these areas. So these areas were dependent on wolf populations in surrounding areas where wolves were protected. Predator control caused negative impacts on survival rates and dispersal of both breeders and yearlings in the protected area. The number of pups per pack in the protected area decreased for the short-term before populations responded to the reduced wolf density by increasing natality rates. The protected area basically became "a population sink". Authors suggested that more information is needed on impacts of lethal removal on areas where lethal removal does not occur. They also suggested a regional management approach was needed for wolf management since impacts are felt across management boundaries, such as across state lines and across national park boundaries.

Note: Similar studies in Algonquin Provincial Park and Yellowstone NP are showing similar impacts. Several well-known alpha females in Yellowstone have been killed when they followed prey outside park boundaries. These studies have many implications for wolf management.

#39. Research. How important are large areas public lands with limited access and limited fragmentation from roads for wolf survival? WA State has fewer such areas than some states where wolves have been delisted.

What kinds of landscape factors raise the risk of mortality for wolves?

#39. Douglas W. Smith, Edward E. Gangs, John K Oakleaf, Curtis Mack, Joseph Fontaine, Diane Boyd, Michael Jimenez, Daniel H. Pletscher, and Carter C. Niemeyer, ***Survival of colonizing wolves in the Northern Rocky Mountains of the United States".*** 2010

This study looked at mortality rates for 711 radio-collared wolves in Idaho, Montana and Wyoming from 1982 to 2004.

Findings: Mortality risk was higher in northwest Montana than expected and this was attributed to less abundant public land to serve as secure wolf habitat than was found in other areas. Areas with larger core areas had a lower risk of mortality, the greater Yellowstone area and central Idaho. Wolves collared for damage management purposes had substantially lower survival than those collared for monitoring purposes because most mortality was due to human factors. Other factors contributing to increased mortality risk were pup and yearling age class and dispersing status. When habitat variables were analyzed, wolves having abundant agricultural and private land as well as livestock in their territory had higher mortality risk. Wolf survival was higher in areas with increased wolf density, implying that secure core habitat, particularly in the Greater Yellowstone Area and central Idaho was important for wolf protection. Human access was directly linked to mortality risk. Risks were greater where habitat was less fragmented by roads.

Also - see Section 1

Much of the research and discussion in Section 1 is also relevant when thinking about human lethal removal.

Summary of Research and Discussions related to most kinds of human lethal removal

(A general discussion of both predator control and recreational hunting and trapping)

If any of the alternatives in the EIS include any kind of human lethal removal of wolves, whether through predator control or recreational hunting or trapping, it will be important to analyze and disclose all of the impacts of these in the draft EIS. Impacts include not only the direct impact of killing one or more wolves, but also the many other impacts. A large body of research shows that human lethal removal may have many and far reaching impacts on the behavior and overall fitness of wolves and their ability to survive and adapt to changes. It may change wolf and pack behavior. Research shows impacts to the composition, size and behavior of wolf packs. Research shows human lethal removal may change or limit a pack's or wolf's ability to reproduce and successfully raise pups, to hunt and to defend territory / resources. It may limit or change prey choice and dispersal. Viability models of wolf populations must consider both the direct and indirect impacts of human lethal removal. If human lethal removal of wolves is considered in any alternatives, the EIS must clearly state the goals for these actions and support this with research that shows lethal removal is likely to accomplish these goals. Will the human lethal removal be "indiscriminate" or selective? Research suggests human lethal removal may impact the ability of wolves to function in the natural processes and predator-prey interactions found in healthy ecosystems, which is an ecosystem-level impact that might be felt beyond the local area. Will the lethal removal create sink populations in either the immediate area or outside of this area and will the effects be local or go beyond the immediate area where lethal removal occurs? Are corridors adequate for dispersal to repopulate the area?

The EIS must also consider the Public trust Doctrine. Wolves and other wildlife are public assets. These assets are reduced when wolves are lethally removed by humans. Is the human lethal removal based on the best science and does it benefit the public's interest? Does the action reflect the values and interests of most residents of WA State? What are the costs compared to the benefits? Who will it benefit, a small special interest group or the majority of the residents of WA State?

A Sampling of Research, Reviews and Articles Related to Human Lethal Removal of Wolves

#24. Linda Y. Rutledge, Brent R. Patterson, Kenneth J. Mills, Karen M. Loveless, Dennis L. Murray, and Bradley N. White, ***Protection from harvesting restores the natural social structure of eastern wolf packs".*** Biological Conservation, 2009.

#25. Justin H. Bohling, ***"All in the Family".*** International Wolf, Fall 2016.

#26. Dr. Douglas Smith's Oral presentation to the Pacific Wolf Coalition, 2014.

#27. Andres Ordiz, Richard Bischof and Jon E. Swenson,
Saving large carnivores, but losing the apex predator?". *Biological Conservation,* 2013.

#**28**. Adrian Treves, Lisa Naughton-Treves and Victoria Shelley,
"Longitudinal Analysis of Attitudes Towards Wolves". *Conservation Biology,* 2011.

#**29.** Jamie Hogberg, Adrian Treves, Bret Shaw and Lisa Naughton-Treves,
"Changes in attitudes towards wolves before and after an inaugural public hunting and trapping season: early evidence from Wisconsin's wolf range." *2015.*

#**30**. Michelle L. Lute, Adam Bump, and Meredith L. Gore,
"Identity-Driven Differences in Stakeholder Concerns about Hunting Wolves".

#**31**. Adrian Treves and Jeremy T. Bruskotter,
"Tolerance for Predatory Wildlife". *Science. 2014.*

#**32**. Lisa Naughton-Treves, Rebecca Grossberg and Adrian Treves,
"Paying for Tolerance: Rural Citizens Attitudes toward Wolf Depredation and Compensation." *Conservation Biology,* 2003.

#**33.** Gordon Haber, *Biological, Conservation, and Ethical Implications of Exploiting and Controlling Wolves".* August 1996.

#**34**. David Ausband, Michael Mitchell, Carisa Stansbury, Jennifer Stenglein and Lisette Waits,
"Harvest and group effects on pup survival in a cooperative breeder". The Royal Society, 2017.

#**35.** Scott Creek and Jay Rotella, *"Meta-Anaysis of Relationships between Human Offtake, Total Mortality and Population Dynamics of Gray Wolves*." PLoS One 2010.

#**36**. Dennis L. Murray, Douglas W. Smith, Edward E. Bangs, Curtis Mack, John K Oakleaf et al.,
"Death from anthropogenic causes is partially compensatory in recovering wolf populations". *Biological Conservation,* 2010.

#**37.** Thomas Gehring, Brucke Kohn, Joelle Gehring and Eric Anderson,
"Limits to Plasticity in Grey Wolf, Canis lupus, Pack Structure: Conservation Implications for Recovering Populations". Canadian Field-Naturalist, 2003.

#**38**. Joshua Schmidt, John Burch, Margaret MacCluskie, "***Effects of Control on the Dynamics of an Adjacent Protected Wolf Population in Interior Alaska****".* June 26, 2017. Wildlife Monograph.

#**39.** Douglas W. Smith, Edward E. Gangs, John K Oakleaf, Curtis Mack, Joseph Fontaine, Diane Boyd, Michael Jimenez, Daniel H. Pletscher, and Carter C. Niemeyer, ***Survival of colonizing wolves in the Northern Rocky Mountains of the United States".*** 2010

2B.

Research, articles and a discussion of just Predator Control: Killing wolves to protect livestock

Key Questions

First: Why do some wolves attack livestock? What does the best science tell us?

Second: How effective is lethal removal of wolves in resolving conflicts with livestock?

Third: How effective are the various kinds of non-lethal deterrents?

Fourth: Does killing wolves increase social tolerance for wolves?

Fifth: How should the impacts of wolves on the livestock industry be addressed?

Again, many studies have addressed these questions so a sampling of this research will be used as part of this discussion.

Again, one main issue is this one: Will the EIS use the best available science and all of the information that is available when deciding whether to include predator control in any of the alternatives in the EIS? Will these be used when analyzing and disclosing the impacts in the EIS? What will the goals be for lethal removal of wolves be in the EIS?

So far WDFW has been using these when killing wolves: it will reduce wolf depredations on livestock, it will change pack behavior, it will increase social tolerance. Does the best science support any of these?

First Key Question: Why do some wolves attack livestock? What does the best science tell us?

WDFW staff have claimed that these are just bad wolves that need to be killed.

Two relevant research papers

#40. Research: Why do wolves eat livestock? Is it a matter of wolf or prey density? Or is it because of prey availability and opportunity? Wolves are referred to as "opportunistic hunters" who look for especially vulnerable prey.

In this study scats were collected from wolves living in the Ligurian Mountains of northern Italy to determine what they ate. This was compared to environmental features, wild ungulate community diversity, husbandry characteristics and the social organization of the wolves (stable packs or dispersing individuals.) In the Liguria region the density of wild ungulates tends to be lower than in other areas and there are fewer species. Use of non-lethal deterrents also is not common. Herds are left to range free, especially flocks of goats, in unguarded pastures and the mountains.

Lost feral goats are also found in the mountains providing easy prey year around.

#40. Camilee Imbert, Romolo Caniglia, Elena Fabbri, Piertro Milanesi, Ettore Randi, et. al., ***"Why do wolves eat livestock? Factors influencing wolf diet in northern Italy".*** *Biological Conservation.* 2015.

Findings: The wolves in Liguria consumed mainly wild ungulates, 64.4%, especially wild boar and roe deer and to a lesser extent, livestock, 26.3%, especially goats. Wolf diet varied according to years and seasons with an overall decrease of livestock and an increase of wild ungulate consumption. Dispersing individuals consumed more livestock than dispersing individuals.
Wolf depredation on livestock was reduced when prevention measures were adopted on pastures, when packs were more stable, when roe deer were more abundant, and when there was a higher percentage of deciduous woods. The strongest correlation was with packs versus dispersing individuals, followed by the number of pastures, the percentage of pastures that used prevention methods, roe deer density, the percentage of deciduous forest, and finally wild ungulate diversity. Fluctuations during the year were probably from changes in the abundance of the main wild prey species, wild boar and roe deer while the number of livestock was constant. Wolves responded to changes in availability of prey by adapting, changing their prey choice. Differences between packs was explained by the variation in the available wild ungulate species and the density of wild prey.

Findings showed more dependence on livestock for food in the Liguria region of Spain than in other areas in southern area. This was attributed to the fact that those areas have rich and abundant wild ungulate guilds and livestock is not as available since more people use more non-lethal deterrents.

Suggestions to reduce wolf attacks on livestock:
Problems exist between humans and wolves in Liguria. Wolves were illegally killed. Between 2007 and 2014, 7 wolves were illegally killed. Suggestions for how to resolve this conflicts included these: promote wild ungulate expansion, use more preventative measures in pastures, support stable packs, avoid lethal control and poaching that de-stabilizes packs.

#41. Research: How do wolves "learn" to kill a new species of prey?

This study looked at how wolves in Yellowstone "learned" to kill bison, a species that most of the wolves translocated to Yellowstone in 1995 and 1996 were not use to hunting. Might other wolves use the same process and learn to kill livestock?

#41. Douglas W. Smith, L. David Mech, Mary Meagher, Wendy E. Clark, Rosemary Jaffe, Michael K. Phillips and John A. Mack, ***"Wolf-Bison Interactions in Yellowstone National Park".*** Journal of Mammalogy, 2000.

Only 2 of the 41 wolves that were translocated to Yellowstone were had been exposed to bison before being moved to Yellowstone in 1995 and 1996. Elk had been their primary prey. Records were kept on all bison kills by wolves from April 1995 through March 1999. During that period of time, elk were far more plentiful than bison and elk are easier for wolves to kill. The study was looking for insight on how and why wolves may begin to kill a new species of prey.

Data in this study came from the first bison kills that were documented in Yellowstone after the translocated wolves were released from their acclimation pens. Data was collected on fourteen bison kills that could be documented as killed by wolves. If wolves were just seen feeding on a bison carcass and the cause of the death could not be documented as wolf-caused, it was not counted.

Findings: Yellowstone wolves first learned to kill bison when they came upon a easy opportunities: vulnerable bison, ones that were calves, or bison that were in poor condition or injured. The first bison was killed by a group of yearling wolves and this happened just 21 days after their release from the holding pens. The bison was a lone emaciated calf. All 14 bison kills were in late winter when bison were vulnerable because they were in poor condition or because they were injured or young. Most were calves or cows. The one bull had a broken leg. Wolves killed more bison in areas where the wolves' usual prey, elk, were either scarce or absent. Six different packs killed bison but 10 of the 14 kills were made by just two packs. These two packs lived where bison spent the winter. in the territories usually occupied by these two packs.

Bison-wolf interactions were also observed. When wolves approached bison, the vison usually stood their ground. Multiple bison usually formed a tight group. When bison stood their ground and faced the wolves rather than running most wolves lost interest. Bison increased from 1997 to 1999 suggesting that with experience wolves became more successful at killing bison.

The conclusion: wolves are adaptable and they are opportunistic hunters. They will kill prey species that is new to them if the opportunity in the form of a vulnerable animal is encountered or if the need arises. For Yellowstone wolves who were use to killing elk, the opportunity came in the form of bison who were very vulnerable and easy to kill. From these successes, wolves learned to kill bison.

Application:
Why are some wolves in WA State killing livestock?
Are they just "bad wolves? as some at WDFW have tried to claim.
What do the findings of this study suggest?

Do opportunities occur for wolves to kill domestic cattle, especially calves on the large, remote grazing allotments in the Kettle Range? Could it begin with an especially vulnerable calf, one that is under 200 lbs and less mature than the others? Or one that has become separated from its mother in a wooded area or an area with steep terrain? Wolves travel long distances and cover a lot of ground. What are the chances of a wolf finding a vulnerable calf on these allotments? Does it matter if All calves weigh 200 lbs when released onto allotments if this deterrent is used or will having MOST calves at 200 lbs work okay? If removal of carcasses is used as a non-lethal deterrent, does this work if carcasses are not removed before wolves feed on them? Does it work if some carcasses are not found at all? When do these carcasses "teach" wolves to prey on livestock? If range riders check on some or most livestock daily or several times a week is this an effective deterrent? Does it work if not all livestock are found and checked as long as most are found and checked?

OR

Do some WA wolves attack livestock because the need arises - wild prey is scarce while domestic cows and calves are plentiful and the pack has growing pups to feed?

Does the need to hunt easier prey, domestic cows and calves, increase if one or more of the members of the pack is killed? What if one or two of the best hunters are killed, maybe by WDFW in an attempt to stop wolf attacks on livestock?

Second Key Question:
How effective is lethal removal?
What does the best science say about this?

#42. Research: If the EIS is really science-based, it will need to consider the issues found in the work of Dr. Adrian Treves. This is a good place to begin. Adrian Treves, *"Predator control should not be a shot in the dark".*

#42. Adrian Treves, Miha Krofel, and Jeannine McManus, ***"Predator control should not be a shot in the dark".*** 2016.

Dr. Adrian Trevers is one of the experts in this field. He and the others authors reviewed the peer-reviewed scientific literature on predator control in North America and Europe to determine if it really showed "functional effectiveness". They asked which study met gold or even silver standards. At best, these studies showed that lethal methods are "risky", with equal numbers of studies showing lethal methods elevated predation risks or increased livestock losses . None of the studies of lethal methods met the gold- standard, and the results of the only one that first met the silver-standard, the Bradley Study in 2015, were later questioned when biases were identified in the 2018 research by Santiago-Avila et al.

Even if the results of the Bradley Study are useful, they did not even show that lethal removal is all that successful unless the whole pack is removed - and that was questioned because this study failed to look at possible impacts of killing wolves outside the territory of the pack that was killed. Another flaw in this study was its failure to factor in variability between different kinds of herds and pastures. The Bradley Study also failed to use an adequate time period after lethal removal to show that it did indeed work - when the next wolves used that territory.

Even with all of these problems, the Bradley Study still only showed only marginal differences between partial pack removal and no removal if wolves were killed within the first 7 days following a depredation and no difference after 14 days. Bradley does not recommend incremental removal.

Authors of the Adriane Treves study concluded that many lethal and non-lethal methods to protect livestock are not based on good evidence that supports their effectiveness in mitigation predation. Too often when the non-lethal methods that are tried do not work predators, that leads directly to killing wolves without anyone asking if the right non-lethal methods were used for the grazing operation, is it likely that they would work in that operation, and were they used correctly and consistently.

The study evaluated evidence for various lethal and non-lethal methods on farms in Europe and North America. Five non-lethal and seven lethal methods were tested. While they found that most of research did not hold up scientifically, they look at the evidence supporting various methods. Some did not eliminate attacks or even made things worse.

The findings in "*Predator Control Should Not Be a Shot in the Dark*" are now largely supported by six more studies: Miller et al. 2016, Eklund et al. 2017, Lennox et al. 2018, Moreira Arce et al. 2018, two by van Eeden et al. 2018.

Isn't the fact that killing wolves to reduce livestock depredation sometimes increases livestock predation - as found in some studies - something to consider in the EIS? Studies suggest that killing partial packs leaves remaining wolves with less ability to survive and hunt wild prey which means they are more likely to attack the easiest and sometimes most abundant prey, domestic livestock? (Fernandez-Gil et al. 2015) (Santiago-Avila et al. 2018)

Don't studies also show that killing wolves de-stabilizes packs which may affect future success in reproduction, hunting and defending territories, and even pack survival? Isn't this especially true when one or both of the breeding pair are killed? (Brainerd et al.2008) (Borg at al. 2015.)
When there are more inexperienced, younger wolves alone or in packs, aren't they more likely to prey on livestock?

Don't studies also show that killing most or all of packs leaves an open territory that new wolves will occupy and unless husbandry practices are changed, livestock depredations will begin to occur again? Isn't this exactly what has happened on the Diamond M Ranch allotments after the Wedge Pack was killed? After the Profanity Peak Pack was killed? After the Sherman Pack was killed? And won't it happen again now that WDFW has killed yet another successfully breeding pack, the OPT Pack? Won't this happen as WDFW slaughters the Togo Pack? Has WDFW really found suitable non-lethal methods given the way grazing is managed on the large remote allotments in the Kettle Range that are heavily wooded and in steep terrain? Is WDFW really correct when it claims every wolf pack is just "bad", that they just have learned to prey on livestock so they need to be killed? Will this same thinking be used in the EIS or will we see an EIS that is based on the best available science?

Questions related to the studies in this section that need to be resolved in the EIS:

1. What are WDFW's goals in its Protocols for killing wolves? Are these supported by the best science? What does the best science say about the effectiveness of lethal removal?
2. Does WDFW still base some of its Protocol on Bradley when this study's results were questioned for several valid reasons? WDFW still uses incremental lethal removal when even the Bradley Study did not show this to be effective?
3. Why doesn't WDFW find out why non-lethals do not work instead of simply saying they didn't work so wolves must be killed? Don't most studies show that focusing on good husbandry is more effective, long term, than trying to solve the problems by killing wolves?
5. What evidence does WDFW have that any and all of the non-lethal deterrents used on allotments like those leased by the Diamond M Ranch allotments were used correctly and consistently? Has WDFW ever shown the public any documentation that shows this?
6. Are there any lethal or non-lethal deterrents that will be effective on allotments like those used by the Diamond M Ranch when livestock is dispersed rather than grouped? Doesn't the best science and most experts say that these will not work in this situation? What hasn't WDFW been honest with the public about this and instead blames and kills the wolves, saying they were just bad wolves?
7. Does WDFW still believe killing wolves will increase social tolerance for wolves when studies show the opposite is true?
8. Does WDFW really believe its method of lethal removal will change pack behavior when the best science says the opposite?

#43. Research: In Australia, after years of predator control to protect cattle from attacks by dingoes, a large ranch stopped all predator control. What happened? (Note: like wolves, dingoes are social predators.)

#43. Arian D Wallach, Daniel Ramp, and Adam J O'Neill,
"Cattle mortality on a predator-friendly station in central Australia". 2017, *Journal of Mammalogy*

This study in Australia looked at the social stability of dingoes. The study measured "social stability" using data collected such as scent marking rates, dingo scats and urine and ground rakings at water sources

Findings: Dingoes attacked fewer cattle after predator control ended. Also, after the ranch was no longer killing dingoes, the social life of dingoes became more stable. The more stable social life seemed to change their "prey choice" from cattle to wild prey. Most predation that occurred after predator control ended happened during the first 6 months. Attacks on cattle then subsided. Dingo abundance, the total population, remained stable. Over time, after predator control, the main causes of cattle deaths were dams drying up and other husbandry-related deaths.

More studies show most predator control is not effective, long term.

Killing wolves may or may not stop depredation, short term. It may even increase the chances of wolf-caused predations in the future. Long-term, even when all of the wolves are killed, as has been done on allotments in the Kettle Crest, more wolves will disperse into the void and depredations will begin again. WDFW has repeatedly killed wolves and wolf packs on the Diamond M Ranch: the Wedge Pack in 2012, the Profanity Peak Pack in 2016, then the Sherman Pack, and now in 2019, the OPT Pack.

Who believes that WDFW has now solved the wolf depredation problems on the Diamond M Ranch allotments?

Studies are showing that non-lethal deterrents can solve some problems if the non-lethal deterrents and the livestock management plan are both appropriate for the grazing area and both are used consistently and diligently. Have these things ever happened on the allotments in the Kettle Crest?

#44. Research:

#44. Bradley J. Bergstrom, et. al., ***License to Kill: Reforming Federal Wildlife Control to Restore Biodiversity and Ecosystem Function".*** *Conservation Letters,* 2014.

This policy review found that the last 100 years of lethal removal of wildlife was ineffective in reducing predation long term while causing harm to ecosystems and their biodiversity. Yet the program continues because livestock producers want it and the public pays the bills.

#44. Research: How effective is predator control?

The data base for this study was 20 years of depredation reports and trapping data with 923 verified depredations at 434 farms that resulted in 1,440 wolves being killed. Pups were released if trapped. The number and sex of wolves that were killed in each depredation incident was included in the data. Data was collected for depredations on cattle, sheep, and turkeys, though most of the depredations were on cattle and most occurred during the summer grazing season when they were not penned. The factors were compared to the number of depredations the following year.

#44. Elizabeth K. Harper, William J. Paul, L. David Mech and Sanford Weisberg, ***"Effectiveness of Lethal, Directed Wolf-Depredation Control in Minnesota",*** 2007.

Findings:
Correlations between the number of wolves killed and next year's depredations showed either more depredations the next year or were non-significant. Findings varied by what farm animal was involved. Most depredations involved cattle so results best reflect what happened with cattle. When outcomes of all four efforts were analyzed, the recurrence rate for "no trapping" was higher than for the other three efforts, however differences were small. Only when an adult male was removed was reoccurrence the lowest. The total number of wolves removed did not appear to affect reoccurrence either.

When localized farm clusters were analyzed, results showed that as more wolves were killed one year, the depredations increased the following year. Killing wolves did not decrease re-depredation rates for farms within 8 km of the original depredation. For cattle and turkeys, killing wolves had no effect on reoccurrence. However, attempting to trap did have some effect. Depredations were linked to farm size, with larger farms having more. When depredations on all species of livestock were pooled, overall rate of recurrence the same year was quite low.

For sheep and turkeys, reoccurrence was higher than for cattle. Most depredations involved cattle. Age and sex of the wolf had no effect on depredation rates except for removing an adult male. For just sheep, results showed "some evidence" that successful trapping led to lower recurrence rates than did no trapping or unsuccessful trapping.

Discussion: The depredation peak for cattle corresponded with availability of newborn calves and a slight decrease in June may be related to the availability of deer fawns. Unsuccessful trapping was not concentrated in any one area. The correlation between wolves killed and depredations the following year could have been because these farms had more wolves OR because the remaining wolves were forced to prey on livestock due to the loss of pack members. The reason no trapping was successful may have been the increase human activity and presence, though this does not explain why in some instances killing an adult male was somewhat effective. In anther study, fladry kept wolves out of cattle pastures for, on average, 61 days before wolves crossed this barrier to kill livestock. (Musiani et al 2003) This too might have been related to human presence. Changes in husbandry practices also may have changed over time affecting the findings. Daily human visits simulating trapping activities might be a useful non-lethal deterrent since it is more cost-effective than trapping and killing wolves, especially in remote areas.

Note: Another similar study found that there were fewer subsequent depredations when trapping was unsuccessful than where it was successful. (Fritts 1982, Fritts et al. 1992.)

#. 45. The 2014 study by Wielgus and Peebles is especially noteworthy because the findings demonstrated how powerful the livestock industry is in WA State; so powerful that Wielgus was later fired and WDFW would only agree to give this researcher 5 minutes of time to discuss his research at an important WAG meeting - and even then, one WAG from the agricultural community refused to attend if Dr. Wielgus was allowed to speak. Dr. Wielgus did not attend the WAG meeting.

The fact that WDFW was not interested in input to WAG from Dr. Wielgus is also especially noteworthy because Dr. Wielgus and his students had spent countless hours studying both wolves and cattle in the Kettle Range, an area where WDFW has killed by far the most wolves, 26. Doesn't it seem like both WDFW and WAG members would be very interested in hearing what Dr. Wielgus had to say? Why did WDFW go along with the livestock industry's attempts to hide what Dr. Wielgus knows? Who benefited from this silencing of Dr. Wielgus? What does this say about WDFW interest in resolving the issues in the Kettle Range?

Now it is 2019 and since that WAG meeting, WDFW has killed two more wolf packs, one that was successfully breeding and had pups, in the same area Dr. Wielgus knows so well and Governor Inslee has asked WDFW to explain why it keeps killing wolves in the Kettle Range.

Also interesting; the findings of this study are not so different from those of other studies.

#45. Robert B. Wielgus and Kaylie A. Peebles, ***"Effects of Wolf Mortality on Livestock Depredations".*** December, 2014.

The scale of this analysis was large. Data was collected on the number of livestock depredated, livestock and wolf populations, number of breeding wolf pairs and the number of wolves killed over 25 years of predator control in Idaho, Montana and Wyoming. Data was analyzed for relationships between the number of livestock depredated in the current year and the number of wolves controlled the previous year.

Findings: The number of livestock depredated the following year was positively associated with the number of wolves killed the previous years - up until 25% wolf mortality. Above 25% wolf mortality, the total number of breeding pairs and wolves as well as livestock depredations all declined. However usually wolf mortality rates of over 25% are considered sustainable over a long period of time. The number of livestock depredations did correlate with the number of breeding pairs of wolves. Lethal control of wolves also appeared to be related to increased depredations in a larger area the following year. Livestock depredations the following year seemed to be affected by several factors; number of wolves removed through control methods, the number of breeding pairs, the minimum wolf population and the number of livestock on the landscape.

The 5% increase in depredation for both cattle and sheep for every wolf that was killed could be the result of increased breeding to compensate for lethal wolf removal. Increased wolf mortality has been shown to be associated with a "compensatory" increase in breeding pairs, compensatory numbers of wolves and an increase in depredations. (G.C. Haber. 1996.) (L. D. Mech. 2010.) (Sand, Wikenros, Wabakken et al. 2006) (Stahler, Smith and Guernsey. 2006.) Murray, Smith, Bangs, Mack, et al. 2010) (Brainerd, Bangs, Bradley, et al. 2008) As explained earlier, overall wolf populations can withstand the impacts of more lethal removal

than can the natural size and composition and social dynamics of wolf packs. This results in indirect, long-term impacts on wolf populations that are important but sometimes ignored.

#46. Research: Other similar studies: The results of more and more studies of the effectiveness of predator control raise questions about how effective it really is, about what methods are most effective, and whether it is cost-effective.

#46. Many studies show that if control takes place during the breeding season and a member of the breeding pair is killed this may lead to pack instability and increased breeding pairs. (L. D. Mech. 2010.) (G.C. Haber. 1996.)

Loss of a breeder in a pack during or near the breeding season can reslult in dissolution of territorial social groups, smaller pack sizes and compensatory density dependent effects such as increased per-capita reproduction. (Brainerd et al. 2008.)
(B. M. VonHoldt, Stahler, Smith, et. al. 2008.) (D. L. Murray, Smith, Bangs, et al. 2010.)

The culling of wolves may also cause frequent breeder turnover and related social disruption which can result in reduced effective prey use through such things as loss of knowledge of prey sources and the ability to kill prey. This can result in increased livestock depredations. (Brainerd, Bangs, Bradley, et. al. 2008) Sand, Wikenros, Wabakken, et al. 2006) Stahler, Smith Guernsey. 2006.)

#47. Miscellaneous research:

#47A. Research used in the 2011 Washington Wolf Management Plan pertaining to grazing livestock near dens and rendezvous sites.

This 2011 Plan used the some of the best available science when it stated that livestock were must vulnerable when they were near or in core wolf habitats, and especially when near dens and rendezvous areas. Wolf packs have a limited ability to travel far when they have young pups that cannot travel with the pack when it is hunting. This restricts the area the pack can use for hunting. Thus, the 2011 Plan's recommendation was that livestock should not be near dens and rendezvous sites.

Does WDFW understand the importance of this, since in several instances it has killed wolves after wolf attacks on livestock that were grazing near dens and rendezvous sites?

Should this same recommendation be in the post-recovery plan?

#47B. The Bradley Study, Elizabeth Bradley, 2015.

This study looked at statistics from Wyoming, Idaho and Montana and found that killing the entire pack was effective in reducing predations in a localized area. Partial pack removal was only somewhat more effective than no action - if performed within the first seven days of predation. After that, it was only slightly better than no action, and it made no difference at all if conducted after 14 days following an attack on wildlife. The impact of increased human presence was not explored. She did not see that killing one wolf was likely to be effective.

#47C. Dr. Douglas Smith - Presentation at the Pacific Wolf Coalition's meeting, 2014.

Killing wolves reduces social cohesion in wolf packs. Killing wolves may reduce pack size enough to limit prey choices and/or make finding enough food more difficult. Killing wolves may cause wolves to disperse. All of these factors can increase the chances that wolves will attack livestock.

Is Livestock Production a Business or a Culture?
When the EIS considers predator control, which will it be?

In WA State, are we talking about some very large livestock businesses?
Will this be considered when addressing the need for predator control?

Will the EIS on wolf management analyze and disclose relevant information about the main driver of predator control of wolves - the livestock industry?

Predators including wolves pose a risk for producers operating where predators live.
Will the EIS look at this risks in a way that frames it as a business risk?
Will the EIS look at this risk as it relates to businesses rather than as a cultural risk?

Is it true that successful businesses usually must do risk assessments to determine how to manage risks? How important are livestock losses caused by predators in relationship to all risks faced by livestock producers such as livestock diseases and injuries, fire, extreme weather events, theft, etc. ?

Is the public responsible for making grazing allotments on our public land safe for livestock?
What would this really require on some of the larger more remote allotments?

Another Key Question:
How Effective are Non-Lethal Deterrent?

When are they effective and how must they be used to be effective?
Will they work regardless of how livestock grazing is managed and how they are implemented?

#48. Research: The large body of research that was compiled by Western Wildlife Outreach on use of non-lethal deterrents - at WDFW's request in 2013.

WDFW asked WWO to prepare a thorough review of peer-reviewed, scientific research papers on use of nonlethal deterrents. WWO reported on 50 papers and made recommendations based on these papers.

Why has WDFW ignored this research when writing its Protocols? Can we expect the same thing in the EIS?

#48. Western Wildlife Outreach, Jane Hutchinson, "*Living with Livestock and Wolves. Wolf-Livestock Non-lethal Conflict Avoidance: A Review of the Literature."* WDFW Website, 2014.

Findings: Many of the studies concluded that non-lethal measures to avoid conflicts only work when: 1. they are properly selected so they are appropriate in the given grazing situation, and,

2. they are properly deployed.

This means that experts need to work with each producer to develop a grazing plan that will work using the available non-lethal tools. Studies have shown that in some grazing situations there is no way to adequately protect livestock, such as where livestock is dispersed across large allotments that have steep terrain and heavily wooded areas and limited sight distance. Range riding cannot be properly deployed in these situations so it should not be considered as an effective deterrent. For range riding to be effective, range riders must be able to see all of the livestock at least daily. Livestock would need to be grouped and actively managed, "herded", as was a common practice when sheep herders with dogs lived with the sheep. One of the best predictors of wolf attacks on livestock is grazing livestock near wolf dens or rendezvous sites.

Instead of using this research, WDFW, in its Protocols and in its management, has reduced the use of non-lethal deterrents to a one-size-fits-all requirement of use of two deterrents using a check- the- boxes- approach that too often leads to lethal removal.
Producers are not required to use grazing plans like grouping and actively herding livestock when implementing non-lethal deterrents and without this, no science says non-lethal deterrents like range riding and fladry and fox lights will be effective.
Does WDFW use any science when writing its Protocols, and if so, what science?
Will we see this same failure to be science-based in the EIS?

#49. Research: Another good source of valuable information on WDFW's use of lethal and non-lethal deterrents is from one of the leading wolf experts in the United States and internationally, Carter Niemeyer.

Carter Niemeyer, a wildlife biologist, had a 33 year career with federal agencies in the management of predators, especially wolves. He worked fo 10 years as a wolf specialist for Wildlife Services and was a member of the USFWS field team that captured the wolves in Canada for wolf re-introduction in Yellowstone NP and central Idaho. He has served as a consultant on wolf behavior and livestock-wolf interactions throughout the world. He's captured 300 wolves in traps and with helicopters and co-authored numerous publications and journal articles on wolves. Now retired, he still contracts with various wildlife agencies to offer his expertise. In this capacity, and on his own time, he has visited many areas in WA State where there have been wolf-livestock conflicts and he has done this many times, offering his advice. He has also studied WDFW's Protocols. His stated goal is to provide his knowledge, experience and training to the recovery and management of wolves so these will maintain the highest standards and use the best science.

#49. Carter Niemeyer, **"*Corrected Declaration of Carter Niemeyer - 12- NO 18-2-10130-34".*** *Superior Court of Washington for Thurston County, Petitioners: Center for Biological Diversity and Cascadia Wildlife, Respondents: Washington Department of Fish and Wildlife, Kelly Susewind.* August 2018.

Findings of Carter Niemeyer: Range riding, a non-lethal tool frequently used by WDFW, is often effective in some but not all grazing situations, and WDFW has failed to recognize this and continues to rely on ineffective range riding which results wolves being killed.

In his own words: "*From my experience, for range riders to be effective, (a) they must be present daily and nightly (camped on location to be immediately available during the night-time, as many wolf-*

livestock interactions and conflicts occur during the night-time or early morning hours before sunrise; (b) they must be using low stress livestock handling techniques designed to keep their cattle bunched together, rather than spread out across the range where they can't be observed or protected, (c) there must be enough range riders in relationship to the size of the grazing allotment to be able to act as a deterrent; (d) they must be focused on monitoring the cattle, knowing their whereabouts, and observing their behavior, so as to look for signs that the cattle re uncomfortable due to nearby predators; (e) they should be keeping livestock away from wolf den sites and wolf rendezvous sites, since the presence of cattle at these concentrated areas of wolf activity is one of the primary predictors of potential conflict, (f) they should remove sick and injured livestock that might attract predators; and (g) discover wandering and stray/trespass livestock that may become isolated and vulnerable to predators".

Carter Niemeyer visited many grazing areas in WA State where wolf-livestock conflicts were occurring and he saw that the above requirements for effective range riding were not in use, yet WDFW was killing wolves. He saw range riding being used in the Kettle Range where cattle were dispersed. He saw that range riders could not monitor even part of the livestock on a regularly basis because of the steep, rugged, heavily wooded nature of the allotments and because of the size of the allotments and the number of livestock.

He also saw that basic requirements like keeping livestock away from dens and rendezvous sites was not being followed. In 2016, salt blocks were placed near these sites to keep livestock near these areas.

He saw that wolf attractants were not being removed as required in the Protocol and as shown by research to be important. Injured and dead livestock were not promptly found and removed from grazing areas. Instead they were found days or weeks later, sometimes after injures were infected and/or scabbed over and carcasses had been mostly consumed. Range riders knew of some of the carcasses and injured livestock days and even weeks before they were actually found and dealt with. Some carcasses were never removed - because of the terrain or remoteness of the location. These are all "wolf attractants", "unnatural wolf attractants", which are not allowed in the Protocol. He found that future depredations occurred around these. He questioned how WDFW could consider range riding adequate when injured and dead livestock were not promptly found and removed. He noted that others sometimes found the dead and injured livestock, not the range riders.

He found that a dead calf that was found on a USFS allotment in May was only one-and-a-half weeks old. He estimated the weight would have been about 50-70 lbs, far under the 200 lb minimum required in the Protocol. Yet this was counted as a wolf depredation.

Where livestock was grazed in the territory of the Smackout Pack, Carter Neimeyer also identified problems and offered solutions. Fladry was left out all winter habituating wolves to it so it would not be effective in the future. Range riders were not working during the night when most conflicts occur. There were not enough range riders.

Another problem he identified in many situations was that range riders focused too much on GPS data from wolf collars to find dead livestock rather than on watching and managing their livestock and chasing wolves away when they approached.

Will the EIS consider this information or will it be ignored as it has been in every Protocol written by WDFW?

#50. Are guardian dogs and livestock protection collars effective? How cost-effective are they?

#50. J. S. McManus, A. J. Dickman, D. Gaynor, and B. H. Smuts, ***Dead or Alive? Comparing costs and benefits of lethal and non-lethal human-wildlife conflict mitigation on livestock farms."*** 2014.

This 3 year study on 11 South African livestock farms examined costs and benefits of lethal removal and non-lethal conflict mitigation methods. Farmers used existing lethal control the first year and then switched to guardian animals (dogs and alpacas/llamas) or livestock protection collars for the following 2 years.

Findings:

For the first year the mean cost of livestock protection was USD 3.30 per head
and the mean cost of depredation was USD 20.11 per head of stock.
The first year of non-lethal control, the combined implementation and running costs,
were similar to those of lethal control, USD 3.08
However, the mean cost of depredation decreased by 69.3%, to USD 6.52 per head.

The second year of non-lethal control, the running costs were significantly lower USD 0.43 per head, than in the previous years and depredation costs decreased further, to USD 5.49 per head.

This suggests that non-lethal methods can reduce depredation and can be economically advantageous compared to lethal methods of control.

Fourth Key Question:
Does killing wolves increase social tolerance?
Does it increase or decrease support for illegal poaching?

#51 Research: Again Adrian Treves is a leader in studying attitudes towards wolves and how these change before and after lethal removal is allowed.

#51. Adrian Treves has studied this extensively at the lab he founded and directs, the Carnivore Coexistence Lab, at the University of Wisconsin-Madison.

Hasn't WDFW claimed that wolf killing will increase social acceptance of wolves by livestock producers? Is this true?

Dr. Treves and his associates have conducted longitudinal studies, sampling the same individuals' attitudes towards wolves over time, including before and after human lethal removal of wolves was legalized by the State of Wisconsin, both predator control and recreational hunting. This series of on-going studies measured attitudes towards wolves including tolerance, fear support for lethal removal and interest in illegally poaching wolves. Study dates: 2001, 2004, 2009, 2013.

#52 Research:

Dr. Treves has also worked with others to review studies on attitudes towards wolves nationwide and globally. (Naughton-Treves et al. 2003) (Treves et al. 2009) Bruskotter et al. 2013) (Treves and Bruskotter 2014).

#52. Adrian Treves and Jeremy Bruskotter, " ***Tolerance for Predatory Wildlife"***. 2014.

This study suggested social factors led to illegal poaching of predators, not feeling threatened that ones' livelihood is at risk. Government - sanctioned killing of predators reinforced negative attitudes towards predators rather than resolving them or changing them to more positive.

Findings of the studies by Dr. Treves and his associates:
These studies showed no evidence that respondents to surveys became more tolerant of wolves when wolves were killed, either through predator control or hunting. Instead, there was a decrease in social tolerance. Instead, tolerance and inclinations to poach wolves increased.

Two independent studies in 2015 found an even stronger connection between killing wolves and less social tolerance and more inclination to support illegal poaching. It was also associated with more frequent or vociferous calls for yet more wolf killing and public hunting. (Browne-Nunez et al. 2015) (Hogberg et al. 2015)

In 2016 still another study and more work showed a strong possibility that the declining wolf population was the result of an increase in illegal poaching since it exceeded what could be explained by legal killing and natural factors. ("*Blood Does not Buy Goodwill"* and two articles by Chapron and Treves in 2016)

Findings consistently showed killing wolves generally reduces social tolerance.

Hasn't Dr.Treves tried to provide this information from his studies and studies of others, and the doubts raised about the Bradley Study to WDFW a number of times ? Since this research has not been reflected in WDFW's Protocols, will it be used in the EIS?

Hasn't WDFW tried to say that its killing of wolves is based on its 2011 WA State Wolf Plan? Is this really true or was the vision for predator control expressed in that plan very different from WDFW's killing of wolves since its adoption? Wasn't the vision one of "removing problem animals" (page 80) rather than indiscriminate shooting of entire packs from helicopter? If this is true, what can we expect in this EIS?

The following list of issues regarding predator control are just some of relevant issues that this EIS should address:

1. Risk assessment/level of risk. Since livestock production is a business, shouldn't risk assessment be an important part of the discussion when considering use of predator control?

What kind of livestock operations have the most and the fewest wolf attacks on livestock? What science and statistics should be used to determine the level of risk for each producer when considering use of predator control? What is known about how the following factors relate to the amount of risk of wolf attacks on livestock?

1a.) The **size** of livestock operation, number of animals being grazed?

1b.) The **species** being grazed, sheep, cattle, other livestock?

1c.) The **location**: grazing on large more remote allotments on public land versus grazing in fenced pastures in areas near homes and farms?

1d.) The **terrain** of the grazing area, steep and rugged, versus gradual and sloping?

1e.) The amount and configuration of **forested areas** in the grazing area versus openings?

1f.) The **prey density of ungulates** usually preyed on by wolves for food in the grazing area, and whether this changes when livestock are put into the area and there is more human activity (often summer grazing seasons) as compared to times when there is no livestock and no livestock-related human activity (usually winter and when wolves mate and choose den sites)?

1g.) The **breeding status of the wolves/pack**, considering the fact that packs with pups are less able to move to avoid humans or follow prey when pups are using dens / rendezvous sites.

1h.) **Pack size, stability and composition and length of time** the pack has been there?

1i.) **Wolf density in adjacent areas** which may limit the ability of wolf's/pack's to move to another area to avoid humans or to follow prey? Packs defend their resources, their territories.

1j.) The **history and attitude of the producer**? Does the producer have a history of problems with wolf attacks on livestock? Has the producer been cooperative and receptive to learning how to use non-lethal deterrents more effectively?

Question: Why does **WDFW's Protocol** use a one-side-fits-all approach for its requirements for producers to use non-lethal deterrents, regardless of the level of risk, and ignoring all of these factors that might raise risks? Especially since this is not supported by science.

2. What role should husbandry practices play in discussions about predator control? Should wolf depredations be addressed by attempting to change wolf behavior or by killing wolves, or should attempts be made to change the producer's husbandry practices including the way livestock is being managed in grazing areas? Which is more costly when considering the impacts of killing wolves on wolf packs and populations and on the ecosystems?

2a.) What has WDFW learned about the relationship between specific husbandry practices and wolf attacks on livestock?
2b.) What has WDFW learned about the effectiveness of the many non-lethal deterrents it has tried since wolves returned to WA State?

2c.) What non-lethal deterrents have worked on large, remote grazing allotments where 100% of the livestock are not kept in groups?
2d.) When non-lethal deterrents are not applied to management of 100% of the livestock being grazed, such as range rider presence or grouping, how likely is it that wolves will attack the livestock not being protected by that deterrent? When livestock is not kept in groups and range riding and/or human presence is the deterrent being used, what % of the livestock benefit from this range riding or human presence and how many are not protected?
2e.) Should predator control be used when producers choose husbandry practices and deterrents that fail to protect 100% of their livestock?
2f.) Is there science that says range riding and/or human presence is effective when livestock is dispersed across large, wooded, remote, and rugged allotments like those in the Kettle crest?
2g.) Is there science that says any non-lethal deterrents are usually effective when livestock is dispersed across the kind of allotments found in the Kettle crest? If so, which ones? What is the risk associated with these allotments? Should predator control be used in high-risk grazing areas like this? Is it ever effective? Is it cost effective? What is its impact on wolf populations as a whole and on individual and neighboring packs when these "sink populations" are created by use of lethal removal?

3. How effective is killing wolves as part of predator control - on stopping attacks on livestock? Where? For how long? What does the best science tell us?

3a.) Does lethal removal change pack behavior as WDFW suggests when it kills wolves? For how long? How many wolves have to be killed before it is effective? What does the best science tell us about "prey choice" of wolves? Why do some wolves attack livestock? Is it related to pack size - packs with fewer wolves don't kill livestock as often? Or, is this based on a belief that packs can be taught to not kill livestock by killing some of the pack members - that when they see WDFW kill wolves, the others know this is because someone in their pack attacked some livestock? What science supports this learning process?
3b.) Does killing wolves change and improve the husbandry practices used by the producers who lost livestock so wolves do not need to be killed again in the same area?
3c.) Does killing wolves in the same area more than once change and improve husbandry practices so wolves do not need to be killed again in the same area?
3d.) How effective is "indiscriminate" lethal removal? Isn't this kind of lethal removal based on the belief that all wolves are the same and the effect is the same no matter what wolf is killed? Does the best science support this?
3e.) Is there some kind of "selective" lethal removal that is more effective? If so, what kind? What wolves should be selected? What science supports this?
3f.) Is killing pups effective as some people in WDFW have suggested? Is this selective killing? Or is this based on the following rational: a pack with fewer pups will need fewer calories so the adults will be less likely to kill livestock? Where is the science that supports this?

Questions

How successful is predator control in reducing or eliminating wolf attacks on livestock?

When initially successful, how long does this last before a reoccurrence?

Other options: Reimbursement for losses, non-lethal deterrents

How cost effective is predator control compared to other options?

Who will pay for it and who will do it in post recovery?

Should the livestock industry be looked at as a business or as a culture?

Should WDFW consider business concepts like these: "Risk assessment"? "Acceptable risk"? "Acceptable loss"? Public subsidies?

Fifth Key Question:
How should the impact of wolves on the livestock industry be addressed When WDFW manages wolves?

Doesn't some of this issue come down to how it is framed?

Isn't it true that ranchers worked very hard to get rid of all of the wolves from WA State? Before all of the wolves were killed, livestock producers had to deal with wolves and didn't they often do this by using range riders who stayed with the livestock 24/7 and had guard and herding dogs to assist them? Weren't the animals kept in groups? Yes, some have had grazing leases on federal land for generations and they can choose to use them - or not. If they choose to use them, they do so knowing wolves are there. Producers may adapt to this new reality by changing their grazing plans or they can send their livestock out mostly alone onto these allotments and accept the losses. Tax payers may be willing to pay for some losses and some might want to pitch in to help pay for non-lethal deterrents. In the end, isn't livestock producing actually just a business?

Does WDFW have an obligation to make these allotments safe for livestock production?

Isn't the effort to frame these issues as one of protecting the livestock industry because it is a matter of saving a "culture" missing the main point? There are many "cultures" that have developed around business ventures, the slave plantations in the South, the coal mines in West Virginia, the whaling industries along the Atlantic and Pacific Coasts.

Is there any doubt that livestock producers are running businesses?

Don't most other businesses deal with their risks very differently than what we see in the livestock industry in WA State when it comes to their risks of wolf depredations?

Risk Assessments

Don't most businesses develop "risk assessments"?
Isn't this usually required when they are getting standard bank loans?
Should the public require this before producers receive public money?
Tax payers pay for range riders and other non-lethal deterrents in the Kettle Range.
Would this happen if we required a risk assessment?

Acceptable Risks and Losses

Doesn't just about every business face the possibility of having risks and losses?
To be viable, businesses need to be able to absorb some losses.
Business plans usually are based on "acceptable risks and losses".

Producers with grazing leases on federal land which is public land, the advantages of cheap fees and the disadvantage of more risks.

Do risk assessments show that these allotments should be used?

The few producers who do have grazing leases on federal land are already receiving a huge subsidy at the tax payer's expense. Management of these grazing leasing and the impacts from grazing far exceed the revenue the USFS and BLM receive from grazing fees that are lower now than at any recent time, $1.35 per month per cow and all of her new calves. That's far below the usual rate seen on other lands in WA State which are often around $20.00 per month per cow and her calves. This gives producers with these federal leases a huge financial benefit and the ability to easily out-compete producers who do not have these leases and are using their own property or pay much higher fees charged for grazing on WA State's land. Many simply cannot compete and they raise specialty meats for restaurants and consumers willing to pay higher prices.

Some of these federal grazing leases are for very large allotments that may be more remote, more rugged and mountainous, more forested, further from homes and roads. This makes them better wildlife habitat. They are more likely to have not only wolves, but also cougar, bears, and coyotes may live on these allotments. And there is far more risk from injuries and lost animals since domestic cattle have not been raised to live in rugged, forested areas. These factors definitely increase the "risks" of grazing livestock on these large allotments versus grazing in "the back acre" behind the house. Many studies and USDA statistics show that risks of losses from many kinds of things increases on larger operations and when more animals are grazed. Profits may also be larger too.

Is the public, the owners of this public land, responsible for making these grazing allotments safe for domestic livestock?

We are already leasing it at far less than it costs us to manage the land and leases.

If this was put to the votes, do you think the public would want to do this?
Would the public, if we could vote, want to use this land at all for livestock grazing, and I doubt many people would support leasing it at far below the going price.

How is this relevant to the EIS on wolf management?

It's very relevant because:

1. isn't the EIS going to address use of non-lethal and lethal deterrents on public as well as private land during post-recovery? Currently these are being used on both, with no distinction made between them even though many people from the public have asked that public land be treated differently. WAG has failed to really address this issue, as WDFW has not either.
2. During recovery, isn't the public paying for much or not most of the non-lethal deterrents? Are we also paying for lethal removal? Who paid to kill the OPT Pack, the Sherman Pack?
3. For post-recovery, will the EIS finally allow us to choose by having alternatives that offer different as well as the same way of handling and paying for non-lethal and lethal deterrents? Hasn't the public asking for a distinction to be made for a long time for grazing on public lands?
4. The public would like to see an alternative that does not allow predator control on public lands, lethal removal of wolves - and other predators - on public lands- to protect domestic livestock.
5. Doesn't WDFW manage the wildlife on these lands even though the land is managed by the USFS and BLM? Doesn't this mean WDFW can manage wolves and other predators on these lands regardless of whether there is livestock grazing or not?

A Look at the Risks associated with Livestock Production

What kills livestock?

#53. Statistics: The USDA Statistics tell us what kills livestock in the U.S. and in Washington State.

The USDA keeps records on the causes of livestock mortality, for the entire country and for each state. It also collects statistics on the use of non-lethal deterrents. The latest report available on-line is for 2015.

First, USDA Statistics for the United States - 2015

What caused adult cattle and calves to die in the U.S. in 2015?
USDA report, 2015

For both adult cattle and calves: almost 98% were due to non-predator causes
For only calves: almost 89% were due to non-predator causes.

What % of these U.S. producers used used non-lethal deterrents?

The % of beef operations in the U.S. that used some kind of non-lethal deterrents - 20.3%
The % of dairy operations that used some kind of non-lethal deterrents - 13.9%

What non-lethal deterrents were used most by these U.S. producers?

Most common - only guard dogs - 26.3% used this one (could be ranch dogs)
Second most common - only fencing - 15.5 % used this one.
Third and fourth most - 5.1% used another non-lethal method only
and 5.1% used frequent checks only.
Only 4.1% used guard animals plus fencing
or removal of livestock plus culling older animals.

Now, USDA Statistics for Washington State - in 2015

How many adult cattle and calves died from either non-predator and predator causes compared to the total number?

Number of cattle lost - non-predator causes - 21,770 - from the total number 998,000 cattle
Number of cattle lost - to predators - 240 - from the total number 998,000 cattle

Number of calves lost non-predator causes- 20,960 - from the total number 425,000 calves
Number of calves lost - to predators - 1,040 - from the total number of 425,000 calves

What % of the operations in WA State had these cattle deaths in 2015?

from non-predator causes - 15.4%
caused by predators - 0.8%

What % of operations in WA State had these calf deaths in 2015?

from non-predator causes - 19.8%
caused by predators - 2.4%

In Washington State

The % of the adult cattle deaths from both compared to total inventory of cattle in WA State in 2015

not caused by predators - 2.2%
caused by predators - 0.0 (? too small ?)

The % of calf deaths from both compared to the total inventory of calves in WA State in 2015

not caused by predators - 4.9%
caused by predators 0.2%

Total Value of the all Cattle and all Calf Losses in WA State in 2015

The value of the adult cattle lost to all causes - $32,244,000
The value of the calves lost to all causes $9, 293,000

What was the % of deaths for each major non-predator cause of mortality in 2015, in WA State, for adult cattle?

Digestive 8.9%
Respiratory 21.6%
Metabolic 7.6%
Mastitis 7.7%
Lameness or injury 9.8%
Other disease 10.3%
Weather 2.8
Calving 11.7%
Poisoning 0.1%
Old age 11.5%
Theft 0%
Other non-predatory 7.2%
Unknown non-predator - 7.2%

What was the % of deaths for each major non-predator cause of mortality

in 2015, in WA State, for calves?

Digestive 33.4%
Respiratory 26.9%
Metabolic 0.3%
Mastitis 0.4%
Lameness or injury 0.5%
Other disease 3.2%
Weather 3.3%'Calving 18.0%
Poisoning 0%
Theft 0%
Non Predator - other 6.0%
Unknown non-predator 7.9%

What predators caused what % of predator-caused deaths in WA State in 2015, for adult cattle?

Coyotes 52.8%
Dogs 8.5%
Wolves 24.2%
cougars 14.6%
Grizzly, black bear, foxes, bobcat, lynx, birds - all 0%
Other and unknown predators both 0%

What predators caused what % of predator-caused deaths in WA State in 2015, for calves?

Coyotes 63.0%
Dogs 0.0%
Wolves 5.0%
cougars 18.3%
Black bears 6.3%
Grizzly, foxes, bobcat, lynx, birds - all 0%
Other predators 0%
Unknown predators 7.4%

According to the USDA, how many cattle and calves were in WA State in 2015?
Total inventory was: 1,155,544 animals.

The WA Department of Agriculture - in 2017

Total - 7,985 farms in Washington State.
Cattle and calves ranked as 4th in market value of agricultural products sold.
Total sales in 2017 of cattle and calves: $1,068,925,000.

Total sales of agricultural products in WA - $ 9,634,461,000
Total sales from fruits, tree nuts and berries were was #1 - $3,614,885,000

How many wolves were in Washington State in 2015?

90 known wolves

How many cattle and calves were in Washington State in 2015?

1, 155, 544

These were most recent statistics that were available on-line.
There are more wolves in WA State now -
so more recent statistics for losses due to predators might be different.

Why are all of these statistics in these scoping comments?

In 2015, in WA State, there were 1, 155, 544 cattle and calves - and how many wolves? - 90.

They offer some perspective on the importance of wolf depredation
on the bottom line in the livestock industry.

How big a loss are wolf depredations when these are compared
to all of the other risks that should be in any livestock producer's risk assessment?

In 2015, in WA State, there were 1, 155, 544 cattle and calves

2.2% of these cattle and 4.9% of these calves died from non-predator causes,
while 0% (too small) of these cattle and 0.2 % of these calves were killed by predators

For cattle - of the 0 % (too small) killed by predators, 24.2% of these were killed by wolves
For calves - of the 0.2% killed by predators, 5% of these were killed by wolves

WDFW reported 90 known wolves in 2015.
There were 7 confirmed attacks on livestock.
Damage claims filed with WDFW - 3.
WDFW's Total payments for damage in 2015 - $15, 174.60

(Source: WDFW website, Wolf Report for 2015)

According to the USDA Report - for WA State :
In 2015, the inventory of cattle and cows in WA - 1, 155, 544

The % of the total cattle inventory that were killed by predators was 0% (too small)
of this 0% caused by predators, 24.2% of these were caused by wolves.

The % of the total calf inventory that were killed to predators was 0.2%
Of this 0.2% loss of calves to predators, 5% of these were caused by wolves.

According to the USDA Report - for WA State

Total value of all adult cattle lost to all causes - $32,244,000
Total value of all calves lost to all causes - $9, 293,000

#54. To put some perspective on the USDA, it is useful to compare the USDA statistics on livestock mortality with WDFW's statistics on wolves and wolf depredations on livestock and wolf mortality for 2015.

WDFW writes a Wolf Report every year summarizing statistics for the year pertaining to wolves; the number of wolves and packs, the number of wolves that died and the reasons, etc.

#54. Text copied from the 2015 WDFW Wolf Report

*"The minimum estimated wolf population in Washington increased by approximately 32% over 2014 estimates to at least 90 known wolves in 18 known packs including at least 8 breeding pairs. Pack sizes ranged from 2 to 8 and averaged 4.4 wolves per pack. One pack that existed in 2014 was no longer considered a pack at the end of 2015 while another pack shifted its activity center to Idaho and was considered an Idaho pack at years end. State and tribal biologists captured 14 unique wolves a total of 15 times from 9 different packs (plus 1 lone individual) and monitored a total of 22 unique radio collared wolves from 13 different packs that existed in Washington at some point during 2015. We documented 7 mortalities in Washington during the year and the causes of mortality included human-caused (*n = *3), unknown (*n = *1), and legal harvest (*n = *3).*

Wolf populations were managed to ensure progress towards recovery goals while also minimizing chronic loss of livestock caused by wolves. Seven cattle were confirmed wolf-kills while 1 dog was confirmed to be injured by wolves. Three packs (15% of known packs that existed at some point during the year) were involved in at least 1 confirmed livestock mortality. No wolves were removed through agency control actions during 2015. The WDFW processed 3 damage claims and paid a total of $15,174.60 to compensate livestock producers who experienced livestock losses caused by wolves."

Estimated population in 2015 - According to WDFW's 2015 Report
90 known wolves,
with 8 successfully breeding pairs

Wolf attacks on cattle - 7 confirmed
Wolves injured 1 dog

Damage claims to WDFW - 3 - WDFW paid a total of $15,174.60

A Look at the Wolf Population in WA State for 11 Years
(According to WDFW Yearly Wolf Reports)
Compared to the total Inventory of Cattle and Calves

Inventory of cows and calves in WA State each year - over 1 million

(Note: the best science says breeding pairs provide the foundation for wolf success)

2008: one breeding pair in the Methow Valley
known wolf mortalities not included in the WDFW report

2009 and 2010: two more new breeding pairs, one each year, in northeast WA
known wolf mortalities not included in the WDFW report

2011: at least 27 wolves, two new packs - 3 breeding packs out of a total of 5 packs
known wolf mortalities not included in the WDFW report
No livestock losses, 1 herding dog injured by wolves and recovering

2012: at least 51 wolves, 5 breeding pairs out of a total of 9 packs,
known wolf mortalities: 11 (WDFW killed 7 to protect livestock, 1 human, 1 unkown,
and 2 WA collared wolves legally killed in ID and BC)
(WDFW costs to kill the 7 Wedge Pack wolves not reported) (It cost $ 76,500)
Livestock losses: 7 confirmed cattle and 1 sheep killed by wolves,
6 cattle and 2 sheep confirmed injured by wolves

2013: at least 52 wolves, 5 breeding pairs out of a total of 13 packs,
known wolf mortalities - 7 (natural-1, human-caused 3, legal harvest by tribes-1
and 2 collared WA wolves legally killed in ID and BC)
Livestock losses: 1 confirmed calf killed by wolves, also 3 confirmed dogs injured.

2014: at least 68 wolves, 5 breeding pairs out of a total of 16 packs
known wolf mortalities: 10 (WDFW killed 1 to protect livestock, 4 other human-caused,
2 unknown, 3 natural)
Livestock losses: Confirmed 2 cattle and 28 sheep killed by wolves,
Confirmed 2 cattle and 6 sheep and 1 dog injured by wolves
WDFW costs for killing 1 wolf ? (not reported)

2015:at least 90 wolves, 8 breeding pairs out of a total of 18 packs,
known wolf mortalities: 7 (3 human caused, 3 legally killed by tribes, 1 unknown cause)
livestock losses: 7 confirmed cattle killed by wolves, 1 dog confirmed injured by wolves
Damage claims to WDFW - 3 - paid $15,175 for direct losses.

2016: at least 115 wolves, 10 breeding pairs out of a total of 20 packs,
known wolf mortalities: 14 (WDFW killed-7, legally killed by tribes-3, other human-caused-2,
human-caused suspicious-2
(WDFW costs for killing the 7 PPP wolves not reported) (It cost $ 135,000)
Livestock losses: Confirmed 9 cattle deaths, Probable 6 cattle deaths,
Confirmed 6 cattle injured by wolves, 1 dog injured by wolves
Compensation to producers $20,037 for losses, $65,648 for indirect losses-2 claims

2017: at least 122 wolves, 14 breeding pairs out of a total of 22 packs,
known wolf mortalities: 14 (WDFW killed-3, caught-in-act ranchers to protect livestock-2,
legally killed by tribes-3, vehicles-2, human-caused under investigation-4

(WDFW costs for killing 3 wolves not reported, was 1 Sherman - $?

2018: at least 126 wolves, 15 breeding pairs out of a total of 27 packs,
known wolf mortalities - 12 (WDFW killed 4, legally killed by tribes-6, human suspicious-2)
(WDFW costs for killing 4 wolves not reported, was 1 Smackout $?
Livestock losses: confirmed 11 cattle and 1 sheep killed by wolves,
and confirmed 19 cattle and 2 sheep injured by wolves,
probable 1 injured cow, probable 1 dead calf.
Reimbursements to 31 producers for non-lethal deterrents - $257,421,
Reimbursement for livestock killed by wolves - $7,536 to 5 producers,
Reimbursement for indirect losses from wolves - $5,950 to 1 producer.

Back to USDA statistics on cow and calf mortalities and their causes.

The following pages from USDA Reports on Livestock Production show:

Table 12: Size of farms and their total inventory in 2017 and 2012 in WA State

In 2017, 33 farms which had over 5,000 animals accounted for 36% of the total number in WA
33 farms had an inventory of 421,453 animals out of the states total -1, 155, 544 -

When farms with over 1000 animals are added to this number, these account for 62% in WA
177 farms had an inventory of over 1000 animals totaling 721,152 animals out of 1,155,544 in WA State.

Table 12. Cattle and Calves - Inventory: 2017 and 2012

[For meaning of abbreviations and symbols, see introductory text.]

Item	2017		2012	
	Farms	Number	Farms	Number
Cattle and calves	11,311	1,155,544	11,861	1,162,792
Farms with -				
1 to 9	5,925	24,796	6,205	26,375
10 to 19	1,928	26,060	2,137	28,484
20 to 49	1,654	48,812	1,732	52,542
50 to 99	661	44,982	662	44,893
100 to 199	385	53,112	430	58,955
200 to 499	420	123,009	352	107,666
500 to 999	161	113,621	167	119,082
1,000 to 2,499	98	147,101	107	160,339
2,500 to 4,999	46	152,598	39	132,377
5,000 or more	33	421,453	30	432,079
Cows and heifers that calved	9,733	516,068	9,816	478,841
Farms with -				
1 to 9	5,931	22,826	6,084	22,717
10 to 19	1,367	17,937	1,361	17,778
20 to 49	1,201	34,601	1,201	34,600
50 to 99	429	29,623	469	31,547
100 to 199	343	46,341	276	36,941
200 to 499	284	88,001	245	77,079
500 to 999	87	60,943	92	60,820
1,000 to 2,499	62	93,935	67	99,250
2,500 or more	29	121,861	21	98,109
Beef cows	9,295	239,154	9,285	211,852
Farms with -				
1 to 9	5,831	22,501	5,938	22,198
10 to 19	1,356	17,737	1,338	17,453
20 to 49	1,180	33,961	1,170	33,549
50 to 99	411	28,341	435	29,120
100 to 199	274	36,456	213	27,629
200 to 499	194	56,590	146	43,442
500 to 999	36	23,976	34	22,231
1,000 to 2,499	12	(D)	10	(D)
2,500 or more	1	(D)	1	(D)

More Statistics for Washington State
Dollar Value of Sales of Cattle and Calves in WA State, listed according to size of the operation

Table 13. Cattle and Calves - Sales: 2017 and 2012

[For meaning of abbreviations and symbols, see introductory text.]

Number sold	2017		
	Farms	Number	Value ($1,000)
Cattle and calves	7,985	933,817	1,068,925
Farms by number sold -			
1 to 9	4,821	17,559	16,943
10 to 19	1,001	13,221	11,647
20 to 49	880	26,964	24,089
50 to 99	483	32,650	29,537
100 to 199	348	48,877	45,923
200 to 499	261	78,103	66,124
500 to 999	88	59,574	50,334
1,000 to 2,499	63	87,460	68,618
2,500 to 4,999	24	79,303	69,005
5,000 or more	16	490,106	686,705
Cattle weighing 500 pounds or more (see text)	7,388	751,022	(NA)
Farms by number sold -			
1 to 9	4,661	16,357	(NA)
10 to 19	837	10,963	(NA)
20 to 49	813	24,682	(NA)
50 to 99	412	27,831	(NA)
100 to 199	331	45,036	(NA)
200 to 499	210	62,263	(NA)
500 to 999	59	37,841	(NA)
1,000 to 2,499	40	59,907	(NA)
2,500 to 4,999	15	47,989	(NA)
5,000 or more	10	418,153	(NA)
Cattle on feed (see text)	166	406,890	(NA)
Farms by number sold -			
1 to 19	47	632	(NA)
20 to 49	54	1,686	(NA)
50 to 99	19	1,354	(NA)
100 to 199	21	2,965	(NA)
200 to 499	11	3,565	(NA)
500 to 999	-	-	(NA)
1,000 to 2,499	6	(D)	(NA)
2,500 to 4,999	2	(D)	(NA)
5,000 or more	6	380,365	(NA)
Calves weighing less than 500 pounds	2,415	182,795	(NA)
Farms by number sold -			
1 to 9	1,512	5,132	(NA)
10 to 19	265	3,410	(NA)
20 to 49	260	7,411	(NA)
50 to 99	147	9,478	(NA)
100 to 199	90	11,988	(NA)
200 to 499	80	23,691	(NA)
500 to 999	31	21,535	(NA)
1,000 or more	30	100,150	(NA)

Table 13. Cattle and Calves - Sales: 2017 and 2012

[For meaning of abbreviations and symbols, see introductory text.]

Number sold	2017			2012		
	Farms	Number	Value ($1,000)	Farms	Number	Value ($1,000)
Cattle and calves	7,985	933,817	1,068,925	8,420	877,290	994,835
Farms by number sold -						
1 to 9	4,821	17,559	16,943	5,229	19,232	17,192
10 to 19	1,001	13,221	11,647	1,119	14,928	12,786
20 to 49	880	26,964	24,089	910	27,148	24,748
50 to 99	483	32,650	29,537	441	30,661	28,550
100 to 199	348	48,877	45,923	287	39,055	34,098
200 to 499	261	78,103	66,124	255	75,967	62,776
500 to 999	88	59,574	50,334	95	66,401	47,563
1,000 to 2,499	63	87,460	68,618	52	77,427	59,427
2,500 to 4,999	24	79,303	69,005	17	58,115	50,303
5,000 or more	16	490,106	686,705	15	468,356	657,392
Cattle weighing 500 pounds or more (see text)	7,388	751,022	(NA)	7,588	726,174	(NA)
Farms by number sold -						
1 to 9	4,661	16,357	(NA)	4,879	17,163	(NA)
10 to 19	837	10,963	(NA)	947	12,666	(NA)
20 to 49	813	24,682	(NA)	804	24,114	(NA)
50 to 99	412	27,831	(NA)	396	27,376	(NA)
100 to 199	331	45,036	(NA)	255	34,664	(NA)
200 to 499	210	62,263	(NA)	203	58,969	(NA)
500 to 999	59	37,841	(NA)	53	33,120	(NA)
1,000 to 2,499	40	59,907	(NA)	32	48,772	(NA)
2,500 to 4,999	15	47,989	(NA)	7	25,280	(NA)
5,000 or more	10	418,153	(NA)	12	444,050	(NA)
Cattle on feed (see text)	166	406,890	(NA)	164	431,976	(NA)
Farms by number sold -						
1 to 19	47	632	(NA)	69	800	(NA)
20 to 49	54	1,686	(NA)	38	1,152	(NA)
50 to 99	19	1,354	(NA)	20	1,433	(NA)
100 to 199	21	2,965	(NA)	14	2,005	(NA)
200 to 499	11	3,565	(NA)	10	3,441	(NA)
500 to 999	-	-	(NA)	2	(D)	(NA)
1,000 to 2,499	6	(D)	(NA)	-	-	(NA)
2,500 to 4,999	2	(D)	(NA)	2	(D)	(NA)
5,000 or more	6	380,365	(NA)	9	414,421	(NA)
Calves weighing less than 500 pounds	2,415	182,795	(NA)	2,632	151,116	(NA)
Farms by number sold -						
1 to 9	1,512	5,132	(NA)	1,761	5,717	(NA)
10 to 19	265	3,410	(NA)	273	3,420	(NA)
20 to 49	260	7,411	(NA)	228	6,696	(NA)
50 to 99	147	9,478	(NA)	126	8,130	(NA)
100 to 199	90	11,988	(NA)	95	12,355	(NA)
200 to 499	80	23,691	(NA)	84	23,960	(NA)
500 to 999	31	21,535	(NA)	35	24,465	(NA)
1,000 or more	30	100,150	(NA)	30	66,373	(NA)

Table 14. Cattle and Calves Herd Size by Inventory and Sales: 2017

[For meaning of abbreviations and symbols, see introductory text.]

Herd size	Cattle and calves inventory						Cattle and calves sales		
	Total		Cows and heifers that calved		Other cattle (see text)				
	Farms	Number	Farms	Number	Farms	Number	Farms	Number	Value ($1,000)
Farms with December 31, 2017 herd size of-									
1 to 9	5,925	24,796	4,708	15,330	3,145	9,466	2,701	11,527	10,710
10 to 19	1,928	26,060	1,794	15,687	1,462	10,373	1,367	9,183	8,033
20 to 49	1,654	48,812	1,563	30,053	1,342	18,759	1,405	23,883	20,588
50 to 99	661	44,982	624	27,332	635	17,650	623	30,258	26,630
100 to 199	385	53,112	361	33,246	370	19,866	380	31,717	28,648
200 to 499	420	123,009	376	73,553	415	49,456	408	70,853	65,602
500 to 999	161	113,621	156	67,080	153	46,541	161	55,865	49,466
1,000 to 2,499	98	147,101	87	78,654	93	68,447	98	80,895	70,941
2,500 to 4,999	46	152,598	39	73,979	45	78,619	46	97,481	87,186
5,000 or more	33	421,453	25	101,154	33	320,299	33	511,158	691,176
All farms with December 31, 2017 inventory	11,311	1,155,544	9,733	516,068	7,693	639,476	7,222	922,820	1,058,979
Farms with no cattle and calves inventory, on December 31, 2017	-	-	-	-	-	-	763	10,997	9,946
Total	11,311	1,155,544	9,733	516,068	7,693	639,476	7,985	933,817	1,068,925

Table 13. **Cattle and Calves - Sales: 2017 and 2012**

[For meaning of abbreviations and symbols, see introductory text.]

Number sold	2017			2012		
	Farms	Number	Value ($1,000)	Farms	Number	Value ($1,000)
Cattle and calves	7,985	933,817	1,068,925	8,420	877,290	994,835
Farms by number sold -						
1 to 9	4,821	17,559	16,943	5,229	19,232	17,192
10 to 19	1,001	13,221	11,647	1,119	14,928	12,786
20 to 49	880	26,964	24,089	910	27,148	24,748
50 to 99	483	32,650	29,537	441	30,661	28,550
100 to 199	348	48,877	45,923	287	39,055	34,098
200 to 499	261	78,103	66,124	255	75,967	62,776
500 to 999	88	59,574	50,334	95	66,401	47,563
1,000 to 2,499	63	87,460	68,618	52	77,427	59,427
2,500 to 4,999	24	79,303	69,005	17	58,115	50,303
5,000 or more	16	490,106	686,705	15	468,356	657,392
Cattle weighing 500 pounds or more (see text)	7,388	751,022	(NA)	7,588	726,174	(NA)
Farms by number sold -						
1 to 9	4,661	16,357	(NA)	4,879	17,163	(NA)
10 to 19	837	10,963	(NA)	947	12,666	(NA)
20 to 49	813	24,682	(NA)	804	24,114	(NA)
50 to 99	412	27,831	(NA)	396	27,376	(NA)
100 to 199	331	45,036	(NA)	255	34,664	(NA)
200 to 499	210	62,263	(NA)	203	58,969	(NA)
500 to 999	59	37,841	(NA)	53	33,120	(NA)
1,000 to 2,499	40	59,907	(NA)	32	48,772	(NA)
2,500 to 4,999	15	47,989	(NA)	7	25,280	(NA)
5,000 or more	10	418,153	(NA)	12	444,050	(NA)
Cattle on feed (see text)	166	406,890	(NA)	164	431,976	(NA)
Farms by number sold -						
1 to 19	47	632	(NA)	69	800	(NA)
20 to 49	54	1,686	(NA)	38	1,152	(NA)
50 to 99	19	1,354	(NA)	20	1,433	(NA)
100 to 199	21	2,965	(NA)	14	2,005	(NA)
200 to 499	11	3,565	(NA)	10	3,441	(NA)
500 to 999	-	-	(NA)	2	(D)	(NA)
1,000 to 2,499	6	(D)	(NA)	-	-	(NA)
2,500 to 4,999	2	(D)	(NA)	2	(D)	(NA)
5,000 or more	6	380,365	(NA)	9	414,421	(NA)
Calves weighing less than 500 pounds	2,415	182,795	(NA)	2,632	151,116	(NA)
Farms by number sold -						
1 to 9	1,512	5,132	(NA)	1,761	5,717	(NA)
10 to 19	265	3,410	(NA)	273	3,420	(NA)
20 to 49	260	7,411	(NA)	228	6,696	(NA)
50 to 99	147	9,478	(NA)	126	8,130	(NA)
100 to 199	90	11,988	(NA)	95	12,355	(NA)
200 to 499	80	23,691	(NA)	84	23,960	(NA)
500 to 999	31	21,535	(NA)	35	24,465	(NA)
1,000 or more	30	100,150	(NA)	30	66,373	(NA)

Table 14. **Cattle and Calves Herd Size by Inventory and Sales: 2017**

[For meaning of abbreviations and symbols, see introductory text.]

Herd size	Cattle and calves inventory						Cattle and calves sales		
	Total		Cows and heifers that calved		Other cattle (see text)				
	Farms	Number	Farms	Number	Farms	Number	Farms	Number	Value ($1,000)
Farms with December 31, 2017 herd size of-									
1 to 9	5,925	24,796	4,708	15,330	3,145	9,466	2,701	11,527	10,710
10 to 19	1,928	26,060	1,794	15,687	1,462	10,373	1,367	9,183	8,033
20 to 49	1,654	48,812	1,563	30,053	1,342	18,759	1,405	23,883	20,588
50 to 99	661	44,982	624	27,332	635	17,650	623	30,258	26,630
100 to 199	385	53,112	361	33,246	370	19,866	380	31,717	28,648
200 to 499	420	123,009	376	73,553	415	49,456	408	70,853	65,602
500 to 999	161	113,621	156	67,080	153	46,541	161	55,865	49,466
1,000 to 2,499	98	147,101	87	78,654	93	68,447	98	80,895	70,941
2,500 to 4,999	46	152,598	39	73,979	45	78,619	46	97,481	87,186
5,000 or more	33	421,453	25	101,154	33	320,299	33	511,158	691,176
All farms with December 31, 2017 inventory	11,311	1,155,544	9,733	516,068	7,693	639,476	7,222	922,820	1,058,979
Farms with no cattle and calves inventory, on December 31, 2017	-	-	-	-	-	-	763	10,997	9,946
Total	11,311	1,155,544	9,733	516,068	7,693	639,476	7,985	933,817	1,068,925

Statistics for United States Size of the Operation for beef operations

Death/loss of adult cattle by cause and size of the operation

C.1.c. For beef operations, percentage of cattle death loss due to nonpredator causes, by cause and by size of operation:

Percent Loss

Size of Operation (number of cows)

Nonpredator cause	1–49 Pct.	1–49 Std. error	50–99 Pct.	50–99 Std. error	100–499 Pct.	100–499 Std. error	500 or more Pct.	500 or more Std. error	All operations Pct.	All operations Std. error
Digestive problems[1]	4.3	(0.6)	5.9	(1.0)	5.5	(0.7)	7.1	(1.1)	5.3	(0.4)
Respiratory problems[2]	13.7	(4.2)	11.7	(1.4)	17.6	(2.3)	24.5	(3.5)	15.9	(1.8)
Metabolic problems[3]	0.8	(0.5)	0.9	(0.3)	0.8	(0.2)	0.7	(0.2)	0.8	(0.2)
Mastitis	0.4	(0.2)	0.3	(0.2)	0.2	(0.1)	0.5	(0.2)	0.3	(0.1)
Lameness or injury	6.6	(1.5)	4.4	(0.6)	2.8	(0.4)	4.4	(0.6)	4.6	(0.6)
Other diseases	4.2	(1.1)	4.3	(0.6)	4.6	(0.6)	4.7	(0.8)	4.4	(0.5)
Weather related[4]	7.6	(1.0)	7.0	(1.1)	19.2	(6.6)	8.9	(1.2)	11.8	(2.7)
Calving-related problems	17.8	(1.8)	14.3	(1.8)	8.9	(0.9)	6.3	(0.9)	12.8	(0.8)
Poisoning[5]	2.6	(0.7)	2.5	(0.8)	2.3	(0.5)	2.7	(0.5)	2.5	(0.4)
Old age	20.5	(1.9)	25.8	(2.0)	16.0	(1.8)	15.3	(2.4)	19.2	(1.1)
Theft (stolen)	1.8	(0.8	0.2	(0.1)	1.0	(0.4)	0.4	(0.1)	1.1	(0.3)
Other nonpredator causes	4.8	(0.7)	5.7	(1.4)	2.9	(0.5)	1.8	(0.4)	3.9	(0.4)
Unknown nonpredator causes	15.1	(1.6)	17.0	(1.8)	18.0	(2.4)	22.7	(3.8)	17.3	(1.2)
Total	100.0		100.0		100.0		100.0		100.0	

[1]Such as bloat, scours, parasites, enterotoxemia, or acidosis.

[2]Such as pneumonia or shipping fever.

[3]Such as milk fever or grass tetany.

[4]Such as chilling, drowning, or lightning.

[5]Such as by nitrate, noxious feeds, or noxious weeds.

Statistics for United States for beef operations:
death loss of calves by cause and size of the operation

2. Death loss in calves due to nonpredator causes

Beef operations reported a higher percentage of calf losses due to calving-related problems (22.7 percent) and weather-related causes (18.3 percent) compared with the other operation types. Conversely, beef operations had a lower percentage of deaths due to respiratory problems than the other operation types. Dairy operations reported higher percentage of calves lost to digestive problems (28.1 percent) compared with beef operations (9.6 percent).

C.2.a. Percentage of calf death loss due to nonpredator causes, by cause and by type of operation:

	Percent Loss							
	Operation Type							
	Beef		Dairy		Mixed		Other	
Nonpredator cause	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error	Pct.	Std. error
Digestive problems[1]	9.6	(0.4)	28.1	(1.6)	19.9	(3.5)	20.4	(3.5)
Respiratory problems[2]	23.0	(0.8)	32.7	(1.4)	36.1	(5.6)	36.3	(4.6)
Metabolic problems[3]	0.4	(0.1)	3.4	(1.7)	0.6	(0.3)	1.4	(0.8)
Mastitis	0.3	(0.1)	1.1	(0.3)	0.3	(0.3)	0.0	(—)
Lameness or injury	1.7	(0.2)	2.6	(0.3)	2.2	(0.8)	1.1	(0.3)
Other diseases	4.1	(0.5)	4.3	(0.7)	2.1	(1.0)	5.6	(1.6)
Weather related[4]	18.3	(0.7)	4.1	(0.6)	5.6	(1.5)	9.7	(3.6)
Calving-related problems	22.7	(0.7)	10.9	(0.9)	7.7	(1.6)	4.1	(1.0)
Poisoning[5]	0.6	(0.1)	0.1	(0.0)	0.6	(0.4)	0.5	(0.3)
Theft (stolen)	1.0	(0.3)	0.0	(0.0)	0.0	(0.0)	0.7	(0.5)
Other nonpredator causes	3.4	(0.3)	2.4	(0.4)	0.8	(0.3)	1.0	(0.3)
Unknown nonpredator causes	14.7	(0.6)	10.2	(1.1)	24.0	(7.4)	19.3	(6.2)
Total	100.0		100.0		100.0		100.0	

[1]Such as bloat, scours, parasites, enterotoxemia, or acidosis.
[2]Such as pneumonia or shipping fever.
[3]Such as milk fever or grass tetany.
[4]Such as chilling, drowning, or lightning.
[5]Such as by nitrate, noxious feeds, or noxious weeds.

Statistics for United States for beef operations

On beef operations, coyotes, unknown predators, and vultures accounted for the highest percentages of calf deaths due to predators (52.8, 12.3, and 10.5 percent, respectively). Deaths due to vultures accounted for higher proportions of calf deaths on smaller operations (10.3, 13.0, and 11.2 percent for operations with 1 to 49, 50 to 99, and 100 to 499 head) than on the largest operations (3.0 percent). Size breakouts are not shown for dairy, mixed, and "other" operations because of low precision (large standard errors) for those estimates.

D.2.c. For beef operations, percentage of calf death loss due to predators, by predator and by size of operation:

Percent Loss

Size of Operation (number of cows)

	1–49		50–99		100–499		500 or more		All operations	
Predator	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Grizzly bears	0.0	(0.0)	0.4	(0.3)	1.3	(0.4)	2.5	(0.8)	0.7	(0.2)
Black bears	1.0	(0.5)	0.9	(0.5)	2.0	(0.6)	1.2	(0.4)	1.3	(0.3)
Bobcats or lynx	1.4	(0.7)	1.1	(0.5)	0.3	(0.2)	0.3	(0.2)	0.9	(0.3)
Coyotes	47.6	(4.1)	60.4	(3.7)	53.4	(2.8)	58.6	(5.1)	52.8	(2.1)
Dogs	7.7	(1.9)	6.4	(2.1)	6.3	(1.4)	3.2	(0.8)	6.6	(1.0)
Foxes	(D)		(D)		(D)		(D)		(D)	
Wolves	1.7	(0.6)	1.6	(0.6)	5.7	(1.4)	4.8	(0.9)	3.3	(0.6)
Ravens	(D)		(D)		(D)		(D)		(D)	
Eagles	6.1	(5.4)	0.7	(0.6)	1.0	(0.3)	0.5	(0.3)	2.9	(2.2)
Vultures	10.3	(2.0)	13.0	(3.2)	11.2	(2.0)	3.0	(0.8)	10.5	(1.2)
Mountain lions, cougars, or pumas	2.9	(0.9)	7.6	(2.3)	4.7	(0.8)	9.6	(2.1)	4.9	(0.6)
Other predators	4.2	(1.3)	3.9	(1.4)	2.4	(0.7)	0.6	(0.2)	3.2	(0.6)
Unknown predators	16.8	(3.1)	3.9	(1.0)	10.9	(2.2)	14.7	(6.2)	12.3	(1.6)
Total	100.0		100.0		100.0		100.0		100.0	

(D)=Number suppressed to avoid potential disclosure of respondent.

Species of predators involved in predator-caused death loss of calves Comparing the size of the operation to the number of calves lost to each predator - in the U.S.

On beef operations, coyotes, unknown predators, and vultures accounted for the highest percentages of calf deaths due to predators (52.8, 12.3, and 10.5 percent, respectively). Deaths due to vultures accounted for higher proportions of calf deaths on smaller operations (10.3, 13.0, and 11.2 percent for operations with 1 to 49, 50 to 99, and 100 to 499 head) than on the largest operations (3.0 percent). Size breakouts are not shown for dairy, mixed, and "other" operations because of low precision (large standard errors) for those estimates.

D.2.c. For beef operations, percentage of calf death loss due to predators, by predator and by size of operation:

Percent Loss

Size of Operation (number of cows)

	1–49		50–99		100–499		500 or more		All operations	
Predator	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**	**Pct.**	**Std. error**
Grizzly bears	0.0	(0.0)	0.4	(0.3)	1.3	(0.4)	2.5	(0.8)	0.7	(0.2)
Black bears	1.0	(0.5)	0.9	(0.5)	2.0	(0.6)	1.2	(0.4)	1.3	(0.3)
Bobcats or lynx	1.4	(0.7)	1.1	(0.5)	0.3	(0.2)	0.3	(0.2)	0.9	(0.3)
Coyotes	47.6	(4.1)	60.4	(3.7)	53.4	(2.8)	58.6	(5.1)	52.8	(2.1)
Dogs	7.7	(1.9)	6.4	(2.1)	6.3	(1.4)	3.2	(0.8)	6.6	(1.0)
Foxes	(D)		(D)		(D)		(D)		(D)	
Wolves	1.7	(0.6)	1.6	(0.6)	5.7	(1.4)	4.8	(0.9)	3.3	(0.6)
Ravens	(D)		(D)		(D)		(D)		(D)	
Eagles	6.1	(5.4)	0.7	(0.6)	1.0	(0.3)	0.5	(0.3)	2.9	(2.2)
Vultures	10.3	(2.0)	13.0	(3.2)	11.2	(2.0)	3.0	(0.8)	10.5	(1.2)
Mountain lions, cougars, or pumas	2.9	(0.9)	7.6	(2.3)	4.7	(0.8)	9.6	(2.1)	4.9	(0.6)
Other predators	4.2	(1.3)	3.9	(1.4)	2.4	(0.7)	0.6	(0.2)	3.2	(0.6)
Unknown predators	16.8	(3.1)	3.9	(1.0)	10.9	(2.2)	14.7	(6.2)	12.3	(1.6)
Total	100.0		100.0		100.0		100.0		100.0	

(D)=Number suppressed to avoid potential disclosure of respondent.

USDA statistics for Washington State, 2015:
Dollar Value of cattle and calves killed by ALL predators in WA State in 2015
(No statistics for dollar value for just livestock killed by wolves.)
For all predators - these are the figures.

cattle $32,244,000
calves $9,293,000
total $41,537,000

USDA statistics for Washington State, 2015
For cattle and calves that were injured but not killed by predators in WA State
Dollar Value of cattle and calves injured but not killed by predators

cattle $119,000
calves $155,000
total $$274.000

Source of the USDA statistics:

#53. USDA, "***Death loss in U.S. Cattle and Calves due to Predator and Non-predator Causes, 2015".*** Published December 2017.

Note: These statistics for wolf-caused deaths and injuries were for 2015. Hopefully newer ones will be available soon. Does WDFW have these for each year? Will these be used in the EIS?

The USDA collected the data for these statistics by asking a sampling of livestock producers either through telephone calls or by visiting the operations. Data from this sampling was then used to create these statistics for all operations.

Statistics varied according to the size and type of cattle operation and where the cattle were when calving and grazing since these factors can greatly increase risks of all kinds including the risk and not just mortality caused by predators. The largest operations often graze and may do calving in the riskiest locations. For all causes, about one-third of cattle operations had deaths in adult cattle and 40% had deaths in calves.

Total reported deaths was about 3.9 million head, down about 4 million from 2010.
The inventory in 2015 was 78 million head of cattle and 34 million head of calves.
This was about the same as in 2010.
However cattle prices were significantly higher in 2015.
Calf deaths due to predators in 2015 were at 11.1 %, up from 3.5% since 1995 and 5.5% in 2010.

Why are these statistics in my scoping comments?

I believe they add some background info and offer some perspective when WDFW considers the importance of wolf-caused injuries and death of livestock. Could these wolf depredations simply be seen as "acceptable losses"? Aren't they just part of the risk assessment when grazing livestock in wolf territories? Especially significant when considering wolf-caused injuries and deaths as "acceptable losses" is seen when these are compared to other causes and especially when these are compared to non-predator causes.

Are the numbers of livestock depredations caused by wolves in the Kettle Range really so significant that WDFW should react by killing wolves? Is it cost effective when we consider: 1. the loss of wolves and impacts on wolves and packs, 2. the cost of lethal removal which is paid for by who - the public ???, 3.) the public's negative feelings of much of the public towards WDFW and ranchers when WDFW kills wolves, 4.) the loss of important apex predators in the ecosystem.

The public's negative feelings were so intense after WDFW slaughtered the OPT Pack this summer that WDFW was afraid to hold its scheduled open houses for the EIS scoping. Was killing the OPT Pack worth this? How many livestock did this pack kill and what were those livestock worth versus all of these bad feelings and the cost of lethal removal?

Ranchers are also on the receiving end of this anger.

The anger is greater when WDFW kills wolves on our public land, and when we know the producer did not use effective non-lethal deterrents because there are no effective ones for the way he grazes his livestock - dispersed - the number of cattle he grazes - and the size, terrain, and other characteristics of his allotments.

Isn't it reasonable that the public would be angry when WDFW tries to mislead us into thinking effective non-lethal deterrents were used and then blames the wolves when these ineffective non-lethals fail? We also know the non-lethals are not used correctly and consistently - something else WDFW tries to mislead us on.

Will the EIS use the statistics for dead and injured livestock in WA for each year wolves have been in WA State? Will the EIS put a dollar figure on these so we can compare this to the cost of reimbursement? Will the EIS do a good cost/benefit analysis of lethal removal and use of non-lethal deterrents? This should be an important part of the analysis and disclosure of info on impacts of predator control.

The statistics on the number of dead and injured livestock that were wolf caused also needs to be in the EIS. USDA collected and showed these statistics for the U.S. in 2015. We need this for WA State every year wolves have been in WA. USDA show far more injuries and deaths on larger operations for most causes. The big operations often had the most losses. Without doubt they have a done a risk assessment. Some of these operations own thousands of livestock and graze livestock for practically nothing on USFS's national forests. Their ability to make a profit far exceeds that of the small ranchers without leases on USFS land.

Aren't many people getting tired of subsidizing big businesses? These statistics on operation size and income are important.

Isn't the Public Trust Doctrine relevant to the EIS when predator control and recreational hunting are considered?

These concepts are well explained in the following article:

#54. Research:

#54. Adrian Treves, Guillaume Chapron, Jose V. Lopez-Bao, Chase Shoemaker, Apollonia Goeckner and Jeremy Bruskotter, ***"Predators and the public trust".*** *Biological Reviews,* Nov. 2015.

The fundamental principle of the "*Public Trust Doctrine*" is that "just" democratic governments must preserve environmental components as assets held in trust for current and future generations. Many countries and states in the U.S., including WA State, have accepted some legal responsibilities for environmental conservation to benefit citizens. Case law has recognized wildlife as part of this trust. Often it is predators who most need this protection and conservation.
ESA has stood up against court challenges based on this and other issues. Wolves were at the center of one controversy in Wyoming. The courts have also said state management is subject to federal court review. All lethal removal of wildlife should be subject to some review based on the public trust doctrine. Killing wildlife limits the uses and enjoyment of these species by others and by non-consumptive users.

The public trust logic suggests allocations for non-extractive uses (wildlife watching) should come before those that deplete the resource (hunting and predator control to protect livestock). The strictest accounting standards should be required based on the best available science. This requires decision-making that is not political and not biased towards any special interest, and is instead based on science. This also requires a high level of transparency and oversight. This prevents "tyrannies of the minorities or majorities". The Court's deference to agencies risks the take-over of courts by narrow,
special interest groups. Public trust principles need to be applied to appointments of all trustees. Otherwise public trust may be lost.

When wildlife destroys property, sometimes called "takings", courts have ruled that the government is not responsibility for these "takings". (Thompson, 1997)
Killing wildlife to protect private property, livestock, especially livestock on public lands, raises the question of whether the environment or a healthy business is more important. When this is coupled with the majority of the evidence that says indiscriminate killing of predators does not necessarily prevent livestock losses unless there is extreme eradication over large areas for a long time, lethal removal to protect livestock is difficult to defend. Under the public trust doctrine, managers, shouldn't managers error on the side of caution when the outcomes are unknown.

Reintroduced wild animals are more often subjected to lethal intervention. (Doremus, 1999)

If a broad public interest cannot be demonstrated for killing predators to protect livestock, then killing wolves becomes a private use of a public trust asset.

This means the "goals" for any lethal removal should clearly state both how the killing benefits the public's asset and how the goal and killing is based on the best available science.

Science-based reasons for not classifying predators like wolves as a "game species" that are hunted include these:

1. Most predators occur in far lower densities than almost all other game species. (elk, deer, etc.)
2. This sparseness is partly maintained by territoriality within and between species. Predators defend their territories (resources) more aggressively than most animals. (Palomares & Caro, 1989). Wolves attack coyotes. (Arjo & Pletscher, 1999.) and other wolves (Smith et al.2010.)
When wolf packs fight, the size of the groups is a major factor in who wins.(Smith et al.)
Human killing of wolves that removes individuals essential to the defense of territory may lead to a collapse of territorial defenses. (Whitman et al.) (Brainerd et al., 2008) (Borg et al., 2014)
This can decrease local density for some time, more if the pack is isolated from other packs. (Adams et al., 2008) This is why wolf populations may grow only slightly. (Fuller et al., 2003) (Cubaynes et al., 2014) Killing wolf packs may leave a void for some time which harms other users and maybe the ecosystem. They at least partially "self-regulate" their populations.
3. Wolf populations, wolf packs and individual wolves respond differently than most game animals when one or more wolves are killed. This may de-stabilize the pack. Breeding may not occur and pups may not survive. With fewer hunters, prey choice might be more limited, increasing chances that livestock will be attacked, and packs may dissolve.
4. When wolves are killed, this may impact wolf populations in adjacent areas as seen in Denali National Park and Algonquin Provincial park and Wisconsin. (Treves et al., 2009).

Is the Paradigm for Carnivore Conservation Shifting from predator control to co-existence when the best science and changing human values are considered?

The American Society of Mammalogists has often challenged widespread lethal control of native mammals, especially of government killing of carnivores in the western U.S. Consensus is emerging among ecologists that depleted or destabilized populations of large predators are negatively affecting the biodiversity and resiliency of ecosystems. This paper was developed at the 2013 annual meeting of the American Society of Mammalogists. It presents data and arguments from the perspective of ecology, wildlife biology and management, social science, ethics as well as from law and poligy that non-lethal methods of preventing depredation of livestock by large carnivores may be more defensible on ecological, legal, and wildlife policy grounds, and more tolerated by society than lethal methods, and that total mortality rates for
large carnivores may be driven higher than previously thought by human causes that are often underestimated."

#55. Article:

#55. Bradley J. Bergstrom, ***"Carnivore conservation: shifting the paradigm from control to coexistence".*** *Journal of Mammalogy.* 2017.

In the history of the Wildlife Services' predator control program, these figures were given:
In 2013, Wildlife Services killed more than 75,000 coyotes not counting 366 dens destroyed, 320 gray wolves, 345 cougar, 3,546 red and gray foxes, and 372 badgers. The annual and constant kills of coyotes has remained remarkably constant since 1939. (Berger, 2006) and (Bergstrom et al. 2014) This department does not monitor populations of species it kills nor overall mortality caused by other factors. It is estimated that federal and state managers killed 23.2% of the est6imated coyote population in Wyoming in 1994-1995 (Taylor et al.2009).

This level of human caused mortality must negatively impact the native ecosystems and biodiversity. Killing carnivores may also be unnecessary and counter-productive to its stated goals.(Treves et al.2016.)

This paper gives 5 categories of reasons why mammalogists and conservation biologists should be concerned:

1. Possible disruption of top-down forces in ecosystems resulting in loss of ecosystem resilience and biodiveristy,
2. The "bycatch" of unnecessary killing of non-target species with nonselective methods of lethal removal,
3. Population reduction of species valued by many parts of society for the benefit of a few favored special interest groups,
4. Ineffectiveness of lethal control of predators - either for reducing livestock depredations or for enhancing game populations, over the long term,
5. ethical considerations about both the intrinsic value of carnivores and humane methods of killing them.

Role of Apex Predators in ecosystems, (and "the top-down forcing")

Evidence collected as of 2011 by 23 prominent ecologists concluded that the loss of apex predators was a major driver of de-stablization and/or collapse of their native ecosystems, leading to diseases, pandemics, irruptions of invasive species, and/or lost ecosystem services.
Aldo Leopold pioneered these concepts. (Estes et al, **"Trophic downgrading of Planet Earth".** *Science,* 2011) A recent review (Binkley et al., "Was ***Aldo Leopold right about the Kaibab deer herd?".*** 2006) concluded Leopold was right. The current condition of rangelands can be attributed partly to depletion of native predators which increased both the number of native ungulates as well as the number of livestock grazing these lands. (Beschta et al. ***" Adapting to climate change on Western public lands: addressing the ecological effects of domestic, wild and feral ungulates".*** *Environmental Management,* 2013) The top-down forcing exerted by wolves on browsing prey had indirect positive effects on songbird communities in the Canadian Rockies. (Hebblewhite et al. ***"Human activity mediates a trophic cascade caused by wolves."*** *Ecology,* 2005) Restoration of wolves in Yellowstone benefited some riparian plant and animal communities. (Ripple and Beschta, ***"Trophic cascades in Yellowstone".*** 2012.) (Mech, ***"Is science in danger of sanctifying the wolf?"*** 2012.) The top-down forcing known as trophic cascade, had many indirect effects on other predators and on lower trophic levels. Facilitative interactions with sympatric large carnivores may occur, as with cougar and grizzlies. (Atwood, Geese and Kunkel, ***"Comparative patterns of predation by cougars and recolonizing wolves in Montana's Madison Range".*** *Journal of Wildlife Management,* 2007) Wolf predation may reduce the abundance of some songbirds and rodents in a 4-species interaction chain, releasing the lowest trophic levels of carnivores. (Levi and Wilmers, ***"Wolves-coyotes-foxes: a cascade among carnivores".*** *Ecology,* 2012.) Apex large carnivores may suppress mesocarnivores, indirectly, which may release small-carnivores to establish a more natural state. Killing of apex predators, conversely, may benefit mesocarnivores and suppress small-carnivores, increasing rodent populations. The sudden increase in Lyme disease in the eastern US my have been triggered by the removal of wolves and the increase in coyotes. A similar shift happened in Australia after lethal control of dingoes killed large numbers. Introduced mesopredators and herbivores damaged plant and animal communities. (Wallach et al., ***"Predator control promotes invasive dominated ecological states".*** *Ecology,* 2010.)

The removal of coyotes has been found to cause population irruptions and reduced diversity in rodent populations. (Henke and Bryant, ***"Effects of coyote removal on faunal community in western Texas".*** *Journal of Wildlife Management,* 1999.) Public hunting of cougars in WA State to reduce livestock depredations was not found to be effective. Neither did the eradication of the Eurasian lynx on sheep depredations unless the magnitude caused a total decline in lynx populations. (Herfindal et al., ***"Does recreational hunting of lynx reduce depredation losses?"*** *Journal of Wildlife Management,* 2005). Lethal removal of wolves could shift depredation from cattle to sheep by increasing the number of coyotes, which could then increase pronghorn mortality since coyotes tend to kill more pronghorn (fawns) than wolves. (Berger et al, ***Indirect effects and traditional trophic cascades: a test involving wolves, coyotes and pronghorn".*** *Ecology,* .2008) (Bergstrom et al., ***"License to kill: reforming federal wildlife control to restore biodiversity and ecosystem function".*** *Conservation Letters,* 2014)
Lethal removal of wolves in the northern Rocky Mts., at rates of up to 25% of the total population, actually increased depredation on livestock. (Wielgus and Peebles, ***"Effects of wolf mortality on*** 2014)

How effective is most predator control?

There are three reasons why predator control is likely to have no long-term effect - or even adverse effects - on depredation of livestock:

A.) **vacant territories** are re-colonized (Knowlton et al. ***"Coyote depredtion control: an interface between biolgocy and managment".*** *Journal of Range Management,* 1999) (Treves and Naughton-Treves, ***"Evaluating lethal control in the Management of human-wildlife conflict".*** 2005)
B.) **immigration** of breeding pairs into an area
C.) immigrants are more likely to be sub-adults which may be more likely to attack livestock than the older adults that are killed by lethal removal (Peebles et al., ***"Effects of remedial sport hunting on courgar complaints and livetock depredations.*** *PLoS ONE* 2013.)

Note: Simulation results suggest that even moderate nonselective predator control can potentially increase densities of the targeted carnivore species. Non-targeted deaths of co-occurring carnivore species decrease competition for the targeted species. (Casanovas et al. ***Shaping carnivore communities by predator control: compeitor release revisited".*** *Ecological Research,* 2012)

Predator Control to Enhance Game Species

Regulation of Prey Densities and Wolf density
Is Population Density Self- Regulation in Wolves?

The Association Society of Mammalogists has supported some lethal control to protect endangered species, but lethal removal to enhance common game species may turn out to be unnecessary, at the best, and harmful at the worst. (Mech and Peterson, "***Wolf-prey relations".***
in *Wolves: behavior, ecology and conservation,* 2003, Chicago Press, pages 131-160.
2003) (Wright et al, ***"Selection of northern Yellowstone elk by gray wolves and hunters".*** *Journal of Wildlife Management,* 2006). Natural predation is the most important selective agent for prey.

#56: Research:

Recent studies have concluded that wolf populations are intrinsically density dependent. Rather than simply being control by prey-density as previously thought, wolf densities are regulated through social interactions, with increasing inter-pack aggression and mortality at higher densities.

#56. (Cariappa et al.,***"A reappraisal of the evidence for regulation of wolf populations".*** *Journal of Wildlife Management,* 2011) (Cubaynes et al., ***"Density-dependent intraspecific aggression regulates survival in northern Yellowstone wolves".*** *Journal of Animal Ecology,* 2014)

Large carnivores have been found to limit prey populations, broadly, and in specific predator-prey interactions (Binkley et al., ***"Was Aldo Leopold right about the Kaibab deer herd?,*** *Ecosystems,* 2006) (Ripple and Van Valkenburg, ***Linking top-down forces to the Pleistocene megafaunal extinctions".*** *BioScience,* 2010) (Christianson and Creel, ***"Ecosystem scale declines in elk recruitment and population growth with wolf colonization: a before-after-control-impact approach".*** *PLoS ONE,* 2014), but the effect of reduction or removal of predators on densities and dynamics of prey populations in any specific case an be hard to predict. Experiments removing coyotes and cougars in Idaho showed winter weather to be much more important than predation in predicting population trends of mule deer. (Hurley et al.***"Demographic response of mule deer to experimental reduction of coyotes and mountain lions in southeastern Idaho."*** *Wildlife Monographs,* 2011) A 7 year effort to removal all mammalian nest predators of ground-nesting birds (coyotes being the largest) from study sites in SE U.S. concluded that removal had no net effect on nest predation, primarily because of compensatory increases in predation by snakes. (Ellis-Felege et al. ***"Redator reduction results in compensatory shifts in losses of avian ground nests".*** *Journal of Applied Ecology,* 2012.)
A meta-analysis of 113 predator removal experiments found the intended beneficiary prey populations declined in 54 of them. This shows the multiple indirect pathways of potential top-down forcing that may be altered by removal of an apex predator from a complex food web, "apparent competition" with an alternate ungulate prey species, mediated through a different predator that increases compensatorily. (Serrouya et al. ***"Using predator-prey threoy to predict outcomes of*** 2015.) Another pathway involves the release of a mesopredator that preys preferentially on young of the same ungulate prey species. (Prugh and Authur, ***"Optimal predator management for mountain sheep conservation depends on the strength of mesopredator release".*** *Oikos,* 2015.)

Use of non-lethal methods

Non-lethal methods such as guardian dogs and livestock protection collars to prevent depredation by leopards, caracals and jackals in South Africa were found to be less expensive and more effective than lethal predator control. (McManus et al., ***Dead or alive? Comparing costs and benefits of lethal and non-lethal human-wildlife conflict mitigation on livestock farms".*** *Oryx,* 2014)

A 7 year pilot project in prime wolf habitat in Idaho used adaptive use of many non-lethal deterrent strategies. This reduced sheep depredation by 3- fold compared to sheep allotments in Idaho using lethal removal. On large-scale operations losses are sometimes greater and use of non-lethal deterrents is sometimes minimal. This study compared sheep losses between grazing areas using non-lethal deterrents and those that did not. Losses on areas using non-lethal deterrents were 3.5 times lower and no wolves were lethally removed. Losses added up to only 0.2% of the total number of sheep that were grazed, a number that could be absorbed by compensating the producer for losses rather than killing wolves. Wolves were killed in areas not using non-lethal, which were not required in Idaho. (Stone et al., *"Adaptive use of non-lethal strategies for minimizing wolf-sheep conflict in Idaho"*, *Journal of Mammalogy,* 2017.)

Could the non-lethal methods be used in the Kettle Range where allotments are large? No, not unless the grazing plan was like the one used in this study - sheep herded and kept together in closely watched groups - within large openings - by herders and dogs so all of the livestock could be seen and protected almost 24/7.

Results from a large cattle station in Australia that stopped lethal removal and implemented non-lethal methods showed that when the predator population stabilized, cattle mortality decreased. Improved husbandry produced the best results. The last two studies failed to meet the "gold standard" discussed by Treves (Treves et al., ***"Predator control should not be a shot in the dark",*** *Frontiers in Ecology and Environment,* 2016.) but their results provide important information on workable alternatives to lethal control. Both studies showed that stable, naturally regulated populations of social carnivores that are not significantly impacted by human lethal removal can be a better option than lethal removal. Both also restore the natural, functional role of apex predators to ecosystems. Excessive harvest of adult male cougars have shown similar results. The adult males were replaced by immigrating adolescent males which were more likely to attack livestock. (Peebles et al. , ***Effects of remedial sport hunting on cougar complaints and livestock depredations".*** *PLoS One,* 2013.)

Social acceptance of lethal removal

While the public still may accept some lethal removal of predators, there is low and declining acceptance of lethal removal. Large carnivores are now being seen as a public trust asset (Bruskotter et al., ***Rescuing wolves from politics: wildlife as a public trust resource".,*** *Science,* 2011) (Treves et al.***" Predators and the public trust".*** *Biological Reviews,* 2015) Traditionally some government resource agencies or boards that rule them, or both, have favored narrower constituencies within the public. Often the state agencies have elected to favor and promote hunting opportunities for certain species, including large carnivores, even when citizens opposed to this hunting greatly outnumber those wishing to hunt these animals. In the State of Michigan, a public wolf hunt was instituted after wolves were delisted. (Vucetrich et al. ***"The principles of wildlife management and wolf harvesting in Michigan".*** *Journal of Mammalogy,* 2017.) Many argued that this was not supported by the best science or by most of the public, and that the role of wolves in Michigan's ecosystems was being ignored by the state agency. The best science has raised many issues about direct and indirect impacts of hunting and predator control, and have challenged standard models used to determine population viability and sustainability. Scientists are suggesting management based not only on population numbers, but also on social factors (social pack management) and on ecosystem functioning, (ecosystem-related management) . (Treves et al., ***"Gray wolf mortality patterns in Wisconsin from 1979-2012",*** 2017) This study suggested that over one-third of mortality of wolves over the past 3 decades in Wisconsin may be due to poaching and another 13% to vehicle collisions. This brings into question total mortality data often used by wolf managers. (Treves et al. 2017) This suggests managers would try to reduce or eliminate human-caused mortality wherever possible.

#57. Research:

Too often studies of the effectiveness of predator control fail to look at the impacts beyond the livestock operation where the predator control happened. This study looked at possible impacts beyond the single operation - to the neighborhood and even the section, and over 17 years to evaluate effectiveness of predator control. Most studies fail to do this. Authors doubted the accuracy of all of their data, which was from government dataset. Changes in conditions over

the long time period and inaccuracies in descriptions of lethal and non-lethal methods may have also biased the results. Authors suggest more studies like this are needed before managers rely on lethal removal.

#57. Francisco J. Santiago-avila, Ari M. Cornman, and Adrian Treves,
"Killing wolves to prevent predation on livestock may protect one farm but harm neighbors".
PLoS One, 2018.)

Findings: For lethal removal, authors found an increased risk of hastening recurrence, by 22%. A significant increase was found in risk of recurrence of 14% every calendar - year. No relationship was found between the number of wolves killed and delay to reoccurrence. Results show that over 17 years, risks of depredation increased by 9 and 14% per year at the section and neighborhood sale. Authors suspected tht higher density of wolves did not necessarily mean more livestock depredations.

Summary of Research and Issues Related to Predator Control: Killing wolves to protect livestock

If predator control is included in any of the alternatives in the EIS, the standards will be high for convincing the public that this is necessary for many reasons. Some are related to the state's obligations under the Public Trust Doctrine to manage wolves for all of the public. Predator control kills wolves, a publicly owned asset. Predator control allocates a part of this public asset to a very small special interest group, livestock producers. The public often ends up paying the costs of predator control without being asked. Wolves are often killed on the public's land. Research is accumulating that shows it is not necessarily effective, especially long-term, and that non-lethal deterrents are often as effective if not more so. This research also shows husbandry practices are often the problem and until these change, no amount of lethal or non-lethal control will work.

Predator control is becoming more controversial as more and more research raises doubts about its effectiveness, both short and long term. Research is showing that it has negative effects beyond the area where it is used. Studies are showing that it is not more effective than non-lethal deterrents and/or reimbursing producers for losses. Many are questioning its benefits versus its costs. Costs? It can be expensive in dollars. Predators are killed. State agencies lose the public's trust and support. Recent studies show it also devalues wolves and increases the likelihood that some will think poaching is okay.

Because the best research has raised so many questions about predator control, if the EIS includes this in any alternatives, it will need to establish clearly stated goals for why it is needed and present an overwhelming amount of science that says predator control will achieve these stated goals. available science.

Many of the broader studies as well as many experts have agreed on this; unless livestock producers change and adapt their basic husbandry practices until they find ones that are effective for their grazing situation, they will continuously have losses due to predators including wolves. There is also broad agreement that when livestock is dispersed across large, wooded grazing areas that are inhabited by wolves, no non-lethal or lethal deterrents will work for long. Research shows that wolves are opportunistic hunters who roam long distances and will make prey choices based on what is most available, what is easiest to kill, and what will provide an adequate amount of food.

The Sampling of Research Addressing Predator Control

#40. Camilee Imbert, Romolo Caniglia, Elena Fabbri, Piertro Milanesi, Ettore Randi, et. al., ***"Why do wolves eat livestock? Factors influencing wolf diet in northern Italy".*** *Biological Conservation.* 2015.

#41. Douglas W. Smith, L. David Mech, Mary Meagher, Wendy E. Clark, Rosemary Jaffe, Michael K. Phillips and John A. Mack, ***"Wolf-Bison Interactions in Yellowstone National Park".*** Journal of Mammalogy, 2000.

#42. Adrian Treves, Miha Krofel, and Jeannine McManus, ***"Predator control should not be a shot in the dark".*** 2016.

#43. Arian D Wallach, Daniel Ramp, and Adam J O'Neill, ***"Cattle mortality on a predator-friendly station in central Australia***". 2017, *Journal of Mammalogy*

#44. Bradley J. Bergstrom, et. al., ***License to Kill: Reforming Federal Wildlife Control to Restore Biodiversity and Ecosystem Function".*** *Conservation Letters,* 2014.

#45. Robert B. Wielgus and Kaylie A. Peebles, ***"Effects of Wolf Mortality on Livestock Depredations".*** December, 2014.

#46. Many studies show that if control takes place during the breeding season and a member of the breeding pair is killed this may lead to pack instability and increased breeding pairs. (L. D. Mech. 2010.) (G.C. Haber. 1996.)

Loss of a breeder in a pack during or near the breeding season can reslult in dissolution of territorial social groups, smaller pack sizes and compensatory density dependent effects such as increased per-capita reproduction. (Brainerd et al. 2008.)
(B. M. VonHoldt, Stahler, Smith, et. al. 2008.) (D. L. Murray, Smith, Bangs, et al. 2010.)

The culling of wolves may also cause frequent breeder turnover and related social disruption which can result in reduced effective prey use through such things as loss of knowledge of prey sources and the ability to kill prey. This can result in increased livestock depredations. (Brainerd, Bangs, Bradley, et. al. 2008) Sand, Wikenros, Wabakken, et al. 2006) Stahler, Smith Guernsey. 2006.)

#47. More sources: The 2011 WA Wolf Management Plan for Recovery,
the Elizabeth Bradley Study, 2015, and Dr. Douglas Smith's Presentation to the Pacific Wolf Coalition

#48. Western Wildlife Outreach, Jane Hutchinson, "*Living with Livestock and Wolves. Wolf-Livestock Non-lethal Conflict Avoidance: A Review of the Literature."* WDFW Website, 2014.

#49. Carter Niemeyer, **"*Corrected Declaration of Carter Niemeyer - 12- NO 18-2-10130-34".*** *Superior Court of Washington for Thurston County, Petitioners: Center for Biological Diversity and Cascadia Wildlife, Respondents: Washington Department of Fish and Wildlife, Kelly Susewind.* August 2018.

#50. J. S. McManus, A. J. Dickman, D. Gaynor, and B. H. Smuts, ***Dead or Alive? Comparing costs and benefits of lethal and non-lethal human-wildlife conflict mitigation on livestock farms."*** 2014.

#51. Adrian Treves has studied this extensively at the lab he founded and directs, the Carnivore Coexistence Lab, at the University of Wisconsin-Madison.

#52. Adrian Treves and Jeremy Bruskotter, " ***Tolerance for Predatory Wildlife"***. 2014.

#53. USDA, "***Death loss in U.S. Cattle and Calves due to Predator and Non-predator Causes, 2015".*** Published December 2017.

#54. Text copied from the 2015 WDFW Wolf Report

#55. Adrian Treves, Guillaume Chapron, Jose V. Lopez-Bao, Chase Shoemaker, Apollonia Goeckner and Jeremy Bruskotter, ***"Predators and the public trust".*** *Biological Reviews,* 2015.

#55. Bradley J. Bergstrom, ***"Carnivore conservation: shifting the paradigm from control to coexistence".*** *Journal of Mammalogy.* 2017.

#56. (Cariappa et al.,***"A reappraisal of the evidence for regulation of wolf populations".*** *Journal of Wildlife Management,* 2011) (Cubaynes et al., ***"Density-dependent intraspecific aggression regulates survival in northern Yellowstone wolves".*** *Journal of Animal Ecology,* 2014)

#57. Francisco J. Santiago-avila, Ari M. Cornman, and Adrian Treves,
"Killing wolves to prevent predation on livestock may protect one farm but harm neighbors". *PLoS One, 2018.)*

2C

Recreational Hunting: Killing Wolves for Recreation and Trophies

Many of the issues related to hunting are similar to those for predator control. This section will focus mostly on those relating only to recreational hunting of wolves. See the research and discussion in 2A and 2B for additional info on lethal removal and its impacts and costs.

Hunting is usually an "indiscriminate killing" of wolves, meaning wolves are killed without regard for who the wolf was, or the role the wolf played in its wolf pack or in the ecosystem where it lived.

#57. Research:

#57. Change to #9 (24.) Gregory J Wright, Rolf O Peterson, Douglas W. Smith, and Lemke, ***"Selection of Northern Yellowstone Elk by Gray Wolves and Hunters".*** 2010.

Selection of elk by hunters in the Gardiner Late Hunt was compared to the selection of elk by the northern Yellowstone wolves. Both were hunting northern Yellowstone elk. Harvest data was from 1996 - 2001. Effects were assessed on reproductive female elk. An index was created of total reproductive impacts to measure impacts to calf production due to hunting and wolf predation.

Findings showed the age classes of female elk selected by wolves and hunters were significantly different. Hunters selected a large proportion of female elk with the greatest reproductive values, whereas wolves selected a large proportion of elk calves and older females with low reproductive values. The mean age of adult females killed by hunters throughout the study period was 6.5 years, while for wolves, it was adult elk kills was 13.9 years. Hunters exerted a greater total reproductive impact on the herd than wolf predation.

The combined effects of hunters killing prime-aged females (2 to 9 years old), wolves killing calves, and predation by other predators has the potential to limit elk populations in the future. However, Yellowstone is unique in that multiple hunters of elk are involved; humans, wolves, grizzly bears, black bears, cougars and coyotes. Adaptive management reduced the harvest of female elk in the Gardiner Late Hunt by 72% in 1997, from 2,221 to 620. Further reductions may be necessary based on non-human predators and environmental factors like weather and climate that impact elk survival.

#58. Two Research Studies:

#58A. Richard Zechnauser, ***"Human hunters and nonhuman predators: Fundamental differences."***

#58B. Florian K. Diekert and Andries Richter, et al., ***"How constraints affect the hunter's decision to shoot a deer",*** 2016.

This study looked at human hunting behavior in Norway and its impact on game species.

Zechnauser concluded tht humans have powers not available to animal predators, both whether to kill prey and to prevent such killing. Some powers are exercised individually, others are the result of collective decisions made by state wildlife agencies. The often strongly selective hunting of humans may have unexpected ecological and evolutionary consequences. The author suggested that human hunters are more capable of limiting hunting activity than is currently occurring.

In this study, authors argued that hunting is not like "harvesting" livestock on a ranch or farm, as sometimes implied in game management. These were some of the difference that were discussed:
1. Most hunting is for recreation, meat or population regulation.
2. Most hunters have quotas limiting their choices and they have a limited time to fill these. When given a choice,
3. Many hunters refrain from killing females or young animals.
4. When trophy hunting is the goal, very specific traits are sought by hunters, raising questions about the impacts of trophy hunting.
5. Hunters usually cannot or do not carefully select the animal they kill in the same way that a farmer does who is raising animals on his farm for meat.
All of these factors create a situation that is not like "harvesting" farm animals. These factors have also led to concerns about hunting leading to unnatural and perhaps unhealthy changes in both species and in ecosystems.

The study found that hunter selectively decreased when more hunters were competing for the game animals and towards the end of the hunting season.

#59. Research

The unique traits of various species of wildlife were continually shaped and reshaped by thousands of years by natural ecosystems and natural process. We see this in the specialized adaptations of pronghorn, elk and moose, and in the complex and dynamic social lies of wolves.

In stark contract with natural process and natural predators, humans now typically exploit high proportions of prey - now predator - populations. Often humans want to target the large, reproductive-aged adults when hunting. This research looked at the impacts of this sudden and dramatic change in the forces that shape and reshape wildlife and ecosystems. Are these ecosystems and animals still as healthy? Authors looked at both human-harvested systems and natural systems.

#59. Darimont, Carlson, Kinnison, et al., ***"Human predators outpace other agents of trait change in the wild."*** *National Academy of Science ,USA,* 2009.

Findings: Harvested organisms showed some of the most abrupt trait changes ever observed in wild populations, indicating that these are capable of changing rapidly.
Some showed an average decline of almost 20% in size-related traits. Almost 20% showed changes in life history traits. Commercially exploited systems showed the most rapid changes. That harvest can quickly change size and life histories suggests that ecological dynamics may also be affected, challenging ecosystem health. Mean and maximum changes were greater than in natural systems.

Authors suggested the extent of the changes they found were direct and consistent results of humans. Humans predators often focus directly on specific traits of species and try to maintain this selection over time. Human predators target fundamentally different age and size classes than natural predators. (Law, ***"Fishing, selection, and phenotypic evolution".*** *2000) (Fenberg and Roy,* ***"Ecological and evolutionary consequences of size-selective harvesting: How much do we know?"*** *2008.) (Hutchings and Fraser,* ***"The nature of fisheries - and farming - induced evolution."****2008.) (Coltman, et al.,* ***"Undesirable evolutionary consequences of trophy hunting".*** *Nature,* 2001.)

Indirect changes depend on 1. the environment's response to human activities and 2. how individual species respond genetically and plastically.
(Carlson, et al., ***Four decades of opposing natural and human-induced artifical selection acting on Windermere pike",*** *Ecological letters,* 2007)

Could these changes affect changes in populations and ecological dynamics including those that affect population persistence? (Yoshida, Jones, et al., ***"Rapid evolution drives ecological dynamics in a predator-prey system."*** *Nature, 2003.) (Kinnison and Hairston,* ***"Eco-evolutionary conservation biology: Contemporary evolution and the dynamics of persistence".*** *Functional Ecology,* 2007.) (Fussman, Loreau and Abrams, "***Eco-evolutionary dynamics of communities and ecosystems".*** *Functional ecology,* 2007.) (Kinnison and Unwin, et al, ***"Eco-evolution vs habitat contributions to invasion in salmon".*** *2008.)* Changes may include ones like shifting reproduction to smaller sized individuals and younger individuals.

What could the effects of these changes mean for - wolves or elk or cougar?

Or should we assume this is only going to happen to species of fish?

Heavy harvesting of coyotes seems to have caused major changes coyote behavior and the dynamics and complexity of their family or pack units. Studies of coyotes in Yellowstone showed they lived in large, extended families similar to those found in wolf packs in Yellowstone. With the introduction of wolves, a larger predator, this changed. The same is true of wolf packs where they are harvested as compared to those in Yellowstone that are both larger and more socially complex and related

#60. Review of Research Articles. The "*Public Trust Doctrine"* and "*North American Model of Wildlife Conservation"* both raise important issues that are relevant to hunting wolves. The public is divided on many of principles in the North American Model which is widely supported by hunters.

Shouldn't this EIS address these issues since residents of WA State are very divided over hunting and only 2.42% of the residents purchased any kind of hunting license in 2018 while wildlife watching is WDFW's largest stakeholder group and its numbers keep increasing? Often this majority feels unheard by wildlife agencies that often focus on the interests of the dwindling number of hunters. How much time and effort has WDFW put into trying to recruit more hunters in WA? Hasn't WDFW tried to make hunting more appealing to young people and women? Many of these non-hunting stakeholders are avid wolf supporters and wildlife watchers.

The authors questioned the goal/goals of a post-recovery hunting season for wolves in 2013, in Michigan. The basic premises found in the Wildlife Society's "*North American Model of Wildlife Conservation"*. were critiqued. This document is widely supported by hunting groups. Often those outside the hunting community feel disempowered and without adequate representation in the management of wildlife. (Nie, 2004).

#60. John Vucetich , Jeremy Bruskotter, Michael Paul Nelson, Rolf O. Peterson, et l., ***"Evaluating the principles of wildlife conservation: a case study of wolf hunting in Michigan".*** *Journal of Mammalogy,* 2017.

Basic principles in the "*North American Model of Wildlife Conservation"* include these: wildlife resources are a public trust, allocation of wildlife resources is by law - and principles of democracy, wildlife can be killed only for legitimate purposes, wildlife is considered an international resource, science is the proper tool to use when managing wildlife, and one of the most controversial, "democracy of hunting is standard". Hunting is challenged using several of these principles.

The failure of some state wildlife managers to identified clear, science-based goals when allowing hunting is questioned. Authors argue that science-based goals that not only justify hunting but also reflect the values and interests of most of the public are necessary when managing a public trust asset like wolves. Authors argue that managers must also answer this question: does hunting achieve the stated goals?

Authors argued that in Michigan the goals for the public hunt were not clear, not based on the best science, and the state could not show that hunting would achieve the stated goals. They also argued that the principles of democracy were not used and instead, the interests of a small minority were being advanced over the interests of the majority. In Michigan, the goal of the wolf hunts was protecting human safety and livestock. both were challenged for several reasons.
Does wolf hunting make the public safer? Does it reduce livestock depredations? What does the best science say? These goals imply that hunting will change wolf behavior.

The goals of the wolf hunt were also stated another way: to reduce the number of complaints and the number of livestock losses. Does the best science support either of these? Do these goals indicate that managers are interested in the interest of the majority of the public or a small special interest group? If wildlife losses are occurring, is hunting the answer, or should wildlife husbandry practices and rancher's use of non-lethal deterrents be the focus? Does science show that hunters will kill the wolves that are preying on livestock? If threats to public safety is a big concern,
is that based on the best science? Will hunters kill the wolves that are most apt to threaten human safety? Or could hunting increase the chances of livestock losses as some science suggests?

In the North American Model, public trust means that all citizens should benefit from wildlife management, not just small special interest groups such as hunters and ranchers. (Bruskotter et al. 2011) Yet many citizens who are non-hunters are not even aware that they can be engaged and can benefit from wildlife management because the focus of most state wildlife agencies is
one stakeholder group, hunters. This extremely out-dated model fails to reflect the changes in the interests and attitudes of most of the public. Few people want to hunt or trap wild animals today.
The hunting community, with the help of WDFW, works hard to explain the role of hunting to a public that is no longer interested in this use of wildlife.

When will WDFW realize that its largest stakeholder group is not hunters, today, residents of WA State are far more interested in wildlife watching, hiking and camping that has nothing to do with killing wild animals?

When non-hunting citizens in Michigan tried to exercise their rights - when the issue of hunting wolves came up - they were disappointed and turned to the referendum process to be heard. Non-hunters are now discussing the need to do the same thing because we are not being heard by WDFW. WDFW's lack of interest in the views of non-hunters - and non-ranchers - and the undue influence of special interest groups is only too clear when looking at appointments to its Wolf Advisory Group (WAG). Even though this group's focus is on an endangered species, the vast majority of the members of WA are hunters or strongly favor hunting. Many are ranchers and quite a few are both hunters and ranchers. The general public, that consists of few hunters or ranchers has few seats on WAG.

Wildlife managers often oppose wildlife management by referenda (Mech 1996) on the grounds. that the public is not adequately qualified to make these decisions. This is easy to challenge when wildlife managers fail to use the best science and favor special interest groups. In WA State, citizens used a ballot measure to stop cougar hunting with hounds and to outlaw some kinds of methods to kill wildlife after WDFW and the legislature failed to listen to their concerns. The North American Model says wildlife should not be killed for "frivolous use", meaning there should be adequate reasons for hunting and predator control.

In Michigan, and probably in WA State, wildlife managers believed killing wolves would increase social tolerance. Science says the opposite is true and these devalue wildlife. Studies in both Wisconsin and Montana showed that after wolf hunting was allowed, social tolerance did not improve, and even illegal poaching did not decline. (Bruskotter et al. 2014) Pauley, 2013) Andren et al. 2006) Treves 2009) and Browne-Nunez et al. 2015.) Attitudes towards wolves actually were more negative when legal lethal control was allowed than when wolves were fully protected. (Treves et al. 2013)

Authors argued that it is hard to make a case for killing wolves to decrease hatred or intolerance of wolves. It actually makes the opposite statement, that wolves are not value. Yet state wildlife managers still yield to those who hate wolves by allowing more legal killing of wolves. This reflects the history of predator management in the U.S., one that saw the total eradication of predators in large parts of the U.S. That sentiment, fear and hatred of predators, especially larger predators, still exists today. How do wildlife managers respond to this and meet their public trust obligations to protect and restore predators to our ecosystems so they again function as apex predators as they did for thousands of years?

Wouldn't education be a better way to increase social tolerance of wolves and reduce some people's fear of wolves?

Wildlife managers must explain to the public why wolves should be hunted.
What is the purpose?
Does the best science support the claim that hunting will address this purpose?

Will citizens use the ballot box to address its concerns about wolf management? Can WDFW really defend its position that its killing of wolves will "change pack behavior" or reduce livestock depredation in the Kettle Range for anymore than a very short time? Yet WDFW continues to defend its killing of wolves using these goals - repeatedly killing packs and individual wolves for the Diamond M Ranch - the Wedge Pack in 2012, the Profanity Peak Pack in 2016, the Sherman Pack, and now, in 2019, the OPT Pack. Citizens finally convinced Governor Inslee to get involved. If he fails to address these concerns, is the ballot box next? If wolf hunting is allowed, this may convince the 97.58% of the residents of WA State who do

not purchase hunting licenses to use the ballot box for wolf management. Michigan residents lost trust in their state agency. Are there signs that this is happening in WA State?

When wildlife managers decided to allow public hunting of wolves after delisting, its goals were sometimes unclear and/or questionable. Wolves are a public trust asset; they belong to the public, so wolves should be managed for all of the public using the principles of democracy. Wildlife managers also have a responsibility to use the best available science when making decisions. Managers should be able to explain the purpose or goal of the action, how the action will meet this purpose or goal, and why the purpose or goal is appropriate for the public it serves. These are all especially when managers consider practices like hunting - and predator control - that deplete the public asset, wolves.

In some parts of Michigan State, the goal of the hunt was to reduce wolf abundance so threats to livestock and human safety would be reduced. Is this true? If hunters kill the allowable number of wolves, will livestock and humans be safer? Much of the research shows even predator control of specific packs that have attack livestock does not necessarily make livestock safer. What research shows that killing the allowable number of wolves will make humans safer?

Does the best science tell us
that recreational hunting, indiscriminately killing of wolves,
reduces attacks on livestock, that it serves as a form of predator control?

Does the best science tell us
that recreational hunting, indiscriminately killing some wolves, makes humans safer?

#61: Review:

This review looks at several key issues that should be considered before carnivores are hunted.

#61. Adrian Treves, ***"Review: Hunting for large carnivores conservation".*** *Journal of Applied Ecology*, **2009.**

Unlike some prey species, social carnivores like wolves have complex patterns of behavior and population dynamics that must be understood before decisions are made to lethally remove single wolves or wolf packs. Years of landscape-level monitoring is needed to understand these. This has become obvious as wolves in Yellowstone National Park are observed and data is collected on a daily basis, at the individual wolf level, the pack level and the landscape level. Many things are still not known or fully understood. Many studies show the importance of stable wolf packs, as noted previously, for pack success and as a way to decrease the changes of attacks on livestock. Killing wolves without knowing the consequences is not sound wolf management. Managers must invest in far more monitoring to consider all of these complexities.

A review of the literature that looks at whether hunting prevents property damage or reduces competition for game shows large gaps in our understanding of these issues. At most, the best science is telling us that these are far more complex than one might think. For instance, reducing the number of wolves, may change prey behavior that may or may not benefit the ecosystem and it may change the number and behavior of other predators, both larger and smaller, which may in turn have consequences. Reducing wolf numbers to reduce attacks on livestock is problematic

for many reasons, as many studies suggest. Montana tried to use hunting to decrease livestock depredations. Quotas were set by the level of livestock losses and no quotas were maintained in some agricultural areas. Systematic study raises doubts about the underlying assumptions. (Jorgensen et al. 1978) (Sunde, overskaug and Kwam, 1998,) (Huygens et al. 2004) (Garshelis, 1989.)

One assumption is that the wolf that is killed by hunters would otherwise be the one who damages property or competes for the desired game species. (Conover, 2001) (Bartel and Brunson, 2003) If it is a species the wolf evolved to eat, competition is more likely. Individuals differ in their tendency to attack livestock. Usually it is the minority. (Wydeven et al. 2004) Chavez and Gese, 2005, 2006) Stander 1990) (Sacks, Blejwas and Jacger, 1999) Angst, 2001) Treves and Naughton-Treves, 2005) Hunters are unlikely to kill the culprits. The age and sex of carnivors that damagte property usually differ from those hunters most often choose. (Faraizl and Stiver, 1996) (Linnell et al, 1999) Hunters also have traditional hunting areas and habits that don't always fit predators well. Some prefer to hunt in wildernesses which could displace carnivores to areas with more people. Hunters sometimes injure their quarry, leaving carnivores more prone to turn to human foods because of their decreased ability to hunt. (Rabinowitz, 1986) Marker et al. 2003)

Another assumption is that hunting will decrease the chances of attacks on livestock by the remaining, surviving wolves. This has not been supported by science. Hunting may select against wolves who have learned to avoid property. (Jorgensen et al, 1978.) (Woodroffe and Franck , 2005)

There are clearly a complex interplay of direct and direct effects of hunting with equivocal results. No studies of the effect of bounties showed a positive effect of reducing property damage. Bounties have not temporarily or permanently reduced coyote abundance or subsequently reduced livestock depredations. (Bartel and Brunson, 2003, page 736) (Berger, 2006) Results of bear hunting have shown mixed results.

Public support for wolf hunting is usually low when it is measured scientifically. When wolves have been hunting, this did not decrease illegal poaching, and in some studies it increased the likelihood that people would consider poaching.

Hunters may indirectly deter carnivores from people and their property - because of the fear factor. This can also negatively affect the opportunity of for other people who want to see or hear wolves to enjoy these experience. Wildlife watchers are the largest stakeholder group for WDFW and the one that is growing the fastest. Does hunting increase favorable attitudes towards carnivores? A study of bear hunting found no difference between residents in areas where they could hunt bears and residents in other areas where bear hunting was not allowed. (Kaczensky, Blazie and Gossow, 2004). It cannot be assumed that hunters who hunt wolves will have positive attitudes towards wolves. Hunters in Wisconsin and the Northern Rocky Mts were studied between 2001-2007 were not ready to champion wolf or grizzly bear conservation. (A Treves and K.A. Martin, unpublished data 2009) However, hunters may feel less inclined to kill wolves outside the hunting season because they value them as "game". Though studies of lynx and wolf hunting in Scandinavia did not show this. (Andren et al. 2006) (Adams et al., 2008) Person and Russell, 2008.)

Is hunting necessary to control the number of wolves?

Do wolves need to be hunted to limit population growth? Studies are showing that in some areas, wolves are limiting their own growth at a level below what might alter the ecosystem, unlike some

other species that can grow large enough to degrade ecosystems. Density-dependent factors regulating wolf populations size include intra-species aggression and indirect competition for resources. Hunting can limit prevent wolves from colonizing an area where they are not wanted.

#62. Research: Many studies have shown that hunting effects wolf behavior at many levels, including at the individual, pack and population levels. Hunting has been shown to alter the age and sex structures of packs. (Ginsberg and Milner-Gulland, 1994) (Milner et al. 2007), and reproductive rate (Knowlton 1972) (Ausband et al. 2015) and ultimate growth of a population. (Pauli and Buskirk, 2007.)

This study looked at whether human killing of wolves (both hunting and trapping) affects the abundance and distribution of wolf packs, the frequency of change in pack occurrence (turnover) when compared to environmental factors. Genetic sampling of wolves, hunter surveys and occupancy models were used to evaluate the effects of hunting and trapping of wolves in the Canadian Rocky Mountains, 2012-2014. The number of wolves killed was determined by surveys, not actual data, which may have created a bias since all harvests are not reported, including those that are done without licenses. Data was also not collected for 2014 creating a possible bias for occupancy rates at the end of the study.

#62. Sarah B.Bassing, David E. Ausband, Michael S. Mitchell, Paul Lukas, et al. ***"Stable Pack Abundance and Distribution in a Harvested Wolf Population".*** *The Journal of Wildlife Management*, 2018.

Findings:

Hunter surveys did not provide accurate data on wolf packs:
Interestingly, authors found that they could detect a wolf pack through rendezvous site surveys with far more accuracy than was found in surveys of hunters. This raises questions about wildlife managers using data collected by hunters to make management decisions as is being done now in some states to reduce costs for state wildlife departments.

Forest Cover was an indicator that a territory would be used by a pack:
Findings showed wolves usually occupied areas with forest cover. Wolf density was related to forest cover. Habitat was a strong indicator of occupancy. Authors believed this offered security habitat for wolves in a human-dominated landscapes like the ones in the study area. Would this be different if human hunting did not occur? These results show higher quality habitat is occupied regardless of the associated risks of human hunting.

Pack turnover:
Authors found far more instances of frequent turnover of individuals within the 3 packs sampled than in whole pack turnover. Turnover of breeders occurred with dispersers from other packs replacing them or a subordinate pack member replacing the lost breeder. This suggests that social structure or dispersal are also important factors in determining wolf density and distribution. Most packs lost members to hunting but most packs persisted. Most turnover of individuals was caused by human harvest. Hunting and trapping occurred during the breeding season and when dispersal was greatest. (Late winter and early spring in the research area.) Authors suggested replacement of lost breeders may have occurred faster because of this timing. Most new members were dispersers from neighboring or nearby packs. Human hunting and trapping had little impact on whether a

territory would be occupied. Other studies have shown that human activities such as roads or building density influenced choice of habitats.

Prey density as a factor in wolf occupation of a territory:
Prey density was not part of this study. However other studies found wild prey densities were highest at lower elevations in the foothills of the study area and this study found the highest occupancy rates for these areas too. Other studies also showed elk selected for forests an shrublands over grasslands as snowpack decreased. Elk selected these especially in the summer and fall.

Understanding the impacts of this turnover on the demographics, genetics, and behavior of wolves and wolf packs is more difficult to study.

#63. Research:

Hunting - Choice of pup rearing habitat remained the same when hunted.

#63. Caitlin Jacobs and David Ausband, "**P*up-reading habitat use in a harvested carnivore."*** February 22, 2018.

Hunting, like other kinds of predation, impacts behavior and habitat use of many wildlife species. A study that looked at differences in pup-rearing habitats between hunted and unhunted gray wolves found that both hunted and unhunted wolf packs used what was defined as highly suitable pup-rearing habitats, areas with standing, ephemeral water and openings, regardless of road density that increases risks from hunting. After loss of a breeder, the packs still did not choose a less suitable pup-rearing site, one in dense vegetation lacking a water source. (Caitlin Jacobs and David Ausband, "P*up-reading habitat use in a harvested carnivore."* February 22, 2018.

A study that looked at differences in pup-rearing habitats chosen by wolves in both hunted and unhunted gray wolves found that both hunted and unhunted wolf packs used what was defined as highly suitable pup-rearing habitats. These were defined as areas with standing, ephemeral water and openings. Both hunted and unhunted wolves chose these regardless of road density that increases risks from hunting. Even after loss of a breeder, packs still did not choose a less suitable pup-rearing site that might be safer, such as one in dense vegetation that lacked a water source. (Caitlin Jacobs and David Ausband, "P*up-reading habitat use in a harvested carnivore."* February 22, 2018.

Study #12 A six year study of 10 wolf packs in the northern Rocky Mountains before and after hunting showed that both survival rates of pups from 3 to 15 months of age and the number of pups per pack decreased after hunting began. The authors suggested more data is needed on both the direct impacts of hunting that they studied and the indirect effects since both may limit population growth. (D. E. Ausband, C.R. Sransbury, J.L. Stenglein, J.L. Struthers, L.P. Waits, "*Recruitment in a Social Carnivore before and after Harvest*. January 8, 2015. Animal Conservation.)

#64. Research:

Hunting - Number of pups and survival of pups decreases with hunting

#64. D. E. Ausband, C.R. Sransbury, J.L. Stenglein, J.L. Struthers, L.P. Waits, **"*Recruitment in a Social Carnivore before and after Harvest".*** "Animal Conservation", 2015.)

Research is accumulating on the short term negative impact of recreational hunting on the number of pups and their survival rates. A six year study of 10 wolf packs in the northern Rocky Mountains before and after hunting showed that both survival rates of pups from 3 to 15 months of age and the number of pups per pack decreased after hunting began. The authors suggested more data is needed on both the direct impacts of hunting that they studied and the indirect effects since both may limit population growth. (D. E. Ausband, C.R. Sransbury, J.L. Stenglein, J.L. Struthers, L.P. Waits, "*Recruitment in a Social Carnivore before and after Harvest*. January 8, 2015. Animal Conservation.)

#65. Adrian Treves, Guillaume Chapron, Jose V. Lopex-Bao, et al., **"Predators and the Public Trust"** *Biological Reviews of the Campbridge Philosophical Society,* 2017.

Summary of Issues Related Specifically to Recreational Hunting

As with predator control, if any alternatives in the EIS include recreational hunting and/or trapping, the EIS will need to justify this as a good use of wolves which are a "public asset", and that this use is in the best interest of and is supported by most residents of WA State. The EIS will need to state clear goals for hunting and show that recreational hunting and/or trapping will achieve those goals, and this will need to be supported by the best available science. Hunting and trapping basically gives a very small special interest group the use of a "public asset", a use that many others find objectionable and a use that depletes this public asset. In 2018, only 2.42% of the residents of WA State purchased any kind of hunting license. Far fewer people support wolf hunting because it is strictly trophy hunting which is far more difficult to defend than hunting for food. The EIS will also need to analyze and disclose all of the impacts of killing wolves; on wolves and wolf packs and wolf populations, on ecosystem functioning, and on non-hunters who enjoy wolves in non-consumptive ways when hiking, camping and wildlife watching. Also relevant, is the research that shows wolves may self-regulate their population through strife between packs. Research also shows that hunting is not an effective method of predator control and instead of increasing social tolerance, it devalues wolves and makes some people more likely to illegally poach wolves. Finally, research shows that human hunters seldom kill the same animals as those that are killed by wolves. Often hunters kill the healthiest animals who are most likely to successfully reproduce while wolves tend to kill the weakest, sickest, oldest or youngest animals. Killing the weakest and sickest may improve the health and viability of prey species, a function that human hunters fail to provide. Many of the issues and impacts of "indiscriminate" lethal removal like hunting, impacts on wolves, on wolf packs on the ecosystems where they live, and on their ability to perform their ecosystem functions were described in comments #1, #2, and some in #3.

Research and Articles Related to Recreational Hunting

#57. Change to #9 (24.) Gregory J Wright, Rolf O Peterson, Douglas W. Smith, and Lemke, ***"Selection of Northern Yellowsteone Elk by Gray Wolves and Hunters".*** 2010.

#58A. Richard Zechnauser, ***"Human hunters and nonhuman predators: Fundamental differences."***

#58B. Florian K. Diekert and Andries Richter, et al., ***"How constraints affect the hunter's decision to shoot a deer",*** 2016.

#59. Darimont, Carlson, Kinnison, et al., ***"Human predators outpace other agents of trait change in the wild."*** *National Academy of Science ,USA,* 2009.

#60. John Vucetich , Jeremy Bruskotter, Michael Paul Nelson, Rolf O. Peterson, et l., ***"Evaluating the principles of wildlife conservation: a case study of wolf hunting in Michigan".*** *Journal of Mammalogy,* 2017.

#61. Adrian Treves, ***"Review: Hunting for large carnivores conservation".*** *Journal of Applied Ecology*, **2009.**

#62. Sarah B.Bassing, David E. Ausband, Michael S. Mitchell, Paul Lukas, et al. ***"Stable Pack Abundance and Distribution in a Harvested Wolf Population".*** *The Journal of Wildlife Management*, 2018.

#63. Caitlin Jacobs and David Ausband, "**P*up-reading habitat use in a harvested carnivore*."* February 22, 2018.

#64. D. E. Ausband, C.R. Sransbury, J.L. Stenglein, J.L. Struthers, L.P. Waits, **"*Recruitment in a Social Carnivore before and after Harvest*".** "Animal Conservation", 2015.)

#65. Adrian Treves, Guillaume Chapron, Jose V. Lopex-Bao, et al., **"Predators and the Public Trust"** *Biological Reviews of the Campbridge Philosophical Society,* 2017.

Comments submitted for scoping
for the EIS on Post-Recovery Wolf Management

Submitted by:

Martha Hall
2617 16th Street
Anacortes, WA 98221
pondfrog.mh@gmail.com

Date submitted:
Monday, October 28, 2019

Section 3

This is the third of four sections that are being submitted.

Section Three:

Role of Wolves in Ecosystems and the Value of Managing Wildlife as parts of Complete Ecosystems

Too often fish and wildlife agencies manage each species of wildlife separately with a focus on sustainability and human "harvest".

The problems with this approach are clearly pointed out in studies in this section. Wildlife species were shaped by thousands of years of natural processes that ecologists and biologists are admitting they do not yet understand. This means the safest management approach for state wildlife agencies, and the one that will provide the most answers about how nature works, is managing all species as parts of complete ecosystems that are not manipulated by humans who do not understand how these systems work.

Could wolves be the catalyst for changing wildlife management to more of an ecosystem approach?

The science and a large segment of the public knows this is needed. Is WDFW ready to be a leader by updating the way it manages wildlife?

While there is no doubt that wolves and other apex predators play an important role in ecosystems, ecologists recommend caution when trying to explain how ecosystems function. Most agree that many more years of careful studies and new ways to measure top-down and bottom-up forces are needed to really understand the complex and dynamic nature of ecosystem functioning, including the interwoven relationships between all of the parts, the natural processes, and the role of climate and weather, and humans

Studies and observations in large national parks like Denali and Yellowstone where ecosystems function fairly naturally with limited interference from humans provide the places where natural ecosystems can be observed and studied.

Far more of these large naturally functioning ecosystems are needed in WA State since ecosystems in different areas are unique.

In the EIS goals and alternatives - set aside "Wildlife Natural Management Areas"

The EIS, in its goals and alternatives, WDFW could manage wildlife in some areas as parts of naturally functioning ecosystems, meaning all species, including wolves, would be protected as they are in national parks. This can be done by establishing special "Wildlife Natural Management Areas" where all species including wolves are managed as parts of naturally functioning ecosystems.

Where?

On large areas of USFS lands including wilderness areas adjacent to already-protected ecosystems in Mt. Rainier NP, Mt St Helens, and Olympic NP, and in the most remote areas of the Kettle Range and SE Washington.

Why?

Establishing these special "Wildlife Natural Management Areas" (WNMA) will greatly increase the size of existing protected areas and they will add the much needed lower elevation habitats. Currently many of the fully protected areas in national parks are primarily higher-elevation habitats. Many if not most species also need lower elevation areas, especially in the winter. The WA Residents who do not hunt, 97.58% also need more places to hike, camp and wildlife watch where there is no hunting so wildlife will be less afraid of humans and easier to observe. These residents also need more areas to see and learn about naturally functioning ecosystems. WDFW might find that in these areas, fewer deer and elk will be infected with the wasting disease we are seeing now, or with the hoof disease now seen in WA elk herds.

HOW?

WDFW has the authority to manage all wildlife on USFS and BLM land. Parts of this federal land could be managed as WNMAs instead of the way they are managed now, as hunting-based units. Currently WDFW manages many species by creating "units". WDFW has these units all over the state. Usually WDFW manages individual species separately in units and the management goals are usually focused on hunting. Since only 2.42 % of the residents of WA state bought any kind of hunting license in 2018, doesn't this suggest that in WA State, most wildlife and most of its units should not be managed for hunters?

A Sampling of Research & Articles addressing the role of wolves in ecosystems

These raise many issues that are very relevant for a science-based EIS.

The goals, alternatives and analysis and disclosure of impacts in the EIS should all include and be based on the research and concepts explained found in these sources.

Ecologists recognize that ecosystem functioning cannot be explained in terms of any one species such as wolves or by any one natural process.

However, research is providing us with some broad background information on how complex and dynamic ecosystem functioning really is.

For instance, this research is showing that wolves may change prey behavior and prey density and also, that just as the opposite is true, prey may change wolf behavior and wolf density.

Many of the details, like how great are these influences, still need to be figured out.

This sampling of research and articles show how hard it is study the complex and dynamic functioning of ecosystems.

#66. Research: What ecologists have been saying for many years is proving to be true in Yellowstone National park; ecosystem functioning is extremely complex and dynamic and scientists are not close to understanding what all of the forces are or how it all works. Focusing on any one species, such as wolves, will not likely provide many answers, but it could provide the wrong answers.

Since wolves returned to Yellowstone in 1995, scientists, especially ecologists, have been looking for changes in the ecosystems and asking if these were the result of adding wolves to the food webs. This has turned out to be a challenge and a source of much debate as scientists recognize that ecosystem functioning is far more complicated than simple top-down and predator-prey food chains. Natural processes are not well understood even though it was these that shaped the plants and animals for thousands of years before humans began to play a major role. Looking at ecosystem functioning in terms of one species misses the complexity of all of the interrelationships between plants, animals, weather and climate, and geology. There has been a significant amount of debate about the role of natural enemies and climate as forces that structure food webs and modify ecosystem function. Many scientists agree with this conclusion presented by Andy Dobson: ***"its complexity will require new minds, new mathematics, and significant, consistent funding."***

In Yellowstone NP, much of the discussion revolves around relationships between wolf density and elk densities because elk hunters has often had a major influence on wildlife management.

#66. Andy P. Dodson, ***"Yellowstone Wolves and the Forces that Structure Natural Systems".*** *PLoS/ Biology, 2014.*

Scientists are debating many issues regarding the role of wolves in these ecosystems. The the elk population was declining from an all time high when wolves arrived in 1995. As wolf numbers grew quickly, elk numbers continued to decline fueling the debate. A long drought and high levels of hunting just outside the border explained some of the lower numbers of elk but what role were wolves playing in this decline? The rate of decline was greater than could be explained by the number of elk killed by wolves.

There is general agreement that that elk changed their feeding habits in the presence of wolves, avoiding areas where they could be easily ambushed. Some vegetation in some riparian areas showed considerably more growth. Aspen in some areas also responded with more growth when elk browsing decreased. Some believe this was the first really significant growth of aspen for over half a century. More recent data is shows similar recoveries in some cottonwoods and willows. These changes led to more abundance and diversity of riparian bird species. This data suggested wolves have a strong top-down effect on the trophic structure of ecosystems.

An alternate theory is that climate changes were the principal driver of these changes, not wolves. Wolves expanded during a time when the Yellowstone region was experiencing a prolonged drought. This reduced forage available for elk inside and outside the park. Climate change was also lengthening the growing season for willows and aspen by as much as 27 days in the last couple of decades - and this is continuing. Yellowstone's vegetation in some areas is mostly conifers and they were recovering from the fires of 1989.

When wolves were returned to Yellowstone, the grizzly bear population was increasing, creating a potential for indirect competition between bears and wolves - wolves select mainly old or injured elk in the winter. This reduces the number of elk that would otherwise die and become frozen meals when grizzlies come out of hibernation. This absence, some believe, is what caused bears to switch to

feeding on elk calves as an alternate food source. Bears, especially grizzly bears, are also consuming a significant portion of wolf kills leaving less for scavengers and forcing wolves to kill more prey.

Dobson argues that these three factors all were happening about the same time and all had an impact on the declining number of elk; drought, wolves returned to Yellowstone and bear density increased.

Some wolves turned to bison which were becoming more plentiful, though they are harder to kill than elk and more dangerous. To effectively hunt and kill bison, wolves rely on larger packs.

The extra bison carcasses provided a new bounty of food for ravens and golden eagles. Both increased in abundance. Less well-understood is the impact of wolves on coyotes. Scientists expected a decline in coyote which might please sheep ranchers. More subtly, wolves may help reduce the threat posed by chronic wasting disease (CWD), an emerging and spreading threat that is spreading from elk and deer to cattle. Wolves are removing sick animals. Wolves may be removing bison infected with brucellosis too.

Wolves seem to be modifying the behavior and abundance of some species on multiple trophic levels, showing how complex the interactions are between the forces that structure patterns of abundance in natural ecosystems. But Dobson questions whether we really understand the structure of food webs. How important are top-down forces? What about bottom-up forces driven by the processes related to climate that determine plant growth? How can these complex forces and processes be understood and measured?

Population-based ecosystem models are needed that focus on interactions between climate, vegetation, and the herbivore and carnivore species. This is a major scientific challenge that should be approached with collaboration, not polarization.

The author suggests we may need to wait another ten years before the impact of wolves on the Yellowstone ecosystem is fully quantified. Strong patterns and correlations that are being observed may not be reflect causation. For instance, the increase in beaver is more likely the result of beaver introductions north of Yellowstone. Stronger data is needed.
If patterns in Yellowstone are repeated in other places where wolves have returned, and if these patterns continue in Yellowstone, there will be more certainty about the role of wolves.

#67. Research: Many scientists are saying that today's science does not yet understand ecosystem functioning. Science has not yet developed ways to measure Its complexity and dynamic nature. This makes it impossible to understand the role of apex predators like wolves and top-down versus bottom-up forces.

Along with the return of wolves to the Rocky Mountains, came numerous studies of wolf ecology. The popular media and some scientific articles credited wolves with everything from increasing populations of beetles and birds to replenishing ground water. These have been attributed to trophic cascades resulting from either large carnivores reducing the number of prey numbers (direct effect) or from causing prey to change their movements and/or behavior (indirect effects) Has this been exaggerated? In this article, Mech too questions how much do we really know about ecosystem functioning.

67. L. David Mech, "***Is science in danger of sanctifying the wolf?".*** *Biological Conservation, 2012.*

Many scientists have been cautious about saying they know the role played by wolves and other apex predators in ecosystem function. Mech and Boitani reviewed many papers and concluded this: **"*we do not claim to know whether the wolf's effects are positive or negative, what its net effect is, or whether the effects are of any great consequence ecologically*."** (Mech and Boitani, 3002, p. 160)

Yellowstone wolf researcher, Douglas W. Smith also said, in 2003, **"*the danger we perceive is that all changes to the Yellowstone system, now and in the future, will be attributed solely to the restoration of the wolf"*** (Smith et al, 2003) .

Ray also warned that "***scientists will likely never be able to reliably predict cascading impacts on elements of biodiversity other than prey"*** *(*Ray et al. 2005)

Hebblewhite and Smith (2010) looked at various complexities involved in trying to determine possible cascading effects of wolves on ecosystems. **They concluded that trophic effects of wolves were quite variable and depended on time since wolf recolonization, ecological complexity of the community, and unknown factors that regulated the top-down strength of predation**.

Mech cautions that many of the changes that have been seen in Yellowstone may be caused by something other than wolves, or partly by wolves. He suggests more time and research is needed, along with caution. The complexity of the ecosystems may make it next to impossible to really understand all of the causes and effects of various parts for a long time.

In this paper, the author attempts to raise some of the following doubts and offer other explanations for some of the changes that have been attributed to wolves:

The effect on coyotes:

Wolves tend to kill coyotes and reduce their numbers. The thinking was that this might result in a "mesopredator release" that would mean an increase in smaller predators, raptors, foxes and badgers. So far this has not been seen in Yellowstone - (2012). After an initial reduction in coyote packs, now the number of coyote packs are has returned to pre-wolf levels, though packs may be smaller- and I would add, this has changed their behavior. (Crabtree and Sheldon, unpublished in Hebblewhite and Smith, 2010) (Buskirk, 1999.)

The effect on scavengers:

Many wondered if wolves would increase the number of scavengers, bears and beetles to ravens and eagles. In Banff some 20 species were documented feeding on wolf kills. (Hebble and Smith, 2010) Fewer prey species (the decrease in the number of elk) may mean less prey biomass and food for scavengers. (Fewer elk means fewer die from starvation and injures.) If the animal had died on its own, wolves may not have eaten on it, which would leave more for scavengers. Many studies are focused on finding out the relationship between wolves and scavengers. Observations are being documented that show many scavengers are using wolf kills. I've noticed, on my trips to Yellowstone, that this often includes bald eagles, vultures, magpies, ravens and coyotes. Also to my surprise, I saw carcasses with no one feeding on them. Does this mean there is more than enough food?

Cascading effects of wolves:

Since wolf introduction, prey have decreased and "the landscape of fear" is changing prey behavior. Elk browsing on aspen is well documented. How much of the decline in elk herds is from wolves has not yet been established. Studies do not all agree. The Greater Yellowstone elk herds are affected by drought, winter severity and human hunting. They are also preyed on by cougars, coyotes, black bears and grizzly bears. In many other areas bears limit ungulate numbers. Both species of bears have learned to actively search for young elk when they are hidden by their mothers during June in Yellowstone. Some of attributed the increase use of elk as food on the major loss of white-bark pine. Studies show that wolves usually have the most effect on ungulate populations when their numbers are small and they are isolated. (See the Madison River study - #74)

Indirect effects of wolves:

Evidence is mounting that the "landscape of fear" is changing elk behavior in Yellowstone, especially foraging and movements. Where wolf density and predation is high, aspen is growing larger, however it is not doing as well as sometimes described in most areas. Elk do avoid aspen in risky sites because of their fear of wolves. More groundwater may explain the increase in willow height. The cause of larger willow in some areas is still unclear. Other causes might be found, such as the long term decline in moose numbers since the fires of 1988, the increase in grizzly bears or the longer growing season.

The declining number of elk is causing a tropic cascade and some of the cause may be wolves. Elk numbers were still 3 to 4 times higher around 1998. Perhaps there are many causes rather than just one or two. The large increase in beavers in the Northern Range can be attributed to the release of 129 beavers just north of the northern range, in Yellowstone.

#68. Research: This study shows the complexity in understanding just the role of predators in the survival rates of newborn elk calves. In many ecosystems, multiple predators are involved and other factors may be important such as weather and climate. Human influences were not even included in this study. When multiple predators are involved, the behavior of each may change.

This study looked at the interaction among predators and between predation and climate to better understand the mechanisms for "compensatory mortality" versus "additive mortality". Radio-collared neonatal elk calves from 12 populations in north-western United States were studied.

#68. Kathleen A. Griffin, Mark Hebblewhite, Hugh Robinson, et al., ***"Neonatal mortality of elk driven by climate, predator phenology and predator community composition".*** *Journal of Animal Ecology, 2011.*

Findings: Neonatal elk survival to 3 months declined following hotter previous summers and increased with higher precipitation in May, especially in areas with wolves and/or grizzly bears. Climate and weather were factors!

Mortality hazards were significantly lower in systems with only coyotes, cougars and black bears compared to higher mortality hazards experienced with gray wolves and grizzly bears. Where wolves and grizzlies were present, mortality by cougars decreased and predation by bears was the primary cause of mortality in these areas.

Only bear mortality appeared to be "additive" and occurred earlier than other predators. The later mortality caused by other predators may have been compensatory as calves age. Wolf predation was low and most likely was a compensatory source of mortality.

Functional redundancy and interspecific competition among predators may combine with the effects of climate on vulnerability to predation to drive compensatory mortality of neonatal elk calves, except for the additive bear predation. Wolves had less of an impact that many want to believe.

#69. Research: This attempt to understand the relationships between elk density and wolf density and the impact of wolves on elk fell far short of its goal, which shows again that many other factors are involved. Trying to explain elk numbers by looking at wolves fails because ecosystem functioning goes far beyond the relationship between any two species.

This was a 5 year comparative study of wolf-elk dynamics on an elk herd in the headwaters of the Madison River within Yellowstone National park and the lower Madison elk herd that winters 40 km downriver outside the park. The resident wolf pack became established on the Madison headwaters area in 1997 and grew to multiple packs totaling 30-40 wolves by 2002. During 1999 emigrants from Yellowstone established a pack on the lower Madison area. However poor recruitment and low adult survival limited wolf population growth, with the area suppporting a single pack never exceeding 5 animals.

#69. Robert A. Garrott, Justin A. Gude, Eric J. Bergman, et al., ***Generalizing wolf effects across the Greater Yellowstone Area: a cautionary note".*** 2005.

Findings: Comparisons between the Lower Madison compared to the Madison headwaters, two areas that are part of the same natural system but had very different wolf and elk densities and very different ecosystem characteristics:

Wolf kill rates on the lower Madison area were approximately double that documented for the Madison headwaters area. Moderate kill raters in the Madison headwaters, combined with high wolf densities and modest elk densities resulted in an estimated 20% of the elk population being killed during the winter and projections of a declining population. Meanwhile, high kill rates on the lower Madison, combined with low wolf densities and high elk densities, resulted in a winter predation estimates not exceeding 4% of the elk population. Authors suspected this level of mortality will be of little biological significance.

The authors concluded that their results suggest the effects of wolf predation on elk differ substantially over relatively small spatial scales, depending on a complex suite of interacting factors. The authors caution against generalizing the effects of wolf restoration on elk dynamics from a single study.

These findings suggest that much more research is needed. Many possible factors were not part of this study. Studying multiple factors all at once is difficult and seldom done which is exactly why ecosystem functioning is not well-understood.

Some of the factors not looked at in this study

What factors caused the large differences in wolf and elk densities in the two areas and could these factors also be important? Human hunting is intense outside the national park - in the lower Madison - while no human hunting occurs inside the park - in the Madison headwaters. How might this affect elk

and wolf density and wolf prey selection and kill rates? Climate and even weather as well as natural features such as elevation, terrain, snowfall and snow depth are very different in the two areas. How might these affect wolf kill rates? Human density and road density is greater in the lower Madison. Could this have an impact on wolves and/or elk and wolf kills? Why do some elk choose to stay in the park in the winter where conditions are more severe rather than moving out of the park to lower valleys? Are humans a factor in the elk's choice of winter habitat? Where is the most and best winter forage for elk, in the Lower or Headwaters part of the Madison River?

Another study of elk and wolves in the Madison River.

Robert A. Garrott, P.M. White, Claire Gower, Matthew S. Becker, Shana Dunkley, Den L. Hamlin, and Fred G.R. Watson, ***"Wolf Effects on Elk Inhabiting a High Risk Landscape: The Madison Headwaters Study.*** Yellowstone Science: Celebrating 20 Years of Wolves, pages 82-84.

#70. Research: Aspen have been at the center of the debate over the top-down effects of wolves on ecosystems. Again, it is far more than just a matter of wolf and elk densities.

This study looked at both the extent and causes of recent quaking aspen recruitment in northern Yellowstone National Park where wolf density is high all year and both bison and elk graze year around. Browsing intensity and height of 87 randomly selected aspen stands were compared, once from 1997-1998 and again in 2012. The relationship between aspen recovery and the distribution of elk and bison was measured by looking at ungulate fecal pile densities and the annual elk count.

#70. Luke E. Painter, Robert L. Beschta, Eric J. Larsen and William J. Ripple, ***"Recovering aspen follow changing elk dynamics in Yellowstone: evidence of a trophic cascade?*** *Ecology, 2015.*

Findings: Authors found more top growth in the aspen in their study areas and attributed this to several factors including wolves, bear predation, expanding bison populations and decreasing elk populations, climate and weather, and shifts in human uses and hunting outside the park boundaries.

In 1998, 90% of young aspen were browsed and none were taller than 200 cm, the height at which aspen begin to escape from elk browsing.

In 2012, only 37% in the east and 63% in the western area were browsed, and 65% of the stands in the east had young aspen taller than 200 cm.

Heights of young aspen were inversely related to browsing intensity, with the least browsing and the greatest heights in the eastern portion, corresponding with recent changes in elk density and distribution.

In contrast, with historic elk distribution, 1930s-1990s, the greatest densities of elk recently, 2006-2012, have been north of the park boundary and in the western part of the range, with relatively few elk in the eastern portion of the range, even in mild winters.

Authors suspected pressure from wolves changed the elk dynamics - along with interacting effects of other influences including increased predation by bears, competition with expanding bison populations and shifting patterns and times of human land use and human hunting outside the park. Authors suggested that this new aspen recruitment in some areas is evidence of a landscape-scale

trophic cascade in which a resurgent large carnivore combined with other ecological changes, benefited aspen through effects on ungulate prey..

#71. Research: This study, like others, showed that some plant communities were not improving after the return of wolves. As with other studies, it too was narrow in scope and raised more questions that can only be answered by studies that take a broad approach that considers all factors.

This study looked at aspen, willows, cottonwoods and other deciduous shrubs and trees inside and outside of Yellowstone National Park where elk and bison are found. Aspen and willow inside and outside high-fenced exclosures that were constructed in Yellowstone NP 1957 and 1962 to prevent ungulate browsing. Six aspen-containing exclosures and four willow-containing exclosures were sampled. Authors suggested that if climate was a cause of more or less growth in these plants, then the aspen and willows inside exclosures should also be declining too.

#71. Molly J. Runyon, Daniel B. Tyers, Bok F. Sowell and Claire N. Gower, ***"Aspen Restoration Using Beaver on the Northern Yellowstone Winter Range under Reduced Ungulate Herbivory".*** *Restoration Ecology,* 2014.

Findings: **This study found that heavy browsing by ungulates continue to degrade many aspen, willow and cottonwood communities in Yellowstone NP. The riparian habitat inside Yellowstone Park was not showing general, over-all improvement since wolves returned. Findings showed aspen were recovering in a few isolated areas both inside and outside the park, however widespread recovery is not occurring despite the 60% reduction in elk numbers from 2000 to 2018. One explanation is that bison have increased in number, filling the void left by elk. Do bison have the same impact on these plant communities as elk?**

.
The majority of the areas that were sampled in this study, 70% in 1991, did not contain deciduous woody vegetation. In 2006 the conditions were worse with 85% of riparian habitat that was suitable did not contain any deciduous woody vegetation.

Discussion: The importance of these plant communities
Healthy aspen, willow and cottonwood plant communities contain exceedingly high biodiversity, greater than any plant communities in the Northern Range. When these plants are not large and healthy, many animals cannot make good use of the riparian areas; mink, otter, amphibians, western toad, boreal chorus frog, and many bird species.

Discussion: The importance of beaver for healthy riparian areas plus the impacts of beaver:
Once plentiful, a beaver survey in 1988-1989 documented only 8 sites with beaver activity throughout the Northern Range inside of Yellowstone NP. Surveys from 1996-2009 confirmed that beaver remain rare or absent throughout the northern range except on Slough Creek. While 129 beaver were released just north of the park from 1986-1999, success of these translocations has been limited along the north end of the park and outside the park. The loss of both vegetation and beaver affects stream hydrology and riparian ecosystem functioning.

#72. Research: This research again shows that the relationships between predators and prey are complicated and trying to understand these by just looking at a simple food chain does not work.

Why have pronghorn been using higher elevation habitats prior to birthing in Yellowstone National park? Is this an attempt to reduce predation on fawns. Coyotes accounted for nearly 80% of the fawn predation. About 66% of the total mortality of fawns occurs within 2 weeks of birth. Adult coyotes do not normally migrate seasonally to mountainous areas. Deep snow restricts coyote movement. Coyotes also typically do not select steep terrain. Pronghorn also do not often inhabit mountainous or areas with steep terrain. However, wolves often range far and wide and will sometimes use steep terrain.

This study looked at pronghorn fawn survival in Yellowstone from 1999-2001 and 2004-2006. Only migrant pronghorn accessed areas where wolves were numerous and winter snow depths were high. The data was collected from 44 GPS collars on adult female pronghorn during spring, summer and early fall.

#72. Kerey K. Barnowe-Meyer, P.J. White, Troy L. Davis, et al., ***"Influences of wolves and high-elevation dispersion on reproductive success of pronghorn."*** *Journal of Mammalogy, 2010.*

Findings: This study found that wolf restoration had an indirect effect on fawn survival, as did climatic factors which influenced both predator mobility and the selection of territories and den sites by predators. These, in-turn, affected predator-prey interactions and pronghorn fawn survival.

Fawn survival was influenced by both winter snow depth and terrain slope. Snow depth was the best predictor of success Steeper slopes also correlated with better rates of survival. Fawn survival was significantly higher in migrant pronghorn. Areas they selected were different in wolf density, winter snow depth and visibility but not terrain slope. Survival of fawns was only weakly associated with wolf density though results show the influence of high wolf density may reduce the risk of coyote predation on fawns in lower areas with less winter snowfall.

Pronghorn births were distributed widely across the Northern range of Yellowstone NP. They were documented from 1585 meters elevation in the west to 2560 meters on the slopes of Mt. Norris to the east. Birthing and fawn-hiding sites were documented in all major habitat types, grasslands, sagebrush-steppe, broken coniferous forests, mixed talus slopes and sub-alpine meadows.

Did wolves and wolf dens at lower elevations improve the survival of pronghorn fawns in lower areas? Study results indicated that wolf competition with territorial coyotes most strongly dictates the net effect of wolf presence on fawn survival. At lower elevations where territorial coyotes were numerous, wolf-coyote competition improves overall fawn survival rates. Female pronghorn selecting lower areas with higher wolf density may be doing this to lower the risk of coyote predation. The influence of wolves on pronghorn fawn survival was greater only in these areas of low winter snowfall where coyotes were abundant, supporting predictions of a coyote-mediated effect of wolves and winter snowfall on pronghorn reproductive success.

Deep winter snow along created higher-elevation "refugia" for female pronghorn.
Authors concluded that this happens because deep snow restricts the mobility of coyotes, the key predator of pronghorn fawns, and the restrictions imposed on the mobility of both coyotes and wolves in the summer by the need to care for pups at den and rendezvous sites.

Discussion: why was fawn survival higher in these higher-elevation areas?

Coyotes establish pair bonds and territory in the middle of the winter and these are maintained throughout the year. Pairs use lower elevation areas because deep snow limits coyote mobility. Since coyotes usually chose territory and den sites in the winter, these are usually located at lower elevations. Female pronghorn could avoid some coyote depredation by fawning at higher elevations. This is why authors concluded that winter snow depth was a major factor in determining predation risk to pronghorn fawns in the summer in Yellowstone.

#73. Research: This study in Wisconsin concluded that wolves did generate a trophic cascade by changing the behavior of deer which benefited maple saplings and forbs.

This study investigated whether gray wolves generate a trophic cascades by reducing white-tailed deer herbivory on saplings and rare forbs in the northern forest of Wisconsin. Deer exclosures were used in areas of high and low wolf use so the role played by wolves in reducing herbivory could be measured. Authors asked, is the effect of wolves a direct reduction in deer numbers and/or is the effect indirect, meaning wolves change deer behavior?

#73. D. G. Flagel, G.E. Belovsky, and D.W. Beyer Jr., ***"Natural and experimental tests of trophic cascades: gray wolves and white-tailed deer in a Great Lakes forest".*** *Community Ecology, 2015.*

Findings: **The study found that wolves likely generated trophic cascades which benefited maples and rare forbs by changing herbivory, not through direct predation - killing deer. Findings showed that high wolf use did decreased deer density and that wolf density also influenced the feeding behavior of the deer.**

In areas of high wolf use, the deer density was 62% less than in areas with few wolves. Also, where wolf density was high, deer visit duration was reduced by 82% and the percentage of time spent foraging was reduced by 43%. In these areas of high wolf density, the proportion of saplings browsed was nearly 7 times less. The average maple sapling height and forb species richness increased 137% and 117% in areas of high versus areas of low wolf use.

The results of the exclosure experiments confirmed the negative impacts of deer on sapling growth and forb species. Plant browsing was negligible inside exclosures where wolf use was high.

#74. Research: The findings of this study again emphasize the many indirect effects of wolves on both another predator, cougar, and on prey behavior which affected prey choice of predators. Food webs are not simple.

When a recolonizing predator enters an already complex predator-prey system like Yellowstone NP, specific anti-predator behaviors may occur. Responses may include conflict and/or avoidance, and one predator may enhance vulnerability to another. This study looked at patterns of prey selection by recolonizing wolves and cougars in the northern Madison Range of Montana. Elk were the primary prey for the wolves while mule deer were the primary prey for cougars, though elk were increasing their predation on elk annually. .

#74. Todd C. Atwood, Eric M. Gese, and Kyran E. Kunkel, ***"Comparing Patterns of Predation by Cougars and Recolonizing Wolves in Montana's Madison RAnge".*** *USDA National Wildlife Research Center.* 2007.

Findings:

Both predators preyed disproportionately on male elk. Wolves were most likely to prey on males in poor physical conditions than cougar. The two predators partitioned hunting habitats. As wolves return to the area, the structural complexity at wolf kill sites increased over time, whereas the complexity of cougar kill sites decreased.

Discussion: Changes in prey behavior - and the many indirect effects of this change on both predators and prey:

Authors concluded that shifts by prey species- elk in this case - to using more structurally complex refugia may be attempts by formerly naive prey to lessen predation risk from wolves. This occurred even though shifting to these areas may have made the elk more vulnerable to cougar predation. This, authors suggested that wolves might reduce cougar predation on mule deer.

Where there are both mule deer and elk, wolves may indirectly benefit mules deer by changing elk behavior. Elk shifted to refugia when wolves were sharing the landscape, diluting the risks of mule deer. Wolves may focus on hunting elk when both deer and elk are available, reducing elk competition with deer.

#75. Research: Most ecosystems have more than one large predator. This study focused on what happens when wolves and cougar have overlapping territories.

This study looked at the diet and spatial overlap among cougar and gray wolves populations in Banff National Park from 1993-2004. The focus was on wolf and cougar behavior and the impact on elk. The number of animals in this study was small. The study started with 8 radio-collared adult cougar out of the larger cougar population. Eventually all adult cougars in the population were collared. Wolves were also collared, starting with 8 wolves from 2 wolf packs.

#75. Andrea D. Kortello, Thomas E. Hurd, and Dennis L. Murray, "***Interactions between cougars and gray wolves in Banff National Park, Alberta."*** *Ecoscience, 1999.*

Findings: The study showed that wolves and cougar can use overlapping territories but when they do, wolves can alter the diet and space use patterns of cougars through interference and exploitative interactions.

Results showed that wolves were dominant over cougar and may have out-competed cougar. Wolves were responsible for cougar mortality and usurping prey carcasses from cougars, but cougars failed to exhibit reciprocal behavior. While cougar and wolf territories overlapped showing the two species would share the same territory, cougars showed a temporal avoidance of areas recently occupied by wolves. Cougar changed their behavior to accommodate wolves. Wolf pack sizes ranged from 1 to 17. Only one mortality was directly attributed to wolves. Most recovered cougar carcasses were thin or emaciated. The annual survival rate for wolves was also low. All wolf mortalities were directly due to humans. Recovered wolf carcasses were generally in good conditions. This suggests that wolves were out competing cougars, however cougar did not vanish from the area.

Cougar may be able to manage sharing territories with wolves because the two species evolved together. Cougar adjust by climbing trees and using steeper, more rugged terrain. During the study, cougar survival rates were low, suggesting there could have been a limited amount of food.

The study documented a 65% decline in the local elk population following the arrival of wolves. Cougars switched from a winter diet primarily of elk to one of mainly deer and other alternative prey. Elk also became less important in wolf diet, but this switch lagged 1 year behind that of cougars. Predation by cougar may be size or sex biased, with larger males tending to kill larger prey, however female cougar are very capable of killing elk.

#76. Review of Observations: Many ecosystems have more than one predator. How do wolves impact other predators in these ecosystems. This review looked at recorded observations from various locations that described wolf encounters with other species. The focus was mostly on carnivores, bears, coyotes and cougar, fox, etc.

This study looked at a narrowly-defined "guild" often associated with wolves. In a broad sense, a guild is the entire group of animals sharing habitats with wolves. "Ecological guilds" are groups of species using common resources in a similar way. The concept of "carnivore guilds" further narrows this.

Researchers in this study looked at "encounters" between wolves and some other members of the "carnivore guild" as well as at a few other species. Their data was based on a literature review that looked for reports of these "encounters". This means the data is simply from those observations that were described in various sources. Observations included in the study came from various areas where wolves live, including Yellowstone N.P. While this is interesting, it provides only a very limited and superficial look at the interactions between these species. The authors simply categorized the interactions using a few choices that were easy to use when looking at various observations.

#76. Warren B. Ballard, Ludwig N. Carbyn, and Douglas W. Smith, "***Wolf Interactions with Non-prey"*** University of Nebraska, 2003.

(*My comment on this literature review. Many more interactions have been recorded since 2003 so this needs updating. For instance, just this week wolf observers saw a wolf bite the rear of a grizzly that was approaching a calf carcass the wolves were feeding on, drawing blood. The grizzly left. More data on wolves- and other wildlife- is constantly being collected in places like Yellowstone NP.)*

Findings: For grizzly bears and wolves.
A search of the literature yielded 108 encounters between grizzlies and wolves besides those in Yellowstone. The most common types involved bears and wolves fighting and chasing each other (24%) and bears defending kill sites against wolf packs. Feeding sites were the most common locations of these encounters. (57%) After that, encounters near wolf dens were next (14%). Who won? Bears won all interactions at feeding sites (22). Near wolf dens, wolves frequently won. In 3 of the 108 encounters, wolves killed bears and in 2 others, the bear killed wolves. In Yellowstone NP, the most common interaction between grizzlies and wolves was simply being in the same area (34%), followed by bears defending kills from wolves (19%),
which were probably wolf kills that bears had stolen. The bears generally won more encounters (40%) or the winner could not be determined (40%). Wolves outnumbered bears 76% of the time. Adult bears without cubs were in 88% of the encounters. While wolves lost most encounters, wolves were quite successful at defending their dens, and even wolf pups 6 to 7 months old chased bears away

from wolf rendezvous sites. Two likely incidents where wolves likely killed grizzly cubs have been recorded. One was near an elk carcass and the other at a bison carcass. Grizzlies commonly usurped kills or defended them from wolves. Grizzlies who live in areas with wolves probably have a higher protein intake than grizzlies living in other areas. This increases wolf kill rate of prey.

Findings: For black bears and wolves.
Fewer interactions with black bears were reported in the literature, 26, probably because they tend to occupy different habitats in many areas. The most common interaction was wolves killing black bears. (9 of 26) Six of these were wolves seeking out black bear dens while one was at a feeding site near a wolf den. Only one observation was of a black bear killing a wolf and this was near a wolf den. In 81% of the interactions, wolves outnumbered bears. Wolves won in 69% of these, while black bears won 15%. Young black bears were involved in 35% which was higher than those with grizzlies. At kill sites, wolves usurped kills occupied by black bears.

Findings: For cougar and wolves.
Few interactions have been observed between cougars and wolves. It is known that they occasionally do kill each other. Wolves usurp cougar kills, which increases cougar kill rates. During the summer cougars often follow prey to higher elevations while wolves stay nearer den and rendezvous sites that are usually lower, which may decrease the amount of overlap in territories.
Most of these ideas lacked data to support them.

Findings: For lynx.and wolves
There is considerable overlap in the ranges of wolves and lynx, but only one observation was found of an encounter. In Jasper National Park, a warden watched a lynx feeding at an ungulate carcass for several days. A single wolf nearby did not get a chance to feed at any time while the observer was watching.

Findings: For wolverine and wolves.
A number of researchers have described interactions between wolverine and wolves. Of these, 8 of the 14 resulted in the death of the wolverine. The wolves did not consume the wolverines they killed. Of the 14 encounters, 5 involved wolves chasing wolverines - with the wolverines successfully escaping using trees or caves. The interactions appeared opportunistic in that only 3 were near wolf kills (carcasses). One of these kills was near a wolverine den and the other 10 encounters were away from wolf kills.

Findings: For coyotes and wolves.
These close relatives may have overlapping territories. Written descriptions of wolves killing coyotes is most often from observations in winter when coyotes are scavenging on ungulate carcasses. Authors suggest that the frequency of such encounters may be determined by the availability of food. When wolves feed primarily on deer, they may eat most of it, excluding coyotes, but when prey is larger, more may be left for coyotes.

Reports of wolves killing coyotes are common. Generally they do not eat the coyotes they kill.
In Yellowstone, by July of 2001, there were 27 documented cases of wolves killing coyotes.
At least 18 of these coyotes were killed near wolf kills when coyotes approached to scavenge.
There are no reports of coyotes killing wolves.

My personal observations of coyote-wolf encounters in June of 2019 - in Yellowstone's Northern Range: Two encounters of coyotes chasing lone wolves, probably wandering yearling wolves. One was 3 coyotes who successfully changed the direction the wolf was traveling and one was with 2 coyotes that turned out the same. Many other observations were at wolf kills and coyotes, usually one, was trying to scavenge. At a particularly interesting bison calf carcass, a wolf kill, the

mother bison tried to protect her calf's carcass for at least 6-8 hours. First wolves tried to feed on it carcass for hours and the mother was tiring but then two other bison came by and helped her defend the carcass. They eventually chased the wolves enough that the wolves left. The coyotes did not give up. One mostly sat on a nearby hillside or rock and watched while the other continuously tried to grab the carcass and the mother repeatedly chased the single coyote. During the time when both coyotes and wolves were at the carcass, I saw no interaction between the coyotes and wolves; both were trying to grab the carcass independent of the other.

Most wolf-coyote interactions occur around wolf kills (122 of 145, 84%. Wolves typically won. (121 of the 145) There were only four observations of coyotes chasing wolves and in all four cases, there were at least as many coyotes as wolves. Three of the four took place away from kill sites. One was near a coyote den. On three occasions, wolves dug into coyote dens and killed at least one pup. Four observations were of a single wolf at her den. This wolf was a subordinate and separated from her pack. Several times coyotes were seen approaching her den. Coyotes benefit from scavenging wolf kills. Since wolves tend to kill coyotes, coyotes may space themselves away from wolves.

On Isle Royale, wolves killed all of the coyotes when they first arrived. In other areas the two species share overlapping territories.

There have been short term changes in the carnivore guild in the Lamar Valley area of Yellowstone NP. After wolves were first re-introduced, the wolves killed 25 - 33% of the coyote population each winter. Coyote numbers decreased 50%. Coyote pack size decreased from 6 to 3.8. They have also changed their behavior. They den closer to roads and reduce the frequency of their vocalizations. The first case of coyotes and wolves cooperating was seen in Yellowstone. Four coyotes attacked a bison calf by grabbing the calf's hindquarters while a single wolf bit the animal's neck. When the calf died, the wolf fed on it while preventing the coyotes from feeding. It has been suggested that in Yellowstone, coyote group size is an important factor in avoiding being killed by wolves

Findings: For red foxes and wolves.
Early stories were of wolves killing foxes. This was documented on Isle Royale, in Denali, and in Wood Buffalo National Park. Wolves may or may not consume foxes they kill. These encounters happened at various sites, though most are near wolf kills where fox were trying to scavenge food. Meier believed foxes eventually scavenged on most kills in Denali even though wolves often chase them away when they are feeding. In Wood Buffalo National park, there is evidence that when wolves are present on the landscape, there were more foxes, suggesting that wolves would be an increase in foxes in Yellowstone. Has this happened?

Findings: For a few other species and wolves.
There are stories of wolves killing river otters, skunks, marten, weasels and golden eagles who were trying to scavenge on wolf kills. In Yellowstone, five wolves were seen attacking a lone badger. Two wolves successfully killed a badger - each was by a lone wolf. The raven-wolf connection is often described and discussed. Ravens benefit by scavenging wolf-killed carcasses. Some observations describe a playful aspect to their interactions. Stahler noticed in Yellowstone that ravens stuck close to wolves while they were traveling, resting and hunting. Also in Yellowstone, ravens discovered 100% of the wolf-killed ungulates in winter. Observed Interactions suggest a social symbiosis that hinted at a shared evolutionary history. They relationship is complex, with ravens sometimes showing wolves where carcasses are located, with wolves opening carcasses to make access easier for ravens, and in a few instances, of wolves killing ravens.

Hunting: Hunting occurs just outside Yellowstone National Park. Observers have noted that Yellowstone animals respond differently to this. Bears are drawn towards hunter activity probably hoping to obtain food. Hunters killing elk and bison near the park borders often leave gut piles that

attract grizzly bears. This has resulted in some encounters between hunters and grizzlies; some ended with the hunter killing the grizzly, some with the hunter being injured. Cougars avoid hunting areas. Wolves seem to have no response.

#77: Article: What really caused the steady decline in elk numbers in northern Yellowstone? These researchers found many possible explanations which shows this issue is more complicated than just the fact that wolves kill elk. Wildlife populations respond to a wide variety of complex and changing natural and human-related factors.

These researches found many possible explanations for this decline in the elk population. However the debate continues as to which are the most important reasons and many still want to blame it on wolves.

#77. Daniel R. MacNulty, Daniel R. Stahler, C. Travis Wyman, Joel Ruprecht and Douglas W Smith, ***The Challenge of Understanding Northern Yellowstone Elk Dynamics After Wolf Reintroduction".*** Yellowstone Science: Celebrating 20 Years of Wolves, Pages 25- 33.

Findings: This is a list of the factors driving this debate:

1. Disagreement about what is the "right number" of elk has been on-going for many years, and has continued when elk numbers were very high and above carrying-capacity and when they are low.
2. The debate over how many elk should be available for human hunters versus wild predators continues?
3. In 1976, Montana State lifted a ban on hunting these elk who migrated out of the park and held hunts extra hunts targeting mainly females. From 1976 to 1995, humans killed large numbers of elk.
4. In 1994 before the first wolves were released into Yellowstone, elk numbers were down far more than could be explained by the hunts.
5. There has been no "controlled" or "replicated" experiment. Instead scientists are using observations and inferring "causation" can be misleading.
6. Summer precipitation has been shown to be am important factor linked to elk survivability.
7. The severity of winters is another important factor linked to elk survivability.
8. Summer drought is another factor linked to elk survivability.
9. While this elk population has been monitored for a long time, monitoring has not been continuous, not all of it has been accurate, and monitoring methods have not always been the same.
10. The hunting ability of wolves is limited and success rates are low, rarely above 20% and often lower. Many times the elk killed by wolves were selected after sifting through the total population because they were especially vulnerable; small, old, yung, in poor health, or caught in treacherous surroundings.
11. Wolves selection usually excludes the healthiest, most fertile females. Female elk from 2 - 8 yrs old have a high annual survival rate: 84%-97%. This benefits elk abudance.
12. Wolves do select calves - in the summer, some years calves were 62% of their diet, and 49% in early winter. This would have a negative impact on elk numbers.
13. Grizzly bears have increased significantly and they too kill elk calves. The proportion of calves killed by black and grizzly bears increased from 23% in 1987-1990 to as much as 60% in 2003-2005.

14. Similarly, cougar numbers increased in the northern range 76% from 1987-1993 to 1998-2004. However the proportion of cougar-killed calves changed very little - based on data from collared cougars.
15. Human hunters in the northern range hunts outside the park primarily kill the most fertile adult female elk because the late hunt emphasizes antler-less elk. This alone can reduce elk number significantly as seen between 1976- 1988. From 1995-2002, late hunt annually killed between 940-2,465 total elk. In 1997 during a severe winter, 2465 elk were killed during this hunt. Total elk harvest in 1996-1997 was 3,320 elk, the largest since hunting started again in 1976. No some hunt have been reduced and even stopped.
16. The ability of grizzly bears to usurp wolf-killed elk - which is a regular occurrence, and sometimes occurs before wolves have consumed very much of the meat - means wolves must kill far more elk to survive.
17. Newer on the scene is the increasing size of the bison herd which may be competing with elk. Previously managers worried about the opposite because bison numbers were low. More wolves are not preying on bison, a prey change that may continue to increase.

The current situation can be described as: fewer elk wintering mainly outside the park, more bison wintering mainly inside the park, lower human harbests and high carnivore predation from multiple predators. Where do wolves fit into this?

#78. Research: How much food to wolves eat? What factors need to be considered in models used to determine prey consumption?

This study challenged methods and models used for determining prey rates for wolves.
Many studies fail to accurately explain prey consumption
because many do not recognize and consider all of the things that might affect total consuption.

#78. Matthew C Metz, John Vucetich, Douglas Smith, Daniel Stahler and Rolf,
"Effect of Sociality and Season on Gray Wolf Foraging Behavior: Implications for Estimating Summer Kill Rates". PLOS 2011.

Findings: Findings suggest that the accuracy of models for prey consumption depends on factors such as GPS collar performance, social behavior of wolves, and the metabolic rate of pups, factors some models ignore.. Accuracy of models depending on GPS collar data depends on accounting for details that may be important in some cases, but not in other cases. The social behavior of wolves must be addressed. Cohesiveness of foraging behavior may also be a factor. Traditional methods assumed every wolf attends every carcass which is flawed. Findings suggested that the PA, probability of wolf attendance at carcasses should consider the age of the wolf and the size of the pack. It also may be influenced by prey availability, predator density and climate factors. In Yellowstone, for instance, grizzlies consume large parts of many carcasses of animals killed by wolves in the summer but not when grizzlies are hibernating. Models also must accurately factor in the food requirements of pups during the summer which is sometimes not known. An accurate count of the number of pups in a pack throughout studies is not always possible. Finally, the study showed the importance of the dynamics of group cohesiveness in wolves, something that is often ignored. This is important as pack size, yet this often is not known because many packs cannot be observed closely enough to measure pack dynamics and cohesion. The perceived decline in per capita kill rate with increasing pack size may be a result of the tendency of larger packs to forage less cohesively. Rates may not decline with pack size if the entire pack is not always present at all carcasses.

Note: Detection rates for carcasses is related to GPS collar performance. Collar success of 75% would be expected to detect only 93% of carcasses of large ungulates and only 83% of small ungulates. Probability of attendance for large carcasses versus small carcasses is also different. Individual wolves do not visit every carcass fed on by a pack and this also must be factored in. The PA ("probability of attendance") is very different for small versus large carcasses. Data from pack is with only one collared wolf may not be as reliable. Various methods of calculating pack size were also a factor. For instance the methods used to account for newborn pups resulted in differences of as much as 50%. The amount of acquired per metabolic-rate-adult-equivalent wolf during the summer and winter declined as pack size increased. Previous studies have shown this too. Wolves are more likely to attend a carcass in the winter than in the summer.

#79. Research: Did the arrival of wolves in Yellowstone change the way elk selected habitats as they tried to obtain necessary resources? Like many studies, this one was limited and focused only on wolves and elk.

This study used seasonal habitat-selection models for elk. Data was collected from radio-collars on elk. This was collected on a variety of locations for two periods of time: for 1985 - 1990 - when there were no wolves and for 2000 - 2002 after wolves were well-established in Yellowstone. Authors suggested that fires and fire-related habitat changes and climate were also likely factors but these were not included in this study.

#79. Julie S Mao, Mark S Boyce, Douglas W Smith, Francis J Singer, David J Vales, John M Vore, and Evelyn H Merrill, ***Habitat selection by elk before and after wolf reintroduction in Yellowstone National Park.*** 2010.

Findings: Findings showed elk behavior in response to wolves was different in the summer than in the winter, which suggests other factors were important - factors not included in this study.

In the summer when wolf activity was centered around dens and rendezvous sites, elk tended to avoid these areas by selecting higher elevation habitats, less open habitat and more burned forests - than before wolves returned.

In winter, elk did not spatially separate themselves from wolves. Compared to pre-wolf times, in the winter elk did select more open habitats. However elk did not change their selection of habitats based on snow water equivalents or slope. In the winter, elk appeared to use other behavioral strategies to reduce predation risks such as grouping in the winter.

In the summer when forage is abundant elk have many habitat choices. They are free to choose from many habitats. However in the winter, elk face severe weather, less nutritious food choices and more competition for the more limited resources. Winter mortality typically accounts for nearly half of the total annual mortality. Elk are especially vulnerable in deep, crusted snow. As elk face these challenges they may be less likely to trade foraging for avoidance of wolves.

#80. Article:

#85. Douglas W. Smith, Rolf O. Peterson, Daniel R. MacNulty, and Michel Kohl, ***The Big Scientific Debate: Trophic Cascades".*** *Yellowstone Science, Celebrating Twenty Years of Wolves, 2010. (pages 70-71)*

Wolf Density in Natural Ecosystems

How much do wolves "self-regulate their population?

The "carrying capacity" of ecosystems.

Often the availability of resources is seen as the main factor in determining wildlife densities.
This was applied not only to ungulate density, but also to wolf density.
The belief was that predator density was closely tied to prey density.

Wolf populations do recover quickly when wolf density is low and prey density is high.
This was the case in Yellowstone N P when wolves were first introduced in 1995.

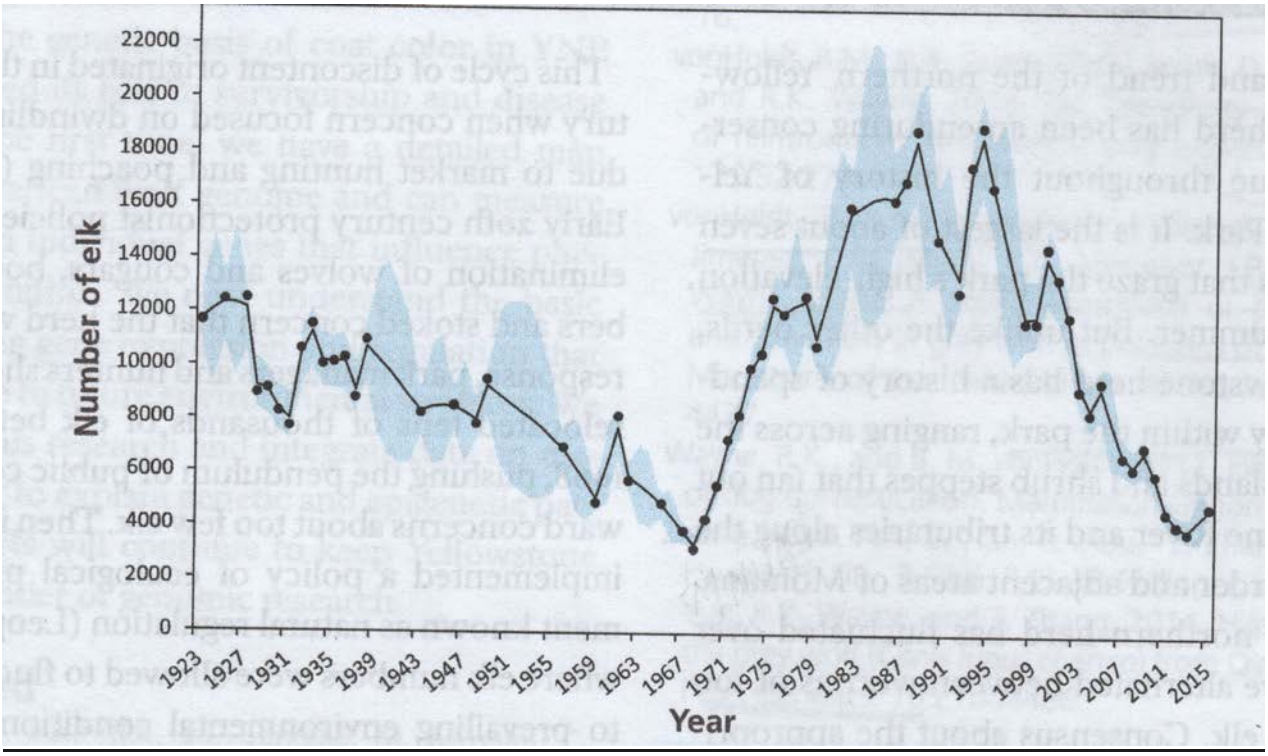
Wolves were introduced just after the elk population reached an all-time high.
Most ecologists agreed these elk numbers were far above "carrying capacity".

Wildlife management inside and outside the Yellowstone NP boundaries before and after wolves the return of wolves

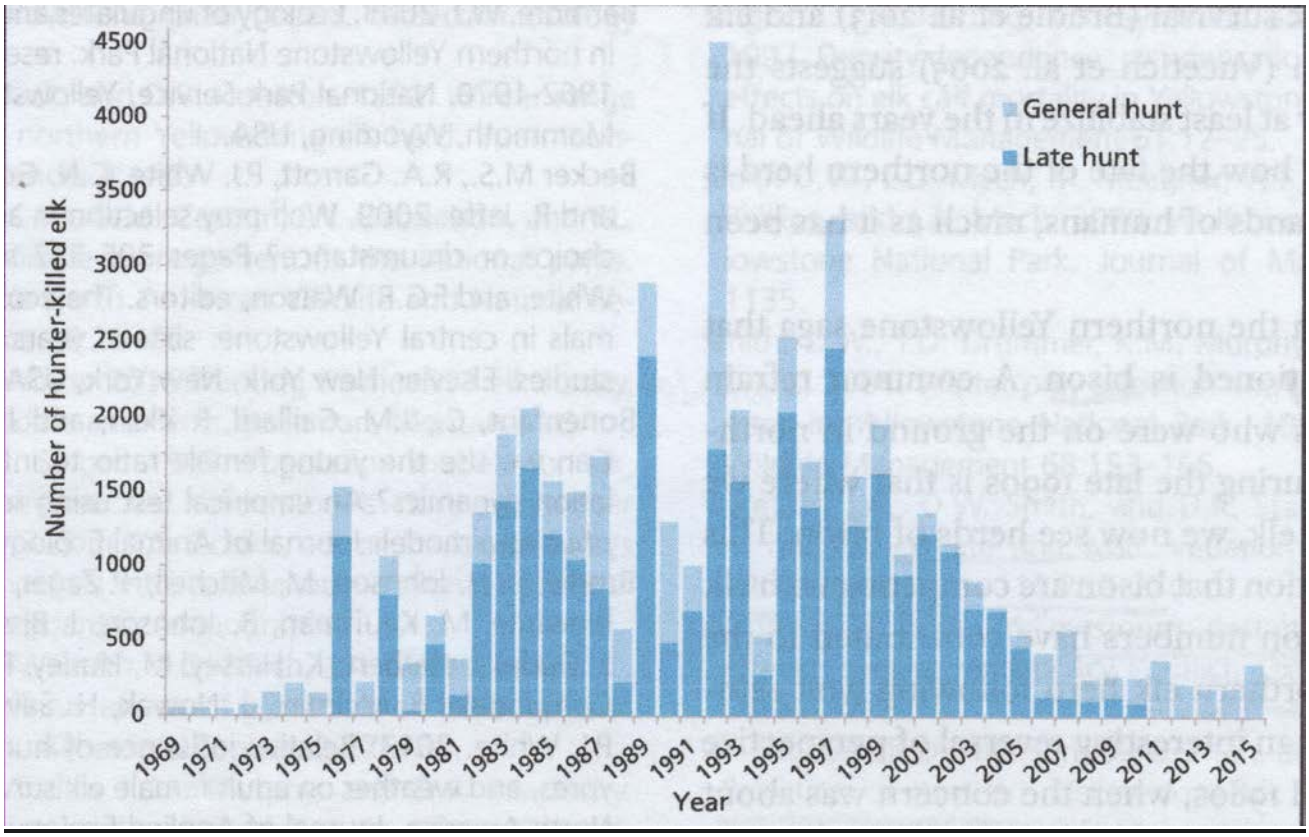
Inside Yellowstone National Park. Inside the park, for years there was "active management" of wildlife which included killing some species to increase the number of another species or to "balance nature" or to eliminate species not liked and/or understood by the public and/or park managers. Wolves were eradicated through predator control that included introducing Sarcoptes scabiei (a mite that causes mange). When it was believed that elk numbers inside Yellowstone NP were above "carrying capacity", rangers killed elk.

Outside Yellowstone National Park. The State of Montana managed elk numbers and other wildlife. Wolves were eradicated along with bison - bison because of the fear of a disease transfer to cattle. Elk were managed through hunting, which ranged from no elk hunting when numbers were low to the addition of a second elk hunt and a large harvest of elk from the two hunts when numbers improved. As the following graphs show, this went on before wolves returned to Yellowstone in 1995. Since many elk and other wildlife species migrate out of the park to lower elevations and less severe weather in the fall, management outside the park affects these species. So does the growing human population outside the park which has meant the loss of important winter habitat for all species. Now houses and small ranches dominate the landscape north of Yellowstone National Park.

Graph: Abundance of elk in the northern Yellowstone herd, 1923-2015
(Many of these elk migrate out of Yellowstone NP in the fall and winter outside the park where they have hunted.) (Note: the first wolves were brought to Yellowstone in 1995.)



Graph showing the number of elk from the northern elk herd killed in Montana's two hunting seasons. Note the numbers just before wolves arrived and the failure of elk to quickly respond to this level of hunting.



Research and observations in Yellowstone are showing that when humans don't manage wolf numbers factors other than prey density regulate wolf density.

Inside the park, a major management decision changed everything.
Yellowstone National Park adopted a new policy that based management on the principal that nature would be allowed to shape the land and the wildlife populations that lived on this land.

Efforts to made to re-establish and/or recover species that had been eliminated or remained only in low numbers. These efforts resulted in a large increase in the grizzly bear and cougar populations as well as translocating 41 wolves to the park. Now Yellowstone has become the perfect place to learn how "complete ecosystems" function. Yellowstone wildlife populations do not function totally without human interventions. They are impacted by management practices outside the park boundaries where elk and deer hunting, and now bison and wolf hunting, occur. Many ungulates and predators must leave the park, especially in the winter, to avoid the extreme weather and snow depths found in the park and to find sufficient food. Predators are following prey species and grizzlies are even following human hunters outside the park looking for food. Many studies have been mentioned in these comments that show management practices like this outside of national parks does affect protected wolf populations inside of parks. (Denali and Yellowstone)

Studies in large naturally-managed areas like Yellowstone and Denali National Parks are telling us that several other factors limit wolf populations besides prey density, and that wolf populations may be self-regulated.

Territoriality, Inter-Pack Aggression and Disease

#81. Article: More studies are showing that wolves limit their populations through aggressive encounters between both wolf packs as they try to obtain and/or protect territories and between members within packs that change the social dynamics of packs.

#81. Kira A. Casssidy, Douglas W. Smith, L. David Mech, Daniel R. MacNulty, Daniel R. Stahler, Matthew Metz, **Territoriality and Inter-Pack Aggression in Gray Wolves: Shaping a Social Carnivore's Life History".** *Yellowstone Science: Celebrating Twenty Years of Wolves, 2010.* (pages 37-41)

This article discusses what have often been the been one of the main causes of wolf mortality inside the park: Intra-specific and inter-specific aggression. Pack disputes have been over control of territories - mostly the prime hunting areas in the northern range where ungulate populations continue to be high compared to other areas.
Wolves prey primarily the elk, but they also kill some deer, bison and a few pronghorn. Recently bison are making up more of the wolf's diet as bison herds increase. When the wolf packs become large, more packs have two and even three breeding females and more disputes are seen pack members.

This article also shows that to defend and gain territory, packs with more members and with members who have specific characteristics, primarily males and older wolves, do better in these battles. Again, both the pack and the individuals within the pack matter, as Kipling said in 1894.

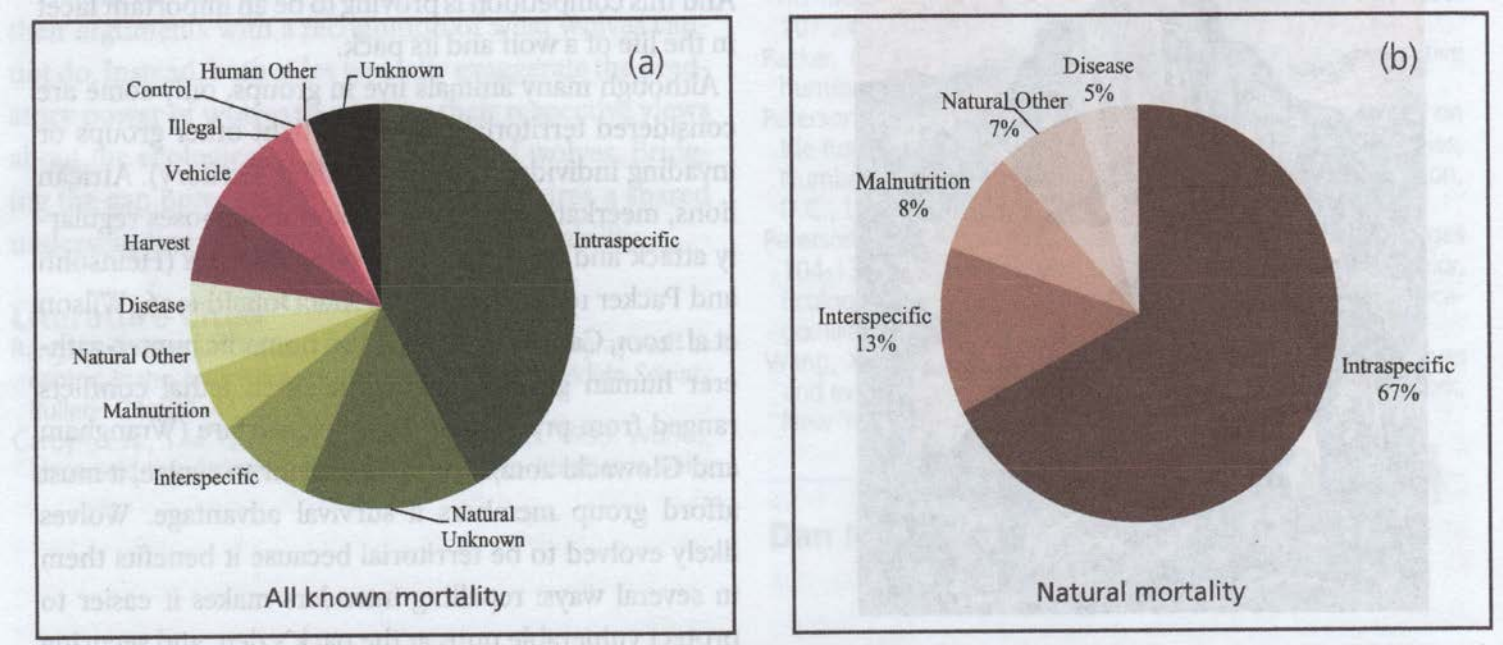


Figure 1. Causes of mortality for Yellowstone National Park collared wolves (1995-2015). (a) All causes of mortality; (b) Natural, known causes of mortality.

#82. Article: This research shows a third factor important in population dynamics: disease. Authors concluded that infectious diseases, along with prey abundance and social competition/aggression between wolves and packs, are all factors that may limit population growth in wolves.

Wolf numbers were at an all-time high at the beginning of 2005 in Yellowstone NP and pup counts suggested another large crop of wolves were coming. Then everything changed. The 18 pups in the Slough Creek Pack dwindled down to 3 lethargic pups. This happed across the northern range of the park. The total wolf population dropped by over 30% in one year! Disease is often overlooked because bodies are not found or they are found too late to test for diseases and sometimes disease is only part of the reason why an animals dies.

#82. Emily S. Almberg, Paul C. Cross, Peter J. Hudson, Andrey P. Dobson, Douglas W. Smith and Daniel Stahler, ***"Infectious Diseases of Wolves in Yellowstone".*** *Yellowstone Science: Celebrating Twenty Years of Wolves, 2010. (* pages 47-49)

Findings: From blood samples the cause was found for this sudden drop in wolf number: canine distemper virus (CDV) Now researchers know there have been three major outbreaks of CDV in Yellowstone, 1999, 2005 and 2008. In 2005, pup survival dropped from the normal 77% to 23%. Adults were less affected and develop a natural immunity if they survive. CDV is thought to be widespread in a variety of carnivores including raccoons, skunks and coyotes. (Almberg, Cross and Smith, 2010, *"Persistence of canine distemper virus in the Greater Yellowstone Ecosystem's carnivore community".* Ecological Applications, 2009.)

Another parasite was also found in Yellowstone wolves in 2007, Sarcoptes scabiei, a mite that was introduced by veterinarians in the early 1900s to eradicate wolves. It persisted in other fur-bearing species to reappear in wolves in 2007. It spread to almost all packs in the northern range of Yellowstone and is fairly prevalent and has caused severe infections. Wolves can revoer but it can persist for years as the infection waxes and wanes. Wolves living in large,

healthy packs are more likely to survive. As pack size decreases, the proportion of infected pack mates increases, and infected individuals are much moe likely to die. (Almberg et al., "*Social living mitigates costs of a chronic illness in a cooperative carnivore".* Ecology Letters, 2015.) (Almberg et al., *"Pasatite invastion following host reintroduction: a case study of Yellowstone's wolves".* Philosophical Transactions of the Royal Society of London, 2012.)

#83: Article: What regulates wolf populations?

"Density Dependence"

(Self-regulation)

Also important, studies in Yellowstone have shown that usually the socially complex packs have pups, but not as often as presumed. Studies show that only about 70-80% of the packs reproduce each year, rather than the 90% that is sometimes presumed. Is this self-regulation? The causes found for packs who did not breed: breeder loss, limited food, disease, aggression between packs. These are collectively called "density dependence". (See article, page 10-11.)

#83. Douglas W. Smith, Daniel R. Stahler, Matthew C. Metz, Kira A Cassidy, Erin E. Stahaler, Emily S. Almberg and Rick McIntye, *"Wolf Restoration in Yellowstone: Re-introduction to Recovery".* **Yellowstone Science: Celebrating 20 Years of Wolves**, June, 2016. Page 10-11.

#83. Article: (Continued) More information in this article about wolf populations is very useful when the EIS looks at wolf populations in WA State.

WA wolves returned differently, dispersing naturally into our state from B.C., Idaho and Oregon, while wolves in Yellowstone were "translocated" by humans. Still, research in Yellowstone might be useful when looking at wolf recovery and post-recovery management in WA State.

.

#83. Douglas W. Smith, Daniel R. Stahler, Matthew C. Metz, Kira A Cassidy, Erin E. Stahaler, Emily S. Almberg and Rick McIntye, *"Wolf Restoration in Yellowstone: Re-introduction to Recovery".* **Yellowstone Science: Celebrating 20 Years of Wolves**, June, 2016. Page 5-11.

Summary: As might be expected, wolf numbers grew quickly from 1995 until reaching a peak in 2003 at 175 wolves in 16 packs. Between 2003 and 2008 numbers went up and down until finally leveling out in 2009 at just under 100 wolves through 2015. Colonization to saturation.

Disease became a factor limiting wolf numbers in the Northern Range when wolf density was peaking. There were three outbreaks of canine distemper virus (CDV), 1999, 2005, and 2008. Sarcoptic mange also took its toll as density increased. Wolves carrying the gene linked to black coats survived the outbreaks of CDV better than gray wolves. Now wolves seem to occupy most of the suitable wolf habitat.

Are territoriality and inter-pack aggression also limiting wolf density in Yellowstone? Prey levels in the northern range of Yellowstone are still above that of most other areas.

Elk numbers in northern Yellowstone seem to be stable after the sharp drop that started before the first wolves were released in the park and continued afterwards. The increase in three large predators, grizzlies, cougars and wolves were a factor in this decrease in elk density. Now, elk are probably still below carrying capacity after previously far exceeding this level. Today's elk are probably as healthy as they have ever been meaning far fewer are vulnerable, easy prey for wolves. Adult elk are five to seven times larger than wolves while wolves only have their teeth and pack to work with when killing their prey. Biologists who capture and collar elk claim Yellowstone elk are "*the leanest, meanest elk in all of western North America*". Why? They are predator-tested and below carrying capacity.

#84. Yearly Articles: The yearly "Wolf Project Reports" from Yellowstone National Park provide information on wolf populations, population dynamics, the stories each year of packs and individual wolves, prey choices, etc. This info is from the Wolf Report for 2018.

#84A. Smith, Stahler, Cassidy, Stahler, Cassidy, et al. "***Yellowstone National Park Wolf Project Annual Report 2018".*** *National Park Service, Yellowstone Center for Resources.* 2019.

#84B. Also #83. Douglas W. Smith et al., "***Wolf Restoration in Yellowstone: Reintroduction to Recovery". Yellowstone Science: Celebrating 20 Years of Wolves",*** 2016, pages 5-11.)

In 2018, there were at least 80 wolves in Yellowstone, in 9 packs, with 7 packs successfully breeding. Overall wolf numbers have been fluctuating less in recent years. Between 2009-2017, total know wolf numbers were usually between 83-108. Breeding pairs have remained consistent. Pack size in 2018 ranged from 3 to 19, with an average of 8.7 members.

This was the first year with no documented intraspecific-caused wolf mortality which is usually the leading cause of wolf mortality inside the park. Three radio-collared wolves died in 2018, inside the park; an adult female and an older female. Evidence suggests that these wolves may have died after being kicked by ungulates. Outside the park, three wolves were legally shot by hunters outside the park, the alpha female of one pack, the alpha male of another pack, and an young female. Another was shot and injured but returned to the park. There were no known mortalities from diseases. Mange is still present in several coyotes and fox but was not seen in wolves in 2018.

This chart showing the total number of wolves in Yellowstone each year should be useful when looking at similar charts for WA State.

Another important factor to understand is dispersal.

Wolves in Yellowstone National Park have good corridors for dispersal inside and outside of the national park.

A huge question and challenge for WA State is figuring out of corredors are adequate in WA between key wolf populations in Northest WA, Southeast WA, the Cascade Mts and the Olympic Penninsula where suitable wolf habitats are available.

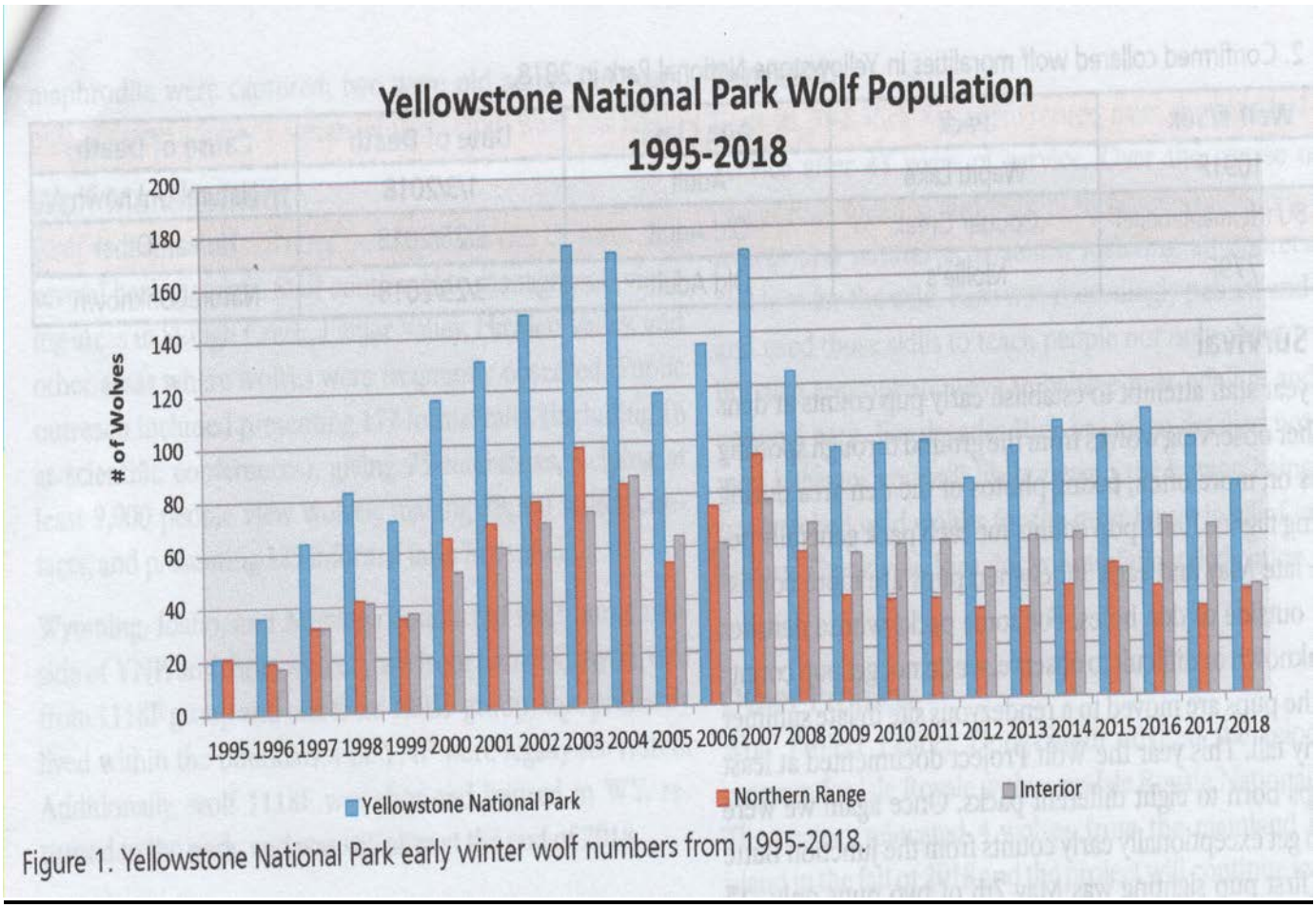
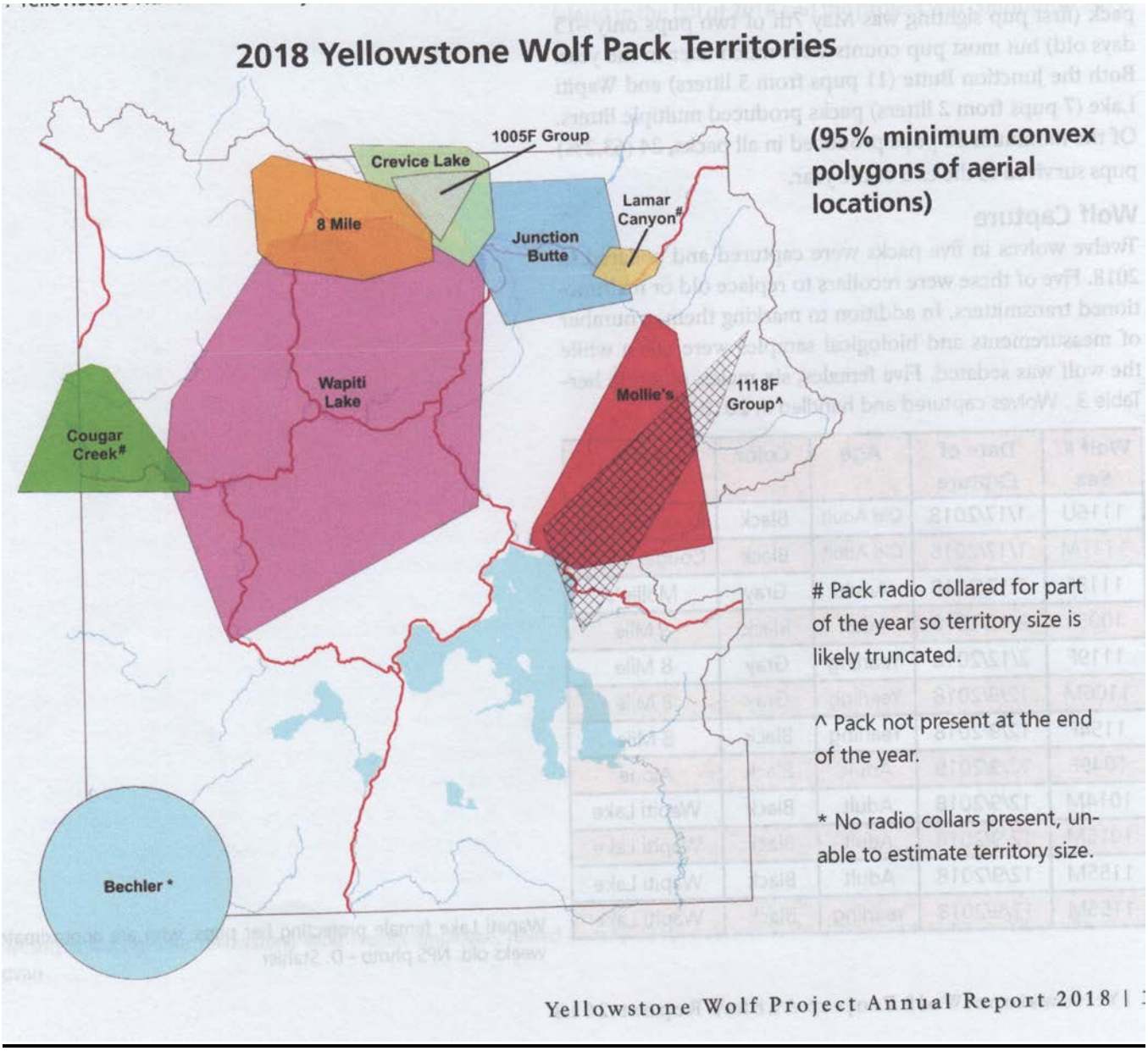


Figure 1. Yellowstone National Park early winter wolf numbers from 1995-2018.

Spatial organization

As in previous reports, it is believed that wolves are occupying all of the suitable wolf habitats in Yellowstone National Park. Habitat requirements are protection from humans, year-around availability of ungulate prey and enough space so pups are protected from other packs. The northern range continues to have a good prey base all year. Packs in the northern range have smaller and overlapping territories. Harsh winters in the interior cause many ungulates to migrate outside the park so these areas are not suitable habitat year-around so territories are larger as these packs follow prey outside the park or move to the northern range to hunt.



Again: wolves are social carnivores who organize themselves into packs to increase survival. Packs determine wolf behavior and survival and overall fitness just as individual wolves determine pack survival behavior and survival.

Outside the park, most wolves are killed by humans. Inside the park, human-caused wolf mortality is low. Inside the park, wolves have "richer age structures and more complex social organization within wolf packs, including very different roles for old individuals within the group.....This protection from human hunting has also led to larger packs." Defending good territories is a necessary reality in the competitive northern range of Yellowstone.

Because wolves have been protected in Yellowstone National Park, a "natural baseline" is available which can provide the knowledge that is needed to understand not only wolf ecology and behavior and fitness and adaptability, but also more important, to understand how ecosystems function. For instance, it was in Yellowstone that researchers discovered that packs have a matrilineal organization and that female wolves often manage the pack dynamics while males take on other important such as hunting and defending territory. The important discovery about the color disease immunity is being explored in Yellowstone wolves.

#85. Article: What do some of the leading wolf scientists have to say about wolf biology and management? L David Mech. Rolf O. Peterson. Douglas W. Smith.

This question should interest people working on this EIS: Are wolves in Yellowstone National Park different from other North American wolves, or do we just know more about them?

#85. L. David Mech, Rolf O. Peterson and Douglas W. Smith, as interviewed by Charissa Reid, "F***ive Questions: Three scientists at the forefront of wolf ecology answer the same questions about wolf biology and Management".*** *Yellowstone Science: Celebrating 20 Years of Wolves.* 2016. pages 76-81

Smith:
First, wolves in Yellowstone are not different from wolves elsewhere - we simply know more about these wolves.
Second, perhaps most important, and this pertains mainly to the wolves in the northern range of Yellowstone, we discovered they can occupy an area at a very high density. The density in the northern range may be the densest wolf population we have seen. This was probably because of the large elk herd in the northern range. That's unique across North America. Usually wolves live at a lower density. Yellowstone National Park is almost 1,000 kilometers squared. In Canada, wolf densities are typically 10 to 15 wolves per 1,000 kilometers squared. In Alaska it is not uncommon to have densities in the single-digits per 1,000 kilometers squared. Where there are white-tailed deer, such as Wisconsin or Minnesota, there may be 30 to 40 wolves per 1,000 kilometers squared. Here in Yellowstone we have 80 to 1000 wolves per 1,000 kilometers squared. So what might be unique about wolf behavior in Yellowstone is this unique high density. Wolf pack territories are 200 to 400 square miles. How wolves are adapting to this very competitive environment is very different.
Third, Yellowstone wolves have been monitored far more intensely than wolves anywhere else. In some places they are monitored year-around. Road access allows easy access to the northern range. Instead of just monitoring through use of radio collars and airplanes, there is extensive ground monitoring. Each day there is a little more and this adds up.

Mech:
First, while every wolf population is different, there is a uniqueness to the origin of the Yellowstone wolves, they were from two different parts of Canada with different gene pools. The practical difference is not entirely known yet but this makes them unique.
Second, there was a great surplus of prey when these wolves were reintroduced which reduced competition at first within packs and between packs. The population in Yellowstone now is more like those in other places - in that they may pretty much equilibrated with their prey. Pack size has decreased.
Third, it has been one of the most scrutinized wolf populations anywhere in the world. The percentage of collared wolves and the time spent observing them and collecting data has been incredible and this has been turned into informative studies and publications. This means that things managers never knew about other wolf populations were discovered in Yellowstone. Until other wolf populations are studied like this, we will not know if Yellowstone wolves are different.

The next question should also interest people managing wolves in WA State: What has been Yellowstone's most significant finding or contribution to wolf research or management?

Mech:
First, no where else in the world did we get the kind of information that MacNulty's studies have produced on the effect of pack size and wolf- individual wolf ages and sizes, and how these affect wolf hunting behavior.This is important to the whole field of predator-prey relationships.

Second, What's most surprising to me has been many of the observations of multiple breeding in some packs - they are not even family packs, there's groups of wolves that get together, like several males, or there's one female that was observed breeding with five males. Is this because these packs are watched so much and the individuals are known so well?

Peterson:
I think the ecosystem role of wolves has been demonstrated in Yellowstone. The top-down significance is not as unique as the fact that so many people are paying attention to this. Before this, the main controversy surrounding wolves was their impact on elk numbers. This conversation is getting more attention from many more people.

Smith:
First, we have a great window into ecosystem functioning. How do ecosystems function has been the hottest scientific debate going on. The trophic cascades arguments are all about this. It's a vibrant debate that is producing a lot of new information.
Second, we've had the opportunity to learn how wolves live in the absence of human exploitation. We've also discovered two things that may or may not occur outside of protected areas like Yellowstone. First, our wolves have organized themselves into matrilineal groups. The manager of the pack appears to manage the packs and female offspring tend to stay in the pack. (philopatry). Male offspring are more likely to leave, disperse, and they may do this to avoid inbreeding. The daughters stay in the pack and may have an opportunity to breed if the alpha female dies. The other new discovery is from genetic testing. There seems to be an interaction between a coat color, whether the wolf is black or gray, and disease immunity and maybe aggression. The black coat is dominant to gray coat color. Homozygous black wolves die at a higher rate, but heterozgous black wolves have a survival advantage maybe because of an immune system gene. These two things still need to be studied a lot more.

The third question is also something wildlife managers everywhere must think about: What is the most pressing issue or conservation challenge facing wolfs in Yellowstone?

Mech:
I'll be surprised if wolves do not last for a long time in the park but I see the relationship between the number of wolves and the number of prey as something that will need to be followed for a long time. Each predator-prey relationship is unique. In Yellowstone, this involves elk, bison, sheep, deer, moose and pronghorn. Will the prey selection of wolves change over time? Will the % change? We see now that wolves are preying on more bison.

Peterson:
Preserving and protecting the Yellowstone ecosystem may be a conservation challenge. Yellowstone is an island in a sea of human- dominated ecosystems - these are pressing in on all sides and they impact Yellowstone. Some hope the wolves will learn to become specialized predators of bison.

Smith:
Social science. Wolves are one of the most studied animals maybe because they are controversial. The real frontier for wolves is human attitudes. People may be the tough part. People visit from all over the world to see wolves. They love them. Just outside Yellowstone's boundaries, constituents want something different for wildlife. This may continue to be an issues. This has been difficult. We have wolves who use and need territories that go outside the borders of the park. Montana responded by reducing wolf hunting next to the park and Wyoming has small hunt unites with limited quotas next to the pack. Balancing this in the future will be a constant challenge.

#86. Article: To end this section on wolf management and ecosystems, I think it is important to think about the basic principles of ecology as described Barry Commoner in his 1971 book, *The Closing Circle*. Wolves would be managed very differently if the most basic laws of ecology were followed - and they might be a lot better managed.

#86. Barry Commoner, *"The Closing Circle"*. *1971*

The First Law of Ecology: Everything is Connected to Everything Else.

To not manage wolves as important parts of ecosystems is to ignore this basic principle. Yet this is how most wildlife is managed. As a separate species with little knowledge of how that species is part of the ecosystem where it lives. Animals are hunted according to seasons and limits with no real understanding of the impact on individual species and its biology and behavior and less understanding of how these are tied to ecosystems and vice versa. This is done partly because most wildlife managers do not understand much about how various ecosystems do function if left alone and the emphasis instead is on something far more simple: sustainable numbers with human harvesting. The livestock model from farming is used, not the laws of nature.

The Second Law of Ecology: Everything Must go Somewhere.

In nature there is no such thing as "waste". In natural ecosystems, everything is used up and used in the system. This includes everything: dead animal carcasses, animal waste, animal release of carbon dioxide and plant release of oxygen. These are all essential to the system, Everything is used by something for something. When humans remove various parts without considering this, such as during hunting, this second law is being ignored as if it is not important.

The Third Law of Ecology: Nature Knows Best.

Humans have the most trouble with this one. Wildlife managers like to play "god" and try to improve on nature. Most often, any human-caused change in a natural system is likely to be detrimental unless it is an attempt to restore what was once there naturally. Humans want to tinker with natural systems. We can't just stand back and see what happens when natural processes shape the animals and plants and landscape. Yet this is how it worked for thousands of years and when we inherited these systems, most were in working very well. They contained spectacular plant and animal species that thrived without human intervention.

The Fourth Law of Ecology: There is No Such Thing as a Free Lunch.

In ecology, as in economics, this law warns us that every gain is won at some cost. It embodies the previous three laws. Anything extracted from natural systems must be replaced or there is a loss. Humans still believe we can take things from natural systems and it won't matter. We do this when scientists are telling us they do not yet know how these systems work. How wise is this?

The many current environmental crisis we are facing is a warning that we have ignored these four basic laws of ecology for too long.

What does all of this have to do with an EIS about managing wolves?

1. Ecologists do not yet understand the complexity and dynamics of ecosystem functioning; maybe it is too complex and too dynamic to understand.

2. Until we understand how they work, maybe we should maintain more complete ecosystems and try to understand how they work.

This brings us back to the key issue for the EIS - Wildlife Natural Management Areas

Managing wildlife in more parts of WA State as complete, natural ecosystems rather than developing management plans for individual species that are based on maintaining sustainable populations and human hunting and trapping.

Wouldn't all of the species living within these WNMA benefit from this hands-off approach? Wouldn't the 97.58% of the people in WA state enjoy hiking and camping and photography and wildlfie watching in these areas? Wouldn't the scientific community, schools and colleges, students, benefit from these areas?

Sampling of Research on the Role of the Wolf in Ecosystems

#**66.** Andy P. Dodson, ***"Yellowstone Wolves and the Forces that Structure Natural Systems".*** *PLoS/ Biology, 2014.*

67. L. David Mech, "***Is science in danger of sanctifying the wolf?".*** *Biological Conservation, 2012.*

#68. Kathleen A. Griffin, Mark Hebblewhite, Hugh Robinson, et al., ***"Neonatal mortality of elk driven by climate, predator phenology and predator community composition".*** *Journal of Animal Ecology, 2011.*

#69. Robert A. Garrott, Justin A. Gude, Eric J. Bergman, et al., ***Generalizing wolf effects across the Greater Yellowstone Area: a cautionary note".*** 2005.

Also: Robert A. Garrott, P.M. White, Claire Gower, Matthew S. Becker, Shana Dunkley, Den L. Hamlin, and Fred G.R. Watson, ***"Wolf Effects on Elk Inhabiting a High Risk Landscape: The Madison Headwaters Study.*** Yellowstone Science: Celebrating 20 Years of Wolves, 2016 pages 82-84.

#70. Luke E. Painter, Robert L. Beschta, Eric J. Larsen and William J. Ripple, ***"Recovering aspen follow changing elk dynamics in Yellowstone: evidence of a trophic cascade?*** *Ecology, 2015.*

#71. Molly J. Runyon, Daniel B. Tyers, Bok F. Sowell and Claire N. Gower, ***"Aspen Restoration Using Beaver on the Northern Yellowstone Winter Range under Reduced Ungulate Herbivory".*** *Restoration Ecology,* 2014.

#72. Kerey K. Barnowe-Meyer, P.J. White, Troy L. Davis, et al., ***"Influences of wolves and high-elevation dispersion on reproductive success of pronghorn."*** *Journal of Mammalogy, 2010.*

#73. D. G. Flagel, G.E. Belovsky, and D.W. Beyer Jr., ***"Natural and experimental tests of trophic cascades: gray wolves and white-tailed deer in a Great Lakes forest".*** *Community Ecology, 2015.*

#74. Todd C. Atwood, Eric M. Gese, and Kyran E. Kunkel, ***"Comparing Patterns of Predation by Cougars and Recolonizing Wolves in Montana's Madison RAnge".*** *USDA National Wildlife Research Center.* 2007.

#75. Andrea D. Kortello, Thomas E. Hurd, and Dennis L. Murray, "***Interactions between cougars and gray wolves in Banff National Park, Alberta."*** *Ecoscience, 1999.*

#76. Warren B. Ballard, Ludwig N. Carbyn, and Douglas W. Smith, "***Wolf Interactions with Non-prey"*** University of Nebraska, 2003.

#77. Daniel R. MacNulty, Daniel R. Stahler, C. Travis Wyman, Joel Ruprecht and Douglas W Smith, ***The Challenge of Understanding Northern Yellowstone Elk Dynamics After Wolf Reintroduction".*** Yellowstone Science: Celebrating 20 Years of Wolves, 2016. Pages 25- 33.

#78. Matthew C Metz, John Vucetich, Douglas Smith, Daniel Stahler and Rolf, *"Effect of Sociality and Season on Gray Wolf Foraging Behavior: Implications for Estimating Summer Kill Rates*". PLOS 2011.

#79. Julie S Mao, Mark S Boyce, Douglas W Smith, Francis J Singer, David J Vales, John M Vore, and Evelyn H Merrill, ***Habitat selection by elk before and after wolf reintroduction in Yellowstone National Park.*** 2010.

#80. Douglas W. Smith, Rolf O. Peterson, Daniel R. MacNulty, and Michel Kohl, ***The Big Scientific Debate: Trophic Cascades".*** *Yellowstone Science, Celebrating Twenty Years of Wolves, 2016. (pages 70-71)*

#81. Kira A. Casssidy, Douglas W. Smith, L. David Mech, Daniel R. MacNulty, Daniel R. Stahler, Matthew Metz, **Territoriality and Inter-Pack Aggression in Gray Wolves: Shaping a Social Carnivore's Life History".** *Yellowstone Science: Celebrating Twenty Years of Wolves, 2016. (*pages 37-41)

#82. Emily S. Almberg, Paul C. Cross, Peter J. Hudson, Andrey P. Dobson, Douglas W. Smith and Daniel Stahler, ***"Infectious Diseases of Wolves in Yellowstone".*** *Yellowstone Science: Celebrating Twenty Years of Wolves, 2016. (* pages 65-69)

#83. Douglas W. Smith, Daniel R. Stahler, Matthew C. Metz, Kira A. Cassidy, Erin E. Stahler, et al., **"Wolf Restoration in Yellowstone: Reintroduction to Recovery".** *Yellowstone Science: Celebrating Twenty Years of Wolves, 2010. (*pages 5-11.)

#84. Smith, Stahler, Cassidy, Stahler, Cassidy, et al. "***Yellowstone National Park Wolf Project Annual Report 2018".*** *National Park Service, Yellowstone Center for Resources.* 2019.

#85. L. David Mech, Rolf O. Peterson and Douglas W. Smith, as interviewed by Charissa Reid, "F***ive Questions: Three scientists at the forefront of wolf ecology answer the same questions about wolf biology and Management".*** *Yellowstone Science: Celebrating 20 Years of Wolves.* 2016. pages 76-81

#86. Barry Commoner, *"The Closing Circle". 1971*

Comments submitted for scoping
for the EIS on Post-Recovery Wolf Management

To: Washington Department of Fish and Wildlife

Submitted by:

Martha Hall
2617 16th Street
Anacortes, WA 98221
pondfrog.mh@gmail.com

Date submitted:
Monday, October 28, 2019

Section 4

This is the fourth of four sections that are being submitted.

Section 4:

The Interests and Values of the Residents of Washington State

Sections 1, 2, and 3 of my comments
focused on the need for the EIS to use the best available science
and I used a sampling of this science
to raise many issues that should be addressed in this EIS.

Section 4 focuses on one more important issues that the EIS must address:
will the goals and all of the alternatives in the EIS
really reflect those of most residents of WA State?

Will the EIS,
when it analyzes and discloses impacts of various actions
accurately identify and look at the impacts
on WDFW's the largest stakeholder group, wildlife watchers?

Contents of Section 4

Part 1

What are the interests and values of the 7 1/2 million residents of WA State?

Only 2.4% bought any kind of hunting license in WA State in 2018.
and this number is still on a downward trend
despite a lot of effort by WDFW to increase this number through many programs.

WDFW's largest stakeholder group is wildlife watchers,
according to the WDFW website. They far out-number and out-spend hunters.

All statistics show that a growing number of residents
enjoy non-consumptive uses of wildlife;
wildlife watching, hiking and camping, nature study, and photography

Wildlife Watchers

All statistics collected and provided on fish and wildlife stateholder groups, by the United States Fish and Wildlife Service, by NOAA Fisheries, and by the Washington Department of Fish and Wildlife show that the largest stakeholder group by far is wildlife watchers.

In Washington State, wildlife watchers far outnumber hunters,
the second group that might be interested in wolf management.

Their economic impact on local communities is also far greater than that of hunters.

Another important fact:
The number of wildlife watchers continues to increase in WA State
as more people enjoy outdoor recreation in non-consumptive sports
such as hiking, climbing, bird watching, nature study and photography.
Most of these people are negatively impacted by hunting directly and indirectly.

Meanwhile, the number of hunters in WA State has been declining
even though WDFW has worked hard to recruit more hunters
through numerous programs for youth, women, the disabled, etc.
while little effort is made to promote non-consumptive uses of wildlife.

WDFW has failed to set aside areas for quality wildlife watching,
areas where wildlife is not hunted at all,
where wildlife watchers do not have to wear orange vests and worry about being shot,
where they do not worry that the animals they are watching will be shot
where every wild animal they see does not flee in fright at the sight of a human.

Instead,
WDFW focuses its management on "game species" that are managed primarily for the 2.42% of the residents who buy hunting licenses.

And Finally,
Residents of all ages, from young children to the senior citizens,
both men and women, minorities,
school classes and students studying wildlife & ecosystems & conservation,
urban and rural residents alike,
are all interested in and enjoy and benefit from wildlife watching.

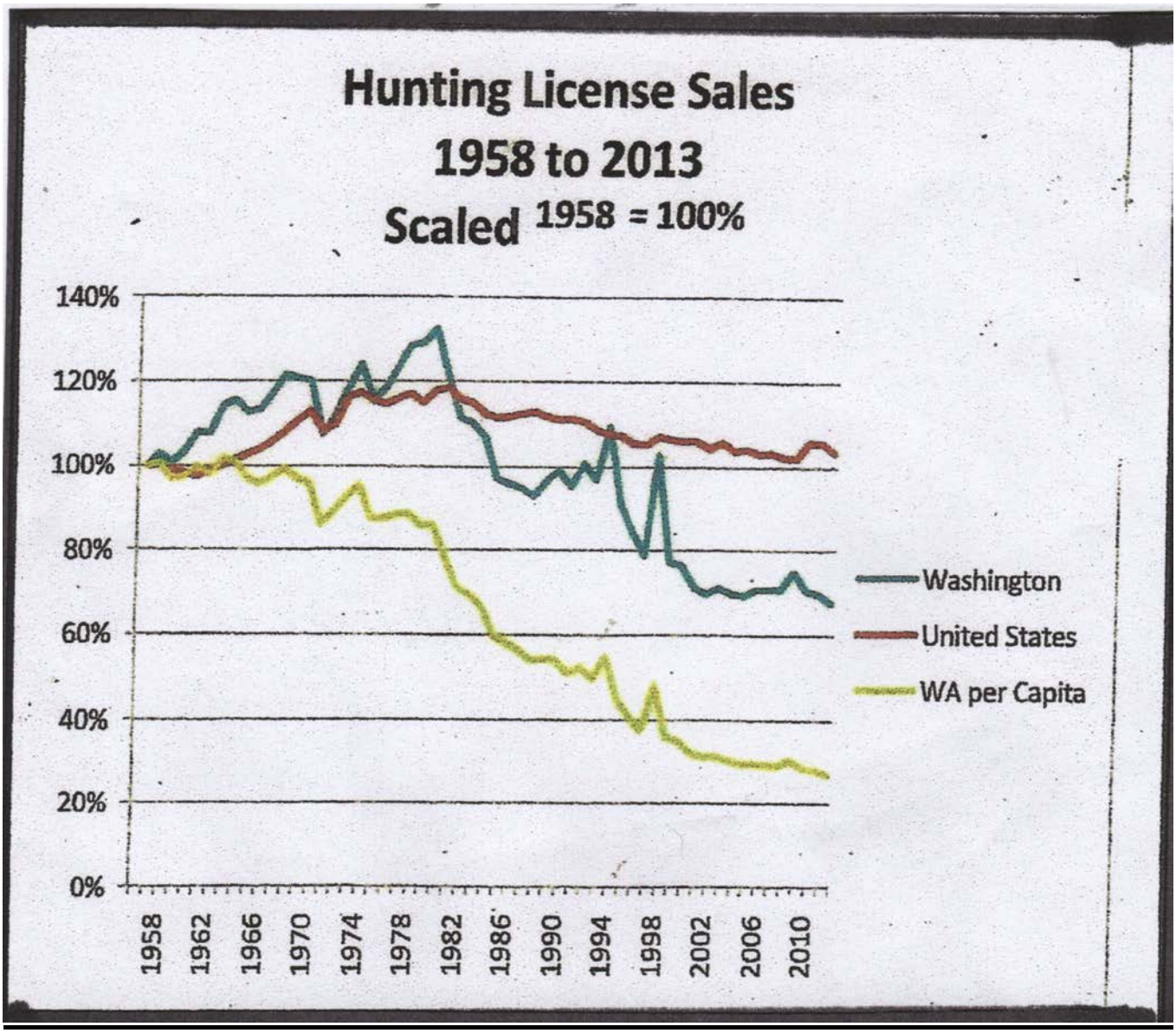
While hunters,
the vast majority are white men living in rural areas.

Aren't these statistics are relevant to the EIS on wolf management
if WDFW plans to management wolves based on the interests and values
of residents of WA State?

See statistics on the number of hunters vs the number of wildlife watchers
and a comparison of what they contribute to local economies
on the following pages,

Graphs 4A, 4B, 4C

Graph 4A Declining Number of Hunters 1953 to 2013 for the U.S. and for Washington State



Graph 4B: Comparison
Number of Participants and their Economic Impacts

of WDFW's Three Main Stakeholder Groups

Washington State Wildlife Watching, Fishing, & Hunting

Value	Wildlife Watching	Fishing	Hunting	Total
Participants	2,168,000	938,053	218,800	3,324,853
Expenditures	$ 3,173,373,000	$ 1,186,275,897	$ 369,565,921	$ 4,729,214,818
Total Economic Impact	$ 5,549,730,265	$ 1,956,335,653	$ 613,583,221	$ 8,119,649,139
Jobs	63,327	16,211	5,612	85,150
Salaries and Wages	$ 2,132,888,979	$ 625,222,636	$ 211,083,317	$ 2,969,194,932
State and Local Taxes	$ 448,488,469	$ 119,631,627	$ 39,653,073	$ 607,773,169
Federal Tax Revenues	$ 453,532,429	$ 150,271,880	$ 50,647,408	$ 654,451,717

Source: 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation

Graph 4C. The % of Residents in Washington State who purchased one or more hunting licenses from 2008 to 2018.

Statistics on the Number and % of Hunters in WA State
based on USFWS Statistics on Number of People Purchasing Hunting Licenses
and US Census Estimates for the Population of WA State

Years 2008 through 2018
11 Years

Year	% of Total Population Purchasing Licenses	Number of Individuals Purchasing Licenses	Total Population WA State
2018	2.43 % (2.42) ☆	183, 063	7, 536, 000
2017	2.44 % (2.45)	182, 149	7, 425, 000
2016	2.49 %	182, 251	7, 295, 000
2015	2.52 %	180, 829	7, 170, 000
2014	2.55 %	180, 411	7, 060, 000
2013	2.69 %	188, 081	6, 970, 000
2012	2.81 %	194, 272	6, 890, 000
2011	2.87 %	196, 276	6, 822, 000
2010	3.09 %	209, 050	6, 746, 000
2009	2.95 %	197, 260	6, 672, 000
2008	3.00 %	197, 215	6, 566, 000

☆ Rounded

Note: Rounding the % to the nearest hundredth,
the % in 2018 was 2.42%, and the % in 2017 was 2.45 %.

Ages of Wildlife Viewers

What small child does find joy in watching a deer with a fawn,
an elk during rut, bears eating huckleberries, wolf pups playing near a den?

All ages of students would benefit from field trips to natural areas
where wildlife were not hunted.
They would see animals that did not flee in fear when students saw them.
They could go during the fall not have to worry about being shot by hunters.

Senior citizens is a growing age group in WA State and are more active all the time.
They are hiking and camping, bird and animal watching, and photographing wildlife.
I am a wildlife watcher and wildlife photographer.
My outdoor experiences in WA State are negatively impacted by hunters
directly and indirectly.

On our longest vacations each summer, a month or more we leave WA State and travel to places like Yellowstone National and the Canadian Rockies. When we get there, we often end up watching and enjoying wildlife species that are here in WA State.

Why can't we enjoy these species in own state, Washington?

1. In WA State, there are either not as many of these animals or they are difficult to find.
2. In WA State, these species are hunted which makes them terrified of humans. This is not fun to see.
3. Large parts of the best viewing times for some species conflict with hunting seasons, which means wildlife watching is not fun. It is not fun to wear orange and worry about being shot, as was the woman hiking on Sauk Mountain one summer. She was shot in the head by kids hunting bears.
5. During hunting season, it is very upsetting to share areas with hunter who are trying to kill what we would like to watch. We simply don't go where and when people are hunting.
6. We live in Anacortes which is near some of the best places to see ducks, swans, and raptors in the fall and winter, the Skagit Valley flats . We almost never go wildlife watching in the flats because of hunting. Sharing parking lots and seeing people walking around with strings of dead ducks and geese is extremely upsetting. Hiking when people are hiding in blinds waiting to kill animals is also extremely upsetting.

We try to spend at least a month in Yellowstone each year. Why?
Because we can see wildlife that is not afraid of people. We get to watch their natural behavior.

Like this black bear, many animals we enjoy in these out-of-state areas are the same species we have here in WA State

We spend hours watching coyotes interacting with wolves, bison or pronghorn, a badger mother with young at their den playing and feeding, sandhill cranes defending their young,

bighorn sheep and mountain goat feeding on cliffs above our campsite.

Am I confident that WDFW write a draft EIS
that reflects the values and interests of the residents of Washington State:
NOT AT ALL.

WHY?

When wolves were still listed as "endangered" by our state, WDFW moved wolf management from the usual team handling these species to the game management team.
and that is where they are today - even though wolves are still listed as endangered.

When wolves were still listed as "endangered" by our state,
WDFW tried to get wolves listed as a "game species".
Fortunately that attempt failed.

The following pages show more examples of why I do not trust WDFW to consider non-hunters when it writes this EIS and manages wolves:

1. **the cover of the WDFW budget request to the state legislature**
2. **Map showing where most of the people in WA State live.**
3. **Appointments to WAG - mostly hunters and/or ranchers**
4. **Appointments to the Game Management Advisory Council**
5. **WDFW's Game Management Plan and EIS**

NEXT PAGE

1.

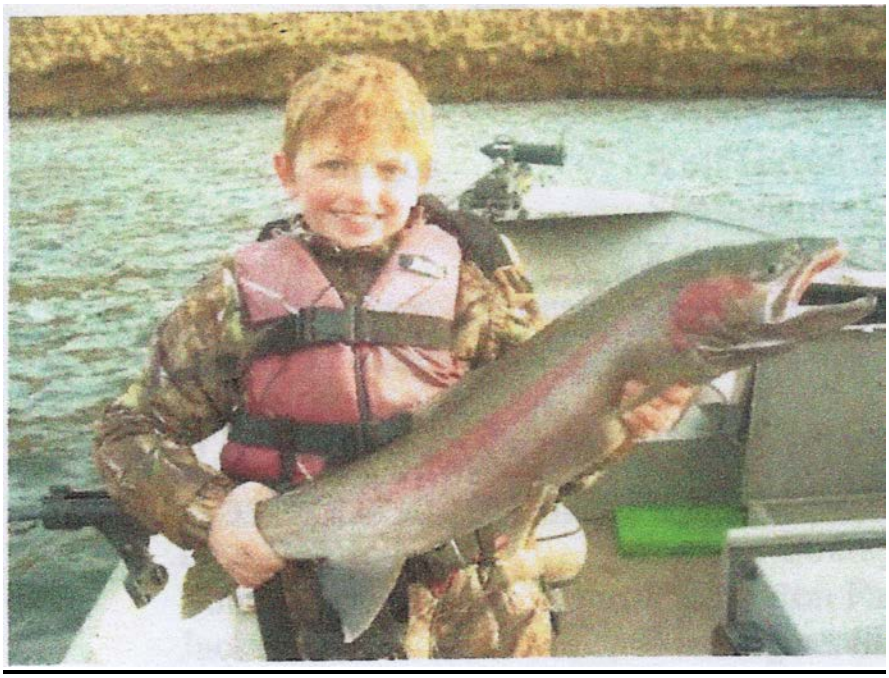
The cover of WDFW's Budget Request to the State Legislature.
And this is the cover on a document asking for more of the public's tax dollars to fund WDFW.

What does this cover say
about who WDFW sees as its stakeholders?

Does this cover look like WDFW realizes that only 2.42 % of the residents hunt?
Does it recognize the largest stakeholder group?

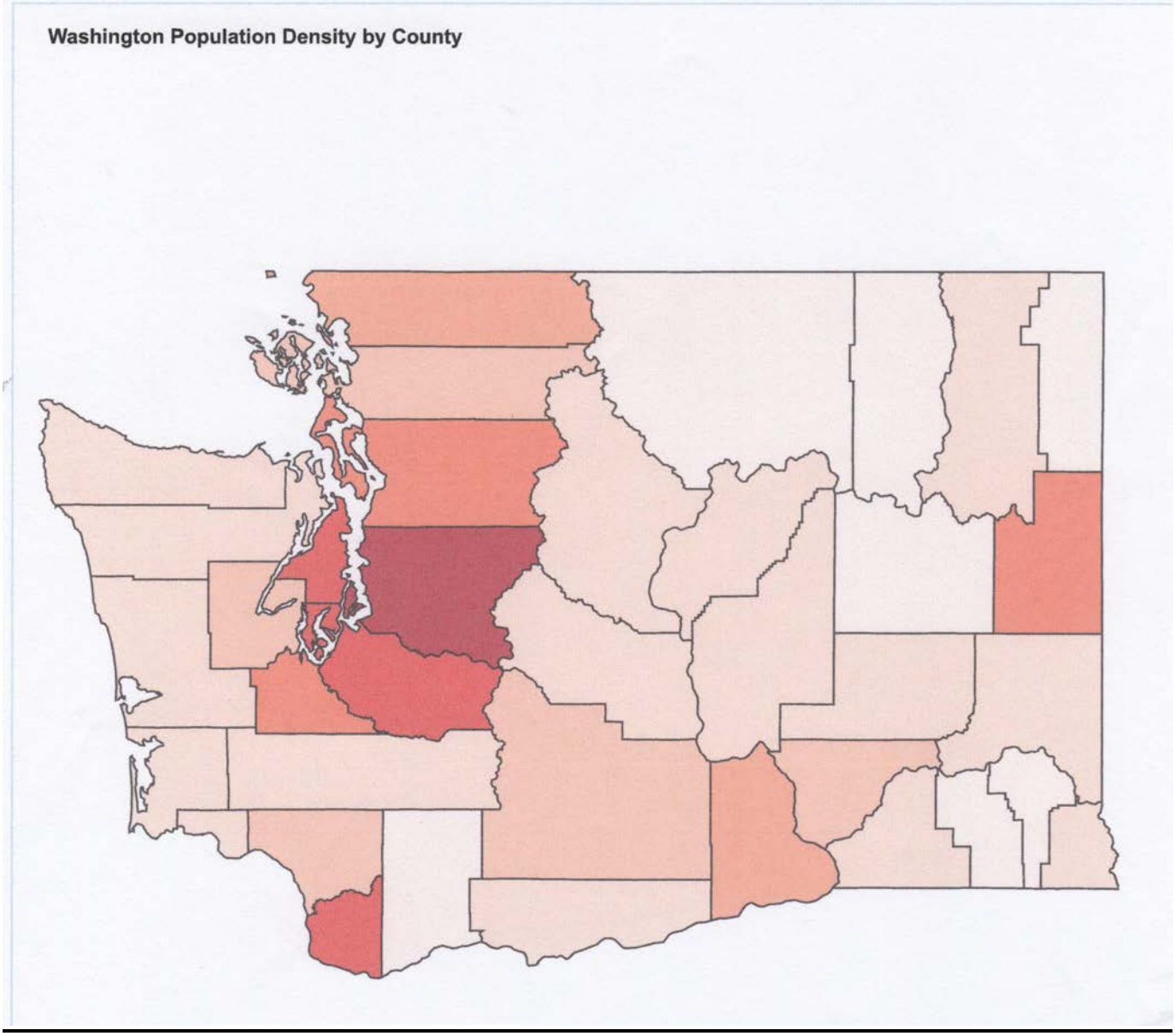
Amazingly, this was the cover of WDFW's request to get more tax dollars from mostly the 97.58 % of the WA State residents who do not hunt.

How many women in Washington State identify with this photo?



How many kids in Washington State identify with this photo?

Did the WDFW Commissioners and Staff identify with these photos? Unfortunately, I suspect that these people just might see their values and interests in these photos. This may be the source of the problem.



Location of Director Susewind's Open Houses when he was first appointed.

Map showing where most people live in WA State.
The darker shades of red mean higher density of population.
I live in Skagit County, which is between two areas of larger density.

When Director Susewind was selected as the new director of WDFW, he held open houses around the state to hear what residents were thinking. However almost all of those open houses were not near the center of where most residents live. Most of his open houses were rural areas scattered across the state.

I live in Anacortes. The closest open house for me was in the Seattle area. Almost no one wants to deal with the traffic problems in the Seattle metropolitan area to attend an open house. Yet that was the closest and only one for all of Whatcom, Skagit, Snohomish, King and Island Counties. I don't know anyone who attended that open house.

Most appointments to the Wolf Advisory Group are either hunters, or ranchers, or people closely associated with one or both of these two very small special interest groups. Originally WAG was

was to have 6 ranchers, 6 environmentalists and 4 hunters. Why when wolves are an endangered species? Why when only 2.42 % of the residents hunt? How many are ranchers? Even one of the so-called environmental groups is closely aligned with hunters, Conservation Northwest. It is affiliated with the Wildlife Federation which is mainly supported by hunters.

Wolf Advisory Group (WAG) Members

Name	Affiliation	City
Samee Charriere	Livestock producer	Clarkston
Tim Coleman	Kettle Range Conservation Group	Republic
Don Dashiell	Stevens County Commissioner	Colville
Tom Davis	Washington Farm Bureau	Olympia
Dave Duncan	Washingtonians for Wildlife Conservation	Ellensburg
Diane Gallegos	Wolf Haven International	Tenino
Andy Hover	Hunter	Winthrop
Jess Kayser	Livestock producer	Centerville
Jessica Kelley	Outdoor recreationist	Seattle
Ralph Kratz	At Large	Ellensburg
Molly Linville	Independent cattle rancher	Palisades
Nick Martinez	Washington State Sheep Producers	Moxee
Dan Paul	Humane Society of the United States	Seattle
Lisa Stone	Hunter	Shelton
Paula Swedeen	Conservation Northwest	Olympia

**All WAG members were appointed to a 3-year membership term*

The same or worse for the Game Management Advisory Council

How many of these folks hunt or are closely associated with hunting?

How many are ranchers or closely associated with ranching?

How many represent environmental organizations that are not affiliated with pro-hunting groups?

How many are also on other WDFW advisory committees like WAG?

There are about 7 1/2 million people in WA State. Most live in urban areas on the west side of the Cascades.

Who represents most of them?

Game Management Advisory Council (GMAC) Members

Name	City
Lee Davis	Ellensburg
Dave Duncan ★	Ellensburg
Gregg Bafundo	Tonasket
Kevin Frankeberger, Ph.D.	Shelton
Warren Gimlin	East Wenatchee
James Horan	Olympia
John Magart	Valley
Terry Mansfield	Cheney
Rob McCoy	Neah Bay
Shawn McCully	Bellevue
Art Meikel	Nine Mile Falls
Darrell Moore	Vancouver
Jan Patricio	Spokane
Mark Pidgeon ★	Bellevue
Reynold Sarns	Oak Harbor
James Stephenson	Yakima
Bobby Thorniley	Republic
Jake Weise	Salkum
Anis Aoude	Olympia
ALTERNATES:	
Jerry Barron	Todd Johnson
Dave Ingham	Al Martz

On WAG ★

WDFW's Game Management Plan

It only takes a quick look at WDFW's "Game Management Plan" to find out that WDFW doesn't even recognize wildlife watchers, its largest stakeholder group. This plan is totally focused only and totally on the interests and values of only 2.42% of the residents of WA State.

This is why I go to Yellowstone to watch wildlife.

The next pages were copied from WDFW's "Game Management Plan".

Each page shows that when WDFW manages game species, and some of these game species are the most popular species to watch in Yellowstone, bears, elk, deer, coyotes, big-horn sheep, mountain goats, WDFW is fully involved with what hunter want to do with game species - shot them - while it doesn't even consider providing quality experiences for non-hunters, wildlife watchers, kids, students, school groups, photographers, etc.

Look at who they asked for input.

Look at what the goals are.

Look at who WDFW is providing quality experiences for.

Think about how this impacts people want to enjoy wildlife that isn't being shot, who want to watch and photograph and learn about wildlilfe in a natural setting.

Then look at the last part, economics.

WDFW needs more money from the non-hunters, the public.

Yet what does WDFW plan to provide for these people? Next to nothing.

What does WDFW think comes first: The money or addressing the interests and values of the stakeholder group?

Game Management

2015-2021 Game Management Plan Development Process

This Game Management Plan (GMP) guides the Washington Department of Fish and Wildlife's management of hunted wildlife for six year timeframes. The focus is on the scientific management of game populations, harvest management, and other significant factors affecting game populations.

The overall goals are to protect, sustain, and manage hunted wildlife, provide stable, regulated recreational hunting opportunity to all citizens, protect and enhance wildlife habitat, and minimize adverse impacts to residents, other wildlife, and the environment.

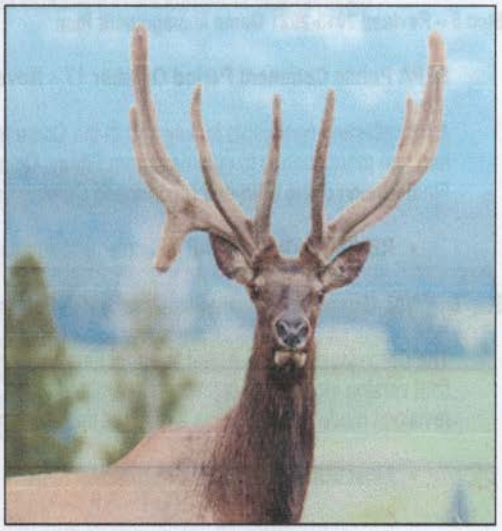
As mandated by the Washington State Legislature (RCW 77.04.012), "... the department shall preserve, protect, perpetuate, and manage the wildlife..."; "the department shall conserve the wildlife... in a manner that does not impair the resource..."; and "The commission shall attempt to maximize the public recreational... hunting opportunities of all citizens, including juvenile, disabled, and senior citizens." It is this mandate that sets the overall policy and direction for managing hunted wildlife. Hunters and hunting will continue to play a significant role in the conservation and management of Washington's wildlife.

An Environmental Impact Statement (EIS) was completed on November 27, 2002, after public review of draft and supplemental EIS documents. The Washington Fish and Wildlife Commission formally adopted the Game Management Plan on December 7, 2002. This comprehensive process facilitated public discussion and understanding, while cooperatively developing the priority strategies.

In 2008, a Supplemental EIS (SEIS) was completed to update the plan for 2009-15. The Environmental Impacts Chapter (Chapter 2) from the original EIS was retained. However, several of the original strategies and objectives had been accomplished; additional studies and research had been conducted; and some priorities had changed. Those changes were addressed in the 2008 SEIS. Public outreach during the development of the SEIS continued to refine and shape the priority issues, objectives, and strategies in the 2009-15 update.

Beginning in June 2013, the department started the public process to update the Game Management Plan for 2015-21. The next step is to post our accomplishments from the 2009-15 Plan and seek the public's ideas for priority issues for the 2015-21 Plan. Once the priorities are determined, a random public opinion survey will be conducted to further refine the priority issues. Those issues will be used to craft objectives and strategies and draft the updated plan. The updated draft Plan will be available for public review and comment during the spring of 2014. The final draft will be created using the information received from the public and other reviewers for presentation to the Fish and Wildlife Commission at their June meeting where public comment will be taken once again. The commission will be asked to consider adoption of the 2015-21 Game Management Plan at their August meeting.

2015-2021 Game Management Plan Development Timeline:



Starting in June 2014, the Department began updating the 2009-2015 Game Management Plan. This revised plan will guide the Department's management of hunted wildlife for the next six years. The focus of the plan is on the scientific management of game populations, harvest management, and other significant factors affecting game populations. Washington's citizens play a strong role in revising this plan, and a variety of public involvement opportunities have been and will be used to solicit ideas.

What's going on now?

- The Fish and Wildlife Commission adopted the 2015-21 Game Management Plan at their December 12-13, 2014 meeting
- See: **Final 2015-2021 Game Management Plan**
  - Final Supplemental Environmental Impact Statement for the 2015-2021 Game Management Plan

Washington Department of Fish and Wildlife

Game Management Plan

July 2015 - June 2021

Washington Department of FISH and WILDLIFE

The main issues identified by the public were categorized into several key areas:

- Scientific/professional management of hunted wildlife
- Public support for hunting as a management tool
- Hunter ethics and fair chase
- Private lands programs and hunter access
- Tribal hunting
- Predator management
- Hunting season regulations
- Game damage and nuisance
- Species-specific management issues

The first public release of the Draft Environmental Impact Statement (DEIS) for the Game Management Plan (GMP) was on July 26, 2002. After an extension, the deadline for public comment was September 10, 2002. Comments were received from over 77 groups and individuals. Extensive public comments resulted in significant re-writing and re-formatting of the EIS and GMP. Key changes included the EIS formatting, modification of elk and cougar issues, refining objectives and strategies, and consideration of the impacts of hunting on non-target wildlife species.

A Supplemental EIS (SEIS) was released on October 18, 2002, with a public comment deadline of November 18, 2002. During this comment period, a scientific peer review of the cougar management section of the plan was also solicited by WDFW.

The process of developing a non-project EIS allowed WDFW to use an iterative process, with releases of a Draft and a Supplemental EIS to facilitate public comments and add, modify, or delete strategies. This iterative process was used instead of the more traditional use of preferred and alternative strategies. Essentially, the number of alternative strategies was not limited and the preferred strategies were developed in concert with the public through a long scoping and development process and multiple comment periods.

The current process (2014) of developing a Supplemental EIS included a public scoping period, discussions with the Game Management Advisory Council, the Wolf Advisory Group, the Master Hunter Advisory Group, the Waterfowl Advisory Group, an updated telephone survey of hunters and the general public, and the current comment period for the draft of this supplemental EIS. Thousands of comments have been received to help shape the amended issues, objectives, and strategies to be implemented in the 2015-2021 Game Management Plan.

A few new issues or emphasis areas have also surfaced including:

- Wildlife Conflict Management
- Recruitment & Retention of Hunters
- Disease Impacts
- Non-toxic Ammunition
- Re-introduction of pronghorn
- Wolf Management

There is nothing about other non-hunting uses of game species.

There is nothing for wildlife watchers.

CHAPTER 1

Introduction

The mission of the Washington Department of Fish and Wildlife (WDFW) is "Sound Stewardship of Fish and Wildlife." The Department serves Washington's citizens by protecting, restoring, and enhancing fish and wildlife and their habitats, while providing sustainable fish and wildlife-related recreational and commercial opportunities. Planning helps the Department prioritize actions to ensure accomplishment of its mission and mandate.

The purpose of the Game Management Plan is to assess current issues for hunted wildlife and outline strategies to help WDFW prepare for the future. The emphasis in this plan is the scientific management of hunted species populations, harvest management (hunting), and other significant factors affecting game populations. The plan is dynamic, and it is designed to facilitate resolution of emergent issues and allow adjustment of priorities when issues are resolved. The issues and options in the plan are based on current management information. As new information becomes available, options may be modified or new ones developed.

The plan identifies priorities for hunted wildlife and keeps the Department focused, directed, and accountable. The plan will guide the development of the three-year hunting season packages for 2015-17 and 2018-20. In addition, the plan will direct the development of WDFW Game Division work plans and budget proposals. Implementation will begin July 2015 and continue through June 2021.

The overall goals of the plan are to protect, sustain, and manage hunted wildlife, provide stable, regulated recreational hunting opportunity to all citizens, to protect and enhance wildlife habitat, and to minimize adverse impacts to residents, other wildlife, and the environment.

Public Involvement

Active public involvement is important for successful planning. In May 2001, WDFW asked the public to identify the key game management issues that need to be addressed in the future. This was done using a series of questionnaires and by facilitating input via a webpage on the agency's website. Over 2,500 responses were received. Based on the issues identified during this process, WDFW hired a consulting firm to conduct a telephone survey of both the hunting public and the general public. This was used to get a more scientific sampling of the public. Responsive Management conducted the surveys using randomly selected telephone numbers with a sample of over 800 citizens for the general public survey and over 700 hunters for the hunter survey. References to public opinion based on this survey are made throughout this plan. To further refine the priority issues, WDFW consulted with the Game Management Advisory Council, the Wildlife Diversity Advisory Council, and members of the Fish and Wildlife Commission. The advisory councils include a cross section of interested citizens who provide feedback and advice to WDFW on a variety of topics. The information from the surveys, polls, and consultations identified the issues addressed in this plan. Finally, WDFW followed the Environmental Impact Statement (EIS) process to facilitate public involvement in reviewing alternatives and setting priorities.

The main issues identified by the public were categorized into several key areas:

- Scientific/professional management of hunted wildlife
- Public support for hunting as a management tool
- Hunter ethics and fair chase
- Private lands programs and hunter access
- Tribal hunting
- Predator management
- Hunting season regulations
- Game damage and nuisance
- Species-specific management issues

The first public release of the Draft Environmental Impact Statement (DEIS) for the Game Management Plan (GMP) was on July 26, 2002. After an extension, the deadline for public comment was September 10, 2002. Comments were received from over 77 groups and individuals. Extensive public comments resulted in significant re-writing and re-formatting of the EIS and GMP. Key changes included the EIS formatting, modification of elk and cougar issues, refining objectives and strategies, and consideration of the impacts of hunting on non-target wildlife species.

A Supplemental EIS (SEIS) was released on October 18, 2002, with a public comment deadline of November 18, 2002. During this comment period, a scientific peer review of the cougar management section of the plan was also solicited by WDFW.

The process of developing a non-project EIS allowed WDFW to use an iterative process, with releases of a Draft and a Supplemental EIS to facilitate public comments and add, modify, or delete strategies. This iterative process was used instead of the more traditional use of preferred and alternative strategies. Essentially, the number of alternative strategies was not limited and the preferred strategies were developed in concert with the public through a long scoping and development process and multiple comment periods.

The current process (2014) of developing a Supplemental EIS included a public scoping period, discussions with the Game Management Advisory Council, the Wolf Advisory Group, the Master Hunter Advisory Group, the Waterfowl Advisory Group, an updated telephone survey of hunters and the general public, and the current comment period for the draft of this supplemental EIS. Thousands of comments have been received to help shape the amended issues, objectives, and strategies to be implemented in the 2015-2021 Game Management Plan.

A few new issues or emphasis areas have also surfaced including:

- Wildlife Conflict Management
- Recruitment & Retention of Hunters
- Disease Impacts
- Non-toxic Ammunition
- Re-introduction of pronghorn
- Wolf Management

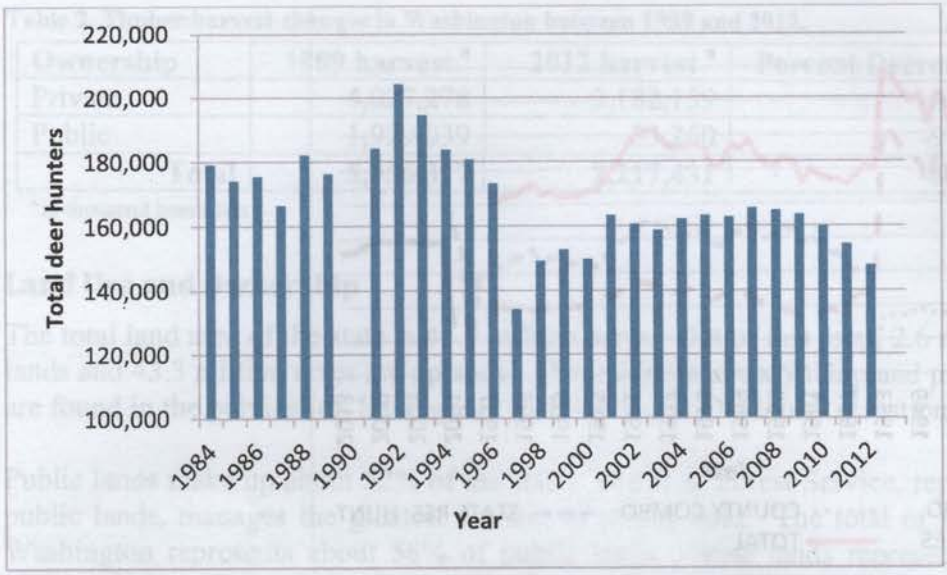


Figure 2. Washington deer hunting participation, 1984-2012.

Resource Allocation

During the 1970s, big game hunter numbers in Washington were at an all-time high. Hunter crowding, competition among hunters, and the declining quality of the hunting experience resulted in significant hunter dissatisfaction. As a result, many hunters changed from the use of modern firearms to primitive archery equipment and black powder muzzle loading rifles to take advantage of less-crowded hunting conditions. In 1982, the Department formed a Big Game Ad Hoc Committee to address the problems facing hunters in Washington and developed a plan of fair allocation of hunting opportunity. The committee identified three major goals as follows:

1. Reduce crowding in the more popular modern firearm hunting seasons.
2. Provide quality-hunting opportunity.
3. Provide early primitive weapon opportunity.

Following extensive debate and public involvement in 1984, the Fish and Wildlife Commission adopted a major change in deer and elk hunting. This new rule required all deer and elk hunters to select one type of gear for hunting (modern firearm, archery or muzzleloading rifle). In addition, all elk hunters continued to be restricted to an elk tag area.

Since 1984, modern firearm deer hunters have continued to represent the majority (over 70%) of active hunters. Archery deer hunter numbers increased to about 19% of deer hunters then stabilized. The number of muzzleloader deer hunters has shown a more protracted incline but appear to have stabilized, representing about 6% of the deer hunters.

On the other hand, elk hunter numbers have shown a more pronounced change in user group size. In 1984, modern firearm hunters represented 88% of all elk hunters, archery hunters 9.5%, and muzzleloader hunters 2.4%. In 1999, the modern firearm hunter represented just 68% of the total, archery hunter numbers doubled in percentage, and muzzleloader hunters increased six-fold (Johnson 1999). Since about 1994, the proportion of each user group (modern firearm, archery and muzzleloader elk hunter) has stabilized at about 69%, 17% and 14% respectively.

Separating hunters by hunting method has successfully distributed hunting pressure, relieved congestion, and increased primitive weapon opportunity. However, the quality of hunting opportunity has been more difficult to assess.

Resource allocation continues to be a contentious issue with hunters. A few of the more hotly contested issues include:

- Which group gets to hunt first?
- How should timing of various hunting seasons between user groups be fairly established?
- Should fairness be related to equal opportunity (days) or equal success?
- How primitive should "primitive weapon" hunting seasons remain?
- How should quality opportunity be addressed?

Hunter Education/Safety Training

Hunter education programs are in place in all 50 states, reaching about 650,000 hunters annually (Duda et al. 2010). In Washington, all individuals born after January 1, 1972, must show proof that they have completed a hunter education course before purchasing a hunting license.

The former Washington Department of Game first offered hunter education in 1955 on a voluntary basis. In 1957, it became mandatory for all juveniles less than 18 years of age. In 1995, all individuals born after January 1, 1972 were required to successfully complete a hunter education class. Washington currently certifies approximately 13,000 Hunter Education students each year.

Hunter Access

As early as 1875, the Legislative Assembly of the Territory of Washington passed a law that prohibited persons from entering upon private lands (enclosed premises) without permission from the landowner for the purpose of hunting grouse during the open season. This law demonstrates the early roots of conflict between hunters and landowners. Hunter access onto private lands and through private lands to public lands is a continuing issue.

WDFW has placed considerable emphasis over the years on obtaining access to lands for the enjoyment of hunting. Currently, there are several programs promoting hunter access. For decades the WDFW Private Lands Program has provided incentives to private landowners through technical assistance, implementation of habitat enhancement strategies, and hunter management assistance. Landowners agree to open their lands for recreational opportunity in exchange for materials and help planting and developing habitat. Over the past decade WDFW has also begun to offer cash incentives on either a per-acre or per-site basis in limited high priority focus areas where access has been difficult to secure. The Department provides free signs and assists the landowner in posting their lands as "feel free to hunt," "register to hunt," "hunt by written permission", or "hunt by reservation only." "Hunt by reservation" is the newest option and was first used in 2013 to provide quality hunting opportunities and give landowners another option to meet their needs. There are over 1 million acres and over 500 landowners in Washington under cooperative agreement.

The Private Lands Wildlife Management Area (PLWMA) program was developed and initiated on a trial basis in 1993. This program was designed to enhance wildlife habitat on private lands and encourage public access opportunities. Two PLWMAs were authorized in 1993, 201-Wilson

Wildlife watchers, non-hunters, they don't matter,

when WDFW and hunters decide how to manage game species.

I wonder how many people even know what WDFW does.

Most people I know think of WDFW as nothing

but big hunting and fishing club,

and they don't hunt or fish.

The discussion of economics

in this Plan

Copied from the Plan

next 3 pages

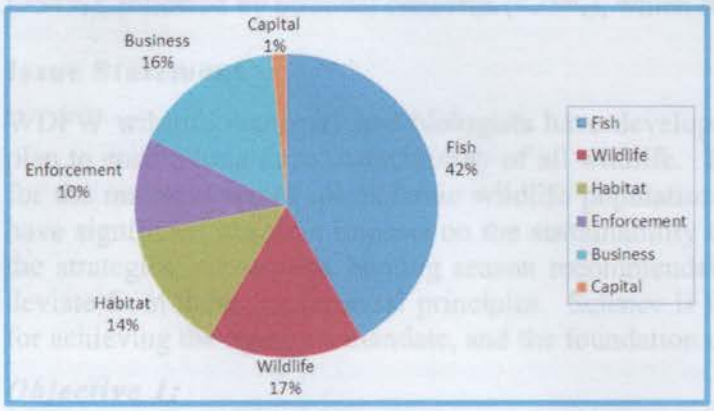
Economics

In 2011, Washington hunters spent $356 million for trip related expenses, equipment, and other expenditures primarily for hunting (U.S. Dept. of Interior et al. 2011). About 46% of their expenditures were for food, lodging, and transportation; 44% for hunting equipment (guns, ammunition, camping); and 10% for the purchase of magazines, membership dues, land leasing, and licenses and permits.

The national survey reported that there were 219,000 resident and nonresident hunters 16 years of age or older who hunted in Washington. These hunters spent 2.5 million days hunting in the state. Expenditures per hunter were $1,421 or $64 per day per hunter.

Resources provided to the Department during the 2013-15 biennium were $375.8 million. Funding came from a variety of state, federal, and private/local sources. The chart below shows relative proportions of those funds.

There are six programs within WDFW. Each program's proportion of the operating budget is shown in the chart below:



The Game Division is one of six divisions in the Wildlife Program. The 2013-15 biennial budget for the Game Division is about $19 million. Of that total, over $5.5 million is dedicated to specific activities. The dedicated fund sources are from auction and raffle sales ($1.3 million), migratory bird permit sales ($639,000), turkey tag sales ($331,000), background license plate sales ($572,000), the eastern Washington pheasant enhancement program ($879,000), and wolf management ($1.8 million). The remaining funds come from the general fund ($60,000), revenue from license sales or the wildlife fund ($5.1 million), and federal funds ($8.7 million), which is mostly from the Pittman-Robertson Act (excise tax on sporting equipment and ammunition).

This $19 million is the base funding for most of the activities identified in this plan except for research, hunter education, and law enforcement. These activities are funded from other divisions

or programs within WDFW. Implementation of new activities in this plan will be dependent on additional funding, grants, and partnerships.

LITERATURE CITED

Duda, M.D, M.F. Jones, A. Criscione. 2010. The Sportsman's Voice: hunting and fishing in america. Responsive Management, Harrisonburg, Virginia, USA.

Duda, M. D., S. J. Bissell, K. C. Young. 1998. Wildlife and the American mind. Public opinion on and attitudes toward fish and wildlife management. Responsive Management, Harrisonburg, Virginia, USA.

Duda, M. D., P. E. De Michele, M. Jones, S. J. Bissel, P. Wang, J. B. Herrick, W. Testerman, C. Zurawski, A. Lanier. 2002b. Washington hunters' opinions on and attitudes toward hunting and game species management. Responsive Management, Harrisonburg, Virginia, USA.

Duda, M. D., M. Jones, T. Beppler, S. J. Bissell, A. Criscione, J. B. Herrick, J. Nobile, A. Ritchie, C. L. Schilli, M. Wilkes, T. Winegord, A. Lanier. 2009. Issues related to hunting access in the United States; Washington state results. Responsive Management, Harrisonburg, Virginia, USA.

Summary of hunting seasons

Season summaries for deer, elk, bear, and more. These are summaries only; please see the appropriate regulation pamphlet for more information.

Deer seasons

Modern firearm, archery, and muzzleloader deer hunting seasons and bag limits.

Elk seasons

Modern firearm, archery, and muzzleloader elk hunting seasons and bag limits.

Fall bear seasons

Summary of fall black bear hunting seasons.

Cougar seasons

Cougar hunting dates and harvest guidelines.

Upland game bird seasons

Summary of grouse, pheasant, quail, partridge, and crow hunting seasons and bag limits.

Wild turkey hunts

Summary of wild turkey seasons and bag limits.

Small game seasons

Summary of hunting seasons for bobcat, fox, raccoon hare/rabbit, grouse, coyote and other small game animals.

Migratory waterfowl seasons

Summary of hunting seasons for duck, coot, snipe, pigeon, mourning dove, swan, goose, and brant.

By Eli Francovich elif@spokesman.com(509) 459-5508

Rich Landers: Lucky hunter proud to be one of the fewer

Molly Andrews, 28, grew up hunting, although her coworkers would never guess it. Andrews, who works at Microsoft, lives in Seattle.

“If you saw me at work, you would never think that I hunt,” she said.

Yet every year she makes a pilgrimage to Spokane to go deer hunting with her father, a retired Washington Department of Fish and Wildlife biologist.

When her coworkers found out about this family ritual, they were curious and surprised. Most had never hunted a day in their lives.

“So many of my friends want to do this, but the barrier to entry is high,” she said.

“(They) want to know where their food comes from and (they want) to spend time outside.”

Andrews’ story is indicative of a larger trend. Nationwide, hunting participation has plummeted.

It’s no different in Washington. As participation decreases, state wildlife agencies, heavily funded by hunting and fishing license sales, are left looking for new revenue sources.

Only 5 percent of Americans 16 years and older hunt, according to a U.S. Fish and Wildlife Service study published in 2017. Fifty years ago, 10 percent of Americans 16 years and older hunted.

“As we’re seeing these declining trends in participation, there is a growing concern at the national level about how we’re going to fund conservation over time,” said Nate Pamplin, WDFW’s policy director.

Nationwide, excise taxes on guns, ammunition and fishing gear alongside license fees account for 60 percent of the funding for state wildlife agencies, according to a National Public Radio story.

Between 2006 and 2016, total hunter participation fell by 8 percent, although angling participation grew by 19 percent. Meanwhile, wildlife watching grew by 21 percent.

Overall, 14 percent of Americans 16 years of age or older fished and 35 percent participated in wildlife watching, according to the study.

In Washington, there has been an 11 percent drop in state hunting license holders over the past 10 years. Even more worrying for state officials, youth hunting participation is down 22 percent. During that same decade, the state’s population grew 16 percent.

Overall, only 3 percent of the state’s population hunts. Ten years ago, it was 4 percent.

In 2007, there were 845,111 anglers, or about 16 percent of the state population. In 2017, that number dropped to 759,325 anglers, or about 12 percent of the state population. That represents a 10-percent drop in anglers over the course of a decade, WDFW spokeswoman Madonna Luers said.

Hunting and fishing license fees and associated federal money make up more than one-third of the Washington Department of Fish and Wildlife’s annual operating budget, Pamplin said.

“Hunting and fishing is the cornerstone to our state,” Pamplin said.

That doesn’t mean WDFW is putting all its eggs in one basket. Roughly 20 percent of the department’s operating funding comes from the state’s general fund. Efforts to monetize other forms of recreation – such as the Discover Pass and vanity license plates – are also attempts to replace decreasing hunting and fishing license sales.

At the same time, WDFW is facing a budget deficit.

Unless new revenue sources are found or approved by the Legislature, Pamplin said in the 2019-21 biennium the department will have an estimated “shortfall north of $30 million.” In 2017, WDFW asked the Legislature to increase hunting and fishing fees. Lawmakers did not pass the bill, leaving the department with a $25 million deficit.

They did approve $10 million in general fund. That money expires in June 2019.

“The situation is compounded for next biennium and we’re currently going through a process to see what is at risk if no new funding materializes,” Pamplin said.

Pamplin said the state tries to retain hunters and recruit new ones. But with decreasing land access, changing social priorities and increased urbanization, Pamplin said the department isn’t assuming hunters and anglers will provide a significant economic contribution in the future.

“State fish and wildlife managers are thinking about how will we be able to manage fish and wildlife into the future, knowing that fund source is potentially fading out,” he said.

The decrease in hunters nationwide and locally is not a new phenomenon. Increased urbanization and growing populations have made access to hunting land harder to come by.

When John Andrews, a retired WDFW biologist, moved to Spokane in 1978, he could drive 10 or 20 miles out of Spokane to hunt. Now he has to go much farther.

For those who don't have permission to hunt on private land, public land can quickly become crowded during hunting season.

Wanda Clifford, the executive director of the Inland Northwest Wildlife Council, said wild game has changed. Pheasant populations, historically an entry-level animal for new hunters, have decreased. Changes in habitat and ecology have made those animals that are on the landscape harder to find (*See: Lucky Hunter*).

"Since the wolves have moved into Washington, the herds have changed," she said. "They no longer feed, behave and move as they once did. Which makes it harder to find these animals."

As hunting land has become harder to access, and more Americans live in urban settings, hunting traditions and knowledge haven't been passed from generation to generation.

Jerry Hickman is the Spokane-area chapter president of the First Hunt Foundation. A large part of the group's mission is reviving those traditions.

"One of the main goals that we're trying to do with First Hunt is to preserve hunting as part of the American culture," he said.

The First Hunt Foundation takes youth and other first-time hunters out shooting and connects them with hunting mentors.

That fulfills two missions: preserve and perpetuate hunting culture, and support state wildlife agencies.

"I've always felt that the people of the state of Washington and Idaho are getting a really good deal with their state wildlife agencies," he said.

Though geographically close, Idaho's hunting landscape couldn't be more different than Washington's.

Over the past decade, Idaho's hunting and fishing numbers have increased.

"We're a growing state," said Roger Phillips, a spokesman for Idaho Fish and Game. "You know a lot of the reasons people come here is for our fishing and hunting."

It helps that roughly 70 percent of Idaho is public land, providing many easy and accessible hunting options. Phillips points out that despite working in Idaho's biggest metropolitan area, Boise, he still only drives 5 to 10 miles out of town to hunt.

"We have a huge amount of land in this state," he said.

License sales make up roughly 38 percent of the state's $100 million annual budget, said Craig Wiedmeier IDFG's license operations manager. In addition to the land, Wiedmeier said Idaho's diverse game species make it a destination spot for many hunters.

Yet the state is still vulnerable. In 2012, IDFG faced a budget deficit after hunting and fishing numbers decreased, partially in response to the economic recession.

Still, Phillips isn't particularly concerned about the future of hunting or angling in Idaho. Although IDFG is always looking for new revenue sources, Phillips said they aren't considering making other recreation users – such as bird watchers, climbers or hikers – pick up the load.

"I just see very different things in play there for the hunters in (Washington) compared to Idaho," he said.

Next Pages

More statistics on WDFW stakeholder groups

US Fish And Wildlife Service
National Hunting License Data

Calculation Year 2018

	Hunting License Data						
State	Paid Hunting License Holders*	Resident Hunting Licenses, Tags, Permits and Stamps	Non-Resident Hunting Licenses, Tags, Permits and Stamps	Total Hunting License, Tags,Permits & Stamps**	Cost - Resident Hunting Licenses, Tags, Permits and Stamps	Cost - Non-Resident Hunting Licenses, Tags, Permits and Stamps	Gross Cost - Hunting Licenses
AK	108,921	278,248	74,532	352,780	$2,922,692.00	$5,568,901.00	$8,491,593.00
AL	547,905	542,838	37,106	579,944	$5,693,734.00	$6,107,717.00	$11,801,451.00
AR	326,559	380,102	136,944	517,046	$8,186,097.00	$10,579,420.00	$18,765,517.00
AS	0	0	0	0	$0.00	$0.00	$0.00
AZ	305,214	456,140	61,607	517,747	$13,358,303.00	$4,515,780.00	$17,874,083.00
CA	280,967	1,007,422	22,738	1,030,160	$20,609,712.00	$1,006,282.00	$21,615,994.00
CO	294,319	459,518	109,246	568,764	$12,751,122.00	$44,305,473.00	$57,056,595.00
CT	37,489	124,169	4,063	128,232	$2,085,367.00	$394,950.00	$2,480,317.00
DC	0	0	0	0	$0.00	$0.00	$0.00
DE	17,847	52,315	7,125	59,440	$632,742.00	$372,462.00	$1,005,204.00
FL	190,232	313,554	18,155	331,709	$7,890,888.00	$984,031.00	$8,874,919.00
GA	651,910	1,297,350	166,091	1,463,441	$6,627,327.00	$7,132,438.00	$13,759,765.00
GU	608	608	755	1,363	$9,120.00	$7,550.00	$16,670.00
HI	10,617	11,068	734	11,802	$501,285.00	$77,070.00	$578,355.00
IA	223,232	516,446	67,438	583,884	$10,772,431.00	$6,940,825.00	$17,713,256.00
ID	286,947	1,047,773	159,224	1,206,997	$10,454,861.00	$15,200,880.00	$25,655,741.00
IL	306,024	1,203,507	83,025	1,286,532	$16,424,426.00	$15,520,789.00	$31,945,215.00
IN	267,447	383,958	20,781	404,739	$9,358,292.00	$2,300,953.00	$11,659,245.00
KS	251,390	349,199	170,676	519,875	$6,732,462.00	$12,704,150.00	$19,436,612.00
KY	352,408	512,113	102,629	614,742	$12,059,992.00	$7,727,579.00	$19,787,571.00
LA	398,808	605,336	53,323	658,659	$7,954,155.00	$2,043,839.00	$9,997,994.00
MA	57,921	246,052	15,504	261,556	$2,009,739.00	$396,357.00	$2,406,096.00
MD	120,334	284,941	60,270	345,211	$3,394,548.00	$2,974,503.00	$6,369,051.00
ME	163,191	214,767	34,323	249,090	$4,635,181.00	$3,236,598.00	$7,871,779.00
MI	706,101	2,171,384	52,786	2,224,170	$33,009,073.00	$4,045,709.00	$37,054,782.00
MN	568,057	1,376,759	44,245	1,421,004	$27,229,500.00	$3,495,674.00	$30,725,174.00
MO	498,319	1,702,400	79,919	1,782,319	$12,585,185.00	$8,708,655.00	$21,293,840.00
MP	20	19	1	20	$190.00	$10.00	$200.00
MS	300,146	335,324	91,402	426,726	$4,023,594.00	$8,249,067.00	$12,272,661.00
MT	253,412	873,323	155,658	1,028,981	$9,459,094.00	$23,458,615.00	$32,917,709.00
NC	585,766	319,136	25,626	344,762	$8,629,779.00	$2,127,935.00	$10,757,714.00
ND	141,553	362,554	157,801	520,355	$4,257,890.00	$7,553,355.00	$11,811,245.00
NE	183,056	339,053	90,202	429,255	$7,565,754.00	$5,935,707.00	$13,501,461.00
NH	58,099	186,931	31,411	218,342	$2,646,432.00	$1,370,915.00	$4,017,347.00
NJ	74,794	303,795	118,442	422,237	$6,981,229.00	$1,147,736.00	$8,128,965.00
NM	107,331	329,423	112,483	441,906	$5,866,269.00	$10,319,383.00	$16,185,652.00
NV	68,744	123,271	26,840	150,111	$3,920,404.00	$3,829,980.00	$7,750,384.00
NY	579,043	1,117,576	48,773	1,166,349	$17,441,081.00	$4,177,215.00	$21,618,296.00
OH	390,268	895,099	100,065	995,164	$16,259,079.00	$6,378,876.00	$22,637,955.00
OK	529,651	377,498	22,740	400,238	$5,735,625.00	$3,870,723.00	$9,606,348.00
OR	264,684	1,173,427	49,243	1,222,670	$20,982,703.00	$5,416,770.00	$26,399,473.00
PA	975,650	2,468,652	101,278	2,569,930	$30,352,406.00	$6,079,410.00	$36,431,816.00
PR	5,910	5,902	8	5,910	$14,144.00	$480.00	$14,624.00
RI	8,209	26,515	4,388	30,903	$362,093.00	$121,483.00	$483,576.00
SC	210,369	722,055	92,230	814,285	$5,434,146.00	$4,283,172.00	$9,717,318.00
SD	233,215	245,474	128,502	373,976	$7,186,745.00	$14,874,974.00	$22,061,719.00
TN	700,600	696,906	40,267	737,173	$17,016,820.00	$3,703,363.00	$20,720,183.00
TX	1,157,779	1,575,985	79,358	1,655,343	$35,200,343.00	$11,017,420.00	$46,217,763.00
UT	236,656	379,805	41,036	420,841	$11,216,469.00	$5,545,567.00	$16,762,036.00
VA	276,019	815,464	44,611	860,075	$17,488,685.00	$3,815,542.00	$21,304,227.00
VI	4	4	0	4	$40.00	$0.00	$40.00
VT	69,943	153,476	15,852	169,328	$2,975,620.00	$989,935.00	$3,965,555.00
WA	183,063	681,049	10,683	691,732	$16,129,772.00	$1,062,087.00	$17,191,859.00
WI	706,400	2,716,899	146,777	2,863,676	$33,771,619.00	$7,609,753.00	$41,381,372.00
WV	217,123	537,767	139,943	677,710	$4,354,126.00	$4,868,774.00	$9,222,900.00
WY	130,304	176,549	71,365	247,914	$6,484,947.00	$18,388,025.00	$24,872,972.00
Total:	15,620,578	33,476,898	3,530,224	37,007,122	$539,645,332.00	$332,544,857.00	$872,190,189.00

US Fish And Wildlife Service
Data on National Hunting Licenses by State

Total Number of Individual License Holders - 2018 to 2007
compared to total population as estimated by US Census
with % of total population that bought a hunting license for each year

2018

2018 WA Hunting License Data State Paid Hunting License Holders* 183,063
2018 Estimated total population - 7, 536, 000
2018 % of total population that purchased at least one hunting license - 2.43 %

2017

2017 - WA Hunting License Data State Paid Hunting License Holders* 182,149
2017 Estimated total population - 7, 425, 000
2017 % of total population that purchased at least one hunting license - 2.44 %

2016

2016 - WA Hunting License Data State Paid Hunting License Holders* 182,251
2016 - Estimated total population of WA State - 7,295,000
2016 - % of total population that purchased at least one hunting license - 2.49 %

2015

2015 - WA Hunting License Data State Paid Hunting License Holders* 180,829
2015 - Estimated total population of WA State - 7, 170, 000
2015 - % of total population that purchased at least one hunting license - 2.52%

2014

2014 - WA Hunting License Data State Paid Hunting License Holders* 180,411
2014 - Estimated total population of WA State - 7, 060, 000
2014 - % of total population that purchased at least one hunting license - 2.55 %

2013

2013 - WA Hunting License Data State Paid Hunting License Holders* 188,081
2013 - Estimated total population of WA State - 6, 970, 000
2013 - % of total population that purchased at least one hunting license - 2.69%

Note: % for population purchasing hunting licenses in 2018, rounded to the nearest hundredth, is 2.42%, and for 2017 it is 2.45%.

2012

2012 - WA Hunting License Data State Paid Hunting License Holders* 194,272
2012 - Estimated total population of WA State - 6, 890, 000
2012 - % of total population that purchased at least one hunting license - 2.81 %

2011

2011 - WA Hunting License Data State Paid Hunting License Holders* 196,276
2011 - Estimated total population of WA State - 6, 822, 000
2011 - % of total population that purchased at least one hunting license - 2.87 %

2010

2010 - WA Hunting License Data State Paid Hunting License Holders* 209,050
2010 - Estimated total population of WA State - 6, 746, 000 (Census - 7, 666, 343)
2010 - % of total population that purchased at least one hunting license - 3.09 %

2009

2009 - WA Hunting License Data State Paid Hunting License Holders* 197,260
2009 - Estimated total population of WA State - 6, 672, 000
2009 - % of total population that purchased at least one hunting license - 2.95%

2008

2008 - WA Hunting License Data State Paid Hunting License Holders* 197,215
2008 - Estimated total population of WA State - 6, 566, 000
2008 - % of total population that purchased at least one hunting license - 3.00 %

2007

2007 - WA Hunting License Data State Paid Hunting License Holders* 197,135
2007 - Estimated total population of WA State - 6, 464, 000
2007 - % of total population that purchased at least one hunting license - 3.04%

Note:

*** A paid License holder is one individual regardless of the number of Licenses purchased.**

**** Persons who Hunted in more than one State are counted in each State where they Hunted**

Next page: Graph 4B: Another copy

Washington State Wildlife Watching, Fishing, & Hunting

Value	Wildlife Watching	Fishing	Hunting	Total
Participants	2,168,000	938,053	218,800	3,324,853
Expenditures	$ 3,173,373,000	$ 1,186,275,897	$ 369,565,921	$ 4,729,214,818
Total Economic Impact	$ 5,549,730,265	$ 1,956,335,653	$ 613,583,221	$ 8,119,649,139
Jobs	63,327	16,211	5,612	85,150
Salaries and Wages	$ 2,132,888,979	$ 625,222,636	$ 211,083,317	$ 2,969,194,932
State and Local Taxes	$ 448,488,469	$ 119,631,627	$ 39,653,073	$ 607,773,169
Federal Tax Revenues	$ 453,532,429	$ 150,271,880	$ 50,647,408	$ 654,451,717

Source: 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation

Finally

Will post-recovery wolf plans written by other states such as Montana, Wyoming, Idaho, Oregon be good sources of useful ideas when writing our state's wolf plan?

These plans may not be very good sources of information for the following reasons:
1.) Wolves were **not** de-listed in Idaho, Montana, and Wyoming because these states had acceptable post-recovery plans that ensured future survival of wolves in these states. Congress de-listed these wolves with a rider attached at the last minute to its 2011 Defense and Full-Year Appropriations Act. Getting a bill pass avoided a government shut-down.
2. Before Congress delisted wolves, environmental groups had been challenging USFWS's attempts to de-list wolves, arguing that the post-recovery plans did not ensure future viability for gray wolves. Federal judges were agreeing with the environmental groups. After delisting, some inadequate post-recovery plans were approved.
3.) Oregon's de-listing of wolves by its commission was very controversial, with two dozen scientists disagreeing. In Oregon, wolves currently only occupy about 12% to 15% of the available wolf habitat in the state. The state has about 140 known wolves.
4.) Each state varies in its amount of suitable wolf habitat and how this is located spatially across the state, the kinds of ecosystems and amount of prey in these habitats that might support wolves, the amount of connectivity between suitable wolf habitats, how near they are to a reliable source of new wolves coming into the state, and how near they are to population sinks where resident wolves are likely to be lost.
5.) Every year wildlife biologists learn more about wolves. This new information was not available when older plans were written. WA State should use all of the available data including the most recent.
6.) Finally, the majority of residents in WA State frequently disagree with the majority of the residents in some of these states on many issues. A wolf plan is being written for WA State, not for the U.S. so our plan should reflect the interests and values of the people in WA State, not people in other states.

Part 2:

The Public Trust Doctrine

While this doctrine applies to Washington State, WDFW has yet to recognize and follow its most basic principles, which include these:

1. Wildlife are a public asset. Wild animals belong to all of the public. This means that this asset, these animals. should not be managed for any one small special interest group, such as hunters or ranchers. This is especially important when a small special group's use reduces the quantity and quality of the public asset, such as hunting and predator control for livestock producers.

The research shows hunting and predator control devalue wolves and increase the likelihood that people will think about poaching. Any wildlife watcher knows that where wildlife is hunted, watching and photographing wildlife is far more difficult and not enjoyable when hunting is actually happening. And the direct impact; animals are removed, the public asset is reduced, and in the case of wolves and some other animals, both its quantity and its quality, and its overall fitness and adaptability. Hunted wolves

are nothing like "natural" wolves; they live different lives, they and their packs behave differently, they may be less fit overall and less able to adapt to changes. Isn't this true of elk and deer too who are suffering from a wasting disease and other health problems after years of human hunting and minimal hunting by natural predators?

2. As a public asset, wildlife should be managed for the public - most of the publie - not small special interest groups. This implies a democratic kind of management based on representation from the general public rather than from small groups with narrow interests such as hunters and ranchers.

3. The Public Trust Doctrine did not put the interests of hunters first, or recognize that hunters have some special reason should have more voice in wildlife management or should receive more than its share of the public asset, wildlife. This happened when hunting groups changed this Doctrine into their North American Model of Wildlife Conservation. This was a carefully calculated effort to gain special rights for hunters. (See next part for more on this model.)

Look who WDFW selects to be on its citizen advisory groups!
Look who sits on the WDFW Commission!
Look at WDFW's Game Management Plan!

Do these look like wildlife, a public asset, is being managed by WDFW according to a democratic process the involves all citizens, or do these look WDFW manages wildlife for small special interest groups?

The Public Trust Doctrine has been used to protect other natural resources as public assets.

Why not wildlife?

What happens when a state agency, WDFW, fails to listen to the public, and instead manages wildlife, a public asset, for small special interest groups?

1. Multiple lawsuits.

These are being filed over WDFW's management of wolves its management of other species. I support and donate to groups filing these lawsuits because I am not heard when I use the methods provided by WDFW to voice my opinion - attending WAG and Commission meetings and talking to staff. That has not worked. I and many others are not being heard. This is an expensive option for both sides and one that favors agencies and depends on who the judge is. Not a first choice.

WAG. The few WAG members representing groups I once donated to did not meet with me or ask me what I thought or take my ideas back to WAG and they did not represent me on WAG. (HSUS, Defenders of Wildlife, Conservation Northwest, Sierra Club.)

Diversity Advisory Group. When WDFW formed a "Diversity Advisory Committee" look who was put in charge of this committee - a group with close ties to hunters and ranchers, and a group at the center of the controversy over the spending close to $2,000,000.00, that's 2 million dollars on WAG and a facilitator from Washington D.C. without caring about whether the public had a voice. A group that has supported WDFW each time it killed wolves, the Wedge Pack in 2012, the Profanity Peak Pack, etc. etc. It has always put ranchers first thinking, I guess, that their cooperation can be bought by killing wolves for them. That has never worked.

2. Multiple citizen initiatives.

Taking the issues to the votes. Citizens did that over bear baiting and chasing cougars with hounds and leg-hold traps and won. However WDFW is still allowing some of these to be used by folks who want to kill black bears to protect private forest lands.

Will citizens do this again if wolf management - even during "recovery" and also during "post recovery" does not reflect the values and interests of most residents of WA State? I hope so and I will be collecting signatures.

It should be clear to WDFW now that most citizens are not happy with WAG, and do not like the Wolf Advisory Group (WAG) because it does not represents most of us, citizens are angry with WDFW's predator control, killing wolves for reasons not based on any reliable science, or with WDFW's Protocol that outlines how producers will use non-lethal deterrents and when WDFW will kill wolves. Citizens are angry about being lied to

by WDFW about the Profanity Peak Pack, the salt licks, the use of wolf collar to find dead livestock instead of to protect livestock, the failure to require non-lethal deterrents that work or admit nothing will work given the way the livestock are managed and where they graze.

Billboards and letters to editors and letters to Governor Inslee were finally heard, when his point-person for natural resources failed to listen to us when we asked her for help. She listens only to a few people on WAG. What will happen next we don't know. Will WDFW tell the truth this time? Will it produce some good science to support what it is doing?

Are lawsuits and citizen initiatives our first choice?
No.
But sometimes these are the public's only choice, when WDFW refuses to listen to the non-hunting public.

Sources used for the Public Trust Doctrine:

Adrian Treves, Guillaume Chapron, Jose V. Lopez-Bao, Chase Shoemaker, Apollonia R. Goeckner, and Jeremy T Bruskotter, "*Predators and the Public Trust*", Wiley, Philosophical Reviews of the Cambridge Philosophical Society, 2015.

Dr. Fred Koontz, "*State Wildlife Agencies Should Protect ALL Wildlife*, Trusting Wildness, 2018.

The Wildlife Society, "*The Public Trust Doctrine: Implications for Wildlife Management and Conservation in the United States and Canada*." Technical Review, 2010.

Part 3

The North American Model of Wildlife Management

There could not be a more perfect example than this model to show how one small special interest group, hunters, try to dominate management of a public asset, wildlife.

Yet, WDFW staff seem to know and follow this model. It is taught at hunter education classes. Hunting groups on WAG and other WDFW committees subscribe to this model.

This model is actually based on the Public Trust Doctrine, but when hunting groups were finished making changes, most informed non-hunters and environmentalists realize that this is another attempt for hunters to get more than its share of wildlife in every way from having a voice in state agencies and legislatures to killing more animals.

What's wrong with this model?

1. The creators of this model re-wrote the narrative about wildlife conservation.

As can be expected from a group that is made up mainly of white men, the authors wrote a narrative about the history of wildlife conservation that left out or down-played the role of women, non-hunters, famous ecologists and other leaders in the movement of saving wildlife, as well as prominent environmental groups who secured new laws that changed wildlife management. This included not recognizing the accomplishments of the women who really managed Audubon Society after the original founders quit - these were men and they were mentioned. The role of the Endangered Species Act, the Clean Water Act, the National Environmental Policy Act, the Migratory Bird Treaty, the campaign to change women's hat styles to save egrets, todays sixth great extinction, etc.

Instead, the narrative in this model explains wildlife conservation in terms of what a few male hunters did through the years to conserve wildlife, and mainly the species they wanted most to hunt. They make the narrative into an artificially optimistic, narrow description about what a few white male hunters accomplished; George Bird Grinnell and Theodore Roosevelt, co-founders of the Boone and Crocket Club, John Lacey who lobbied for and got the Lacey Act. The accomplishments in the 1960s and 1970s which were far more important, are down-played or not mentioned.

Now a much broader and more diverse thinking is challenging this model. Big issues today are the sixth great extinction, biodiveristy loss, non-game species and recovering predators to make ecosystems function more naturally, etc. Markets continue today even though these have long been seen as unacceptable; markets for furs, fish and herpetofauna, for instance.

2. The model contains a as one of its principles, support for hunting: "Hunting opportunity for All.", and as this model is interpreted by hunting groups and some state agencies, as we can see with WDFW, hunting too often becomes the main goal of wildlife management.

To interpret this model this way , hunters say some interesting things:

Principle #5: "No frivolous use of wildlife". Many would consider killing wildlife for fun and sport very frivolous, but hunters claim it is a real sport, that it is sporting, even trophy hunting such as killing animals for a set of horns or antlers or furs.

Principle #7: Use the best-available science, when there is little science that says hunting is the best way to manage wildlife, and more studies all the time and more diseases in wildlife are showing that wildlife might be a lot healthier if it was managed in natural, complete ecosystems using natural processes including predators rather than human hunting seasons and quotas. Hunters are the first ones who feel threatened when they think wolves might be killing the game animals they like to hunt, or that human hunting might be restricted somewhere for any reason. Hunters claim hunting rights everywhere even though large natural ecosystems like in Yellowstone NP have much healthier elk than those found in WA State. Hunters have little respect for natural ecosystem functioning and natural processes yet these shaped the wildlife species that we have today - without human interference. Hunters want to replace all of this with themselves. They oppose having large predators because they might take some of the human hunter's game animals.

Principle #1: Wildlife is held in the public trust. Hunters are the first ones who want more than their 2.42% of the seats on WDFW advisory committees like WAG and the Game Management Council and on the WDFW Commission. And they get more than their share of the seats - and this is fine with hunters. WDFW wants more of the non-hunters' money - it requests our tax dollars each session from the legislature. Meanwhile hunters complain about having to support wildlife conservation by purchasing hunting licenses. They want non-hunters to pay more. **Key economic question: would hunters and WDFW support giving non-hunters a share of representation in decision-making equal to its real size in WA State, using the public democracy doctrine, if non-hunters contributed an amount of money equal to their size? Right now, the public has been paying most of the bills for wolf management yet hunters and ranchers still have most of the seats on WAG and they seem to have their needs met in the Protocol on use of non-lethals and killing wolves. They have the Commission's ear, and that of WDFW staff.**

Basically hunters have been voluntarily buying their strong sense of "entitlement" in WA State - WDFW depends on money from selling hunting licenses.

How much do different stake holders and the public contribute to WDFW each year? From state hunting licenses? from federal funds and revenues? from the state legislature? from car license places and discovery passes? Meanwhile the pubic pays about 94% of the total tab for wildlife and habitat conservation in the U.S., USFS and BLM lands and management, Wildlife Services, and many other programs in the Departments of Interior and Agriculture. How much does WDFW spend on endangered species and non-game animals?

To:
Lisa Wood, SEPA Coordinator
WDFW Habitat Program/Protection Division
WDFW
P.O. Box 43200
Olympia, WA 98504

From:
Martha Hall
2617 16th Street
Anacortes, WA 98221
pondfrog.mh@gmail.com

More Scoping Comments
for the EIS on Post-Recovery Wolf Management
Sent by e-mail to Julie Smith, WDFW, on 11/13/19

Note: the first sections of these comments were sent to Lisa Wood a week ago by U.S. Mail. Since then, I have added more sections and I am submitting these along with the first sections again to WDFW as scoping comments for the EIS on Post-Recovery Management.

Thank you for considering these additional comments.
Martha Hall

I'd also like to add that some of us had problems with the system used to submit comments for this EIS. This is an additional comment. Unlike the WDFW request for comments on the recent request to begin fish farming of a new species in the Salish Sea, we could not find a simple e-mail address for SEPA to use for comments on the wolf EIS. We also could not figure out a way to attach our longer scoping comments to the survey format WDFW used on its website for scoping comments. It appears like WDFW favored having us use the short - and I think very poor survey format on its website. This is unfortunate since this survey failed to address most of the main issues. It is difficult to understand why WDFW chose to handle scoping in this way.

Because of these problems, some of us sent our comments to various people in various ways, often using the U.S. Mail, hard-copy choice rather than sending them electronically. I ended up sending some of my comments to Julie Smith because she was available and said she could receive comments even though she was not listed as such on the WDFW website. Meanwhile, it appeared that Lisa Wood was not available during the end of the comment period and no other person was filling in for her to answer questions.

I find these problems - along with the cancellation of the open houses - very troubling.

Why the open houses were cancelled is still not clear. WDFW has never made a good case for this being necessary rather than addressing its concern about safety by using law enforcement if it felt this was necessary. The new norm for public discourse across this country seems to be to make threats and be confrontational. WDFW has asked for this behavior by not having very good opportunities for citizens like me to be involved in what it does. Instead upwards of $2,000,000 has been spent on WAG which has failed to provide the public with

any meaningful way to be involved. Yet WDFW does not care that WAG members fail to contact and meet with and keep their members informed, or to represent the ideas of the individual groups they are suppose to represent on WAG. As a former member of some of these groups, I can testify that these folks only represent the thinking of a very small group of people, often the CEO and a few select board members and they don't meet with members who donate money. (This includes HSUS, Defenders of Wildlife (when it had a rep on WAG) CNW, Sierra Club, etc.)

More Scoping Comments
on the
EIS for Wolf Post-Recovery Planning and Management

Note: I sent a packet of scoping comments for this EIS to WDFW (Lisa Wood and Julia Smith) before the first deadline, Nov. 1, 2018. These are additional, more miscellaneous issues than those brought up in my first comments which were in four sections, each focused on a single main concept. This is my intended Section 5 which raises a variety of questions that should be considered in the EIS and its goals and alternatives.

Part One: Delisting

What will the criteria be?
Will delisting be addressed in this EIS? Will this EIS delist wolves?
Will the 2011 Plan's Goals for delisting be Used
or will newer and additional information be used?
What criteria and factors should be included when choosing models for sustainable and viable wolf populations in WA State?
Will all criteria be peer reviewed by a panel of unbiased experts?

Will this EIS include goals and alternatives that includes delisting wolves in Washington State
or will delisting be decided outside this EIS by WDFW?

1. Is this EIS going to address delisting issues and if so how?

1A. The following information that WDFW provided to the public when asking for scoping comments on this EIS suggests that WDFW may be considering delisting as soon as 2020 and WDFW may delist using either of two choices given in WAC 220-610-110:

Information from WDFW to the public for scoping:
WAC 220-610-110 offers two ways for WDFW to delist wolves, either by reaching the goals in the recovery plan or by determining wolves are no longer in danger of failing, declining, or are vulnerable to misc. factors that might mean they will again be listed. A Periodic Status Review is used to determine this. Delisting would include a public process.

1B. Many of us believed WDFW was following its 2011 WA Wolf Recovery Plan's goals for delisting rather than delisting through a status review. If delisting is addressed in this EIS, please explain why one method and process would be better than other and the advantages and disadvantages of each method; the 2011 Plan's goals, a status review, and/ or another method and process.

1C. Whatever method is used for delisting, please address why the chosen method is best for the 7 1/2 million people in WA State, of which only 2.42% purchased any kind of WA hunting license in 2018. Why is it better for these 7 1/2 million people than for the even fewer probably are livestock producers. The EIS should address wolves as a "public asset" and explain how management actions will benefit ALL of the people of WA State including WDFW's largest stakeholder group, wildlife watchers, as well as hikers, campers, nature study and research.

1D. When the goals for recovery in the 2011 WA Wolf Recovery Plan were peer reviewed, there was not solid agreement that these goals were even minimally adequate for having a viable, sustainable wolf population.

Will there be a broad peer review process for all actions proposed for delisting efforts in the DEIS so the most-recent best science will be considered? We all know the goals in the 2011 were based as much on what environmentalists could obtain through negotiations with ranchers and hunters as they were based on the best science. How will the DEIS choose goals, through the best available science or through a highly political process where a small minority have a huge voice in what WDFW does? The strength of these two small minorities in WA state, hunters and ranchers, is obvious in many of WDFW's actions, including who WDFW's appoints to WAG - mostly people with an interest in hunting and/or ranching and/or often both, and appointments to the Game Management Council which is largely hunters even though most people in WDFW's largest stakeholder group, wildlife watchers, love to see game species such as black bears when hiking. Even the fact that WDFW still calls a group of animals it manages "game animals" is proof that the agency has changed little in its thinking about wildlife and its value to all residents of WA State. It is an agency still stuck in the old days when people did call wildlife species "game animals" and while it changed its name from "fish and game" to "fish and wildlife" it has not changed its thinking or its focus which is using wildlife mainly to satisfy the wishes of 2.42% of the residents. This has not changed even though WDFW keeps asking for more of our pubic tax dollars. Taxation without representation has never been popular in this country.

1E. The DEIS will be able to use a lot of new science and also new information that has been collected about WA wolves since they returned to WA in 2008.

Will all of this information be used in an unbiased way and will it be in the DEIS? For instance, the WA wolf population grew rapidly at first, but in the last two years growth has been 6% (2017) and 3% (2018). Yet recent news from WDFW like that used in the scoping process has highlighted a growth rate of 28% which is hardly an accurate account of what has been happening in the last two years. Seems like accuracy would require an acknowledgement that something has really changed in the last 2 years and isn't this more important than recovery rates 5 years and more in the past when recovery rates were expected to be high?

2. Much has changed since the 2011 Wolf Recovery Plan was written including new studies that have more provided additional science and thinking on delisting. Please address this newer science and thinking in the EIS when choosing goals and alternatives including the following paragraphs and discussions.

2A.) Social wolf recovery and management. This kind of recovery and management means that managers, WDFW, recognize and manage wolves to maintain "natural wolf packs" as well as individual wolves.

This is based on the science that shows that for wolves, the wolf pack is a critical factor in their overall fitness and ability to adapt to changes. These are negatively impacted when wolves live in unnatural packs that are impacted by indiscriminate lethal removal by humans for predator control, hunting, fear shootings and poaching.

Science strongly supports this kind of wolf management over a livestock model that WDFW uses for most "game animals". This requires the Status Review to consider if wolves and wolf packs are being shaped by natural processes or by WDFW's management plan. Some who have advocated for this kind of recovery have referred to it as "social recovery and management". It is focused on maintaining sustainable wolf populations through natural processes rather than using the livestock model that uses human harvests through hunting to please a small minority of our residents. A significant body of science shows that when humans manage wolf populations through hunting and predator control, wolf and pack behavior are very different - as seen in MT, ID and WY as compared to large national parks such as Yellowstone NP. Will delisting efforts look at these issues
rather than just focusing on the old numbers game of wildlife management based on sustainable populations with harvesting by humans?

2B.) More recent discussions have focused on what is called "ecological-related recovery and management", which has an entirely different focus than the kind of management used WDFW which is a numbers game based on sustainable populations.

In this kind of recovery and management, the focus is on ecosystem management and allowing wolves and other wildlife species to live in natural ecosystems where natural processes that occur when wolves and prey species share habitat and regulate each others' populations in predator-prey interactions along with other forces like climate and fire, rather than having humans manipulate their populations.

2C.) Newer studies and information raise questions about older viability and sustainability models and suggest that the following factors are important to consider when delisting wolves.

2C-a.) Road Density. One main factor that several studies have shown to be closely related to human-caused wolf mortality is road density in wolf habitat areas. More roads, including forest service roads, result in more wolves killed not only by hunters, but also by poachers. At last one study showed that wolves will still den near roads regardless of this factor because they must live near the best habitats to survive and raise pups and this is often has roads. Road density is an especially serious problem for wolves - and other wildlife - in WA State because we have far more road density than other states with wolves, ID, MT, WY. How will this be dealt with in the EIS and in calculating viability for delisting?

2C-b.) Management and mangement changes in wolf areas adjacent to WA State: ID, OR, and Canada as factors in wolf population sustainability.

The main sources of new wolves for WA state are B.C.and perhaps Alberta, Canada and the states of Idaho and Oregon. Both of these use heavy harvest levels because more of their residents hunt and/or they manage wildlife to have large numbers of elk and small numbers of predators to please hunters and/or ranchers, and in the case of BC, to protect woodland caribou populations that have been declining because of roads, snowmobiles, ski areas, and loss of old growth forests. Their large wolf harvests could be one reason why the growth in WA wolf populations has slowed down to only 6% and 3% in the last two years. How many wolves will they supply in the future? Will this number continue, meaning their wolf populations will remain what they were when WA State wolves increased at rates of 20 and 30%? How will WDFW factor in these issues when determining viable and sustainable populations?

2C-c.) Illegal poaching as a factor in sustainability models.

Many studies have raised questions about how to factor into population viability and sustainability the impact of the illegal killing of wolves. We don't even know how much of this is happening. Some suspect it is far more than is known. In WA, could poaching explain some of the sudden slow-down in our wolf population? Could it explain the failure of more wolves to successfully disperse from BC and NE WA to the Central and North Cascades? Many of us who are quite familiar with the culture of hatred towards wolves in Okanogan County suspect a lot of shoot-shovel-and shut up goes on in this county. Studies also show hunting and predator control may increase poaching because these practices tend to de-value wolves in the public's thinking - government killing and sponsored killing of wolves makes it appear that it is really okay to kill wolves. We're seen more instances of poaching in NE WA as WDFW kills wolves and we've seen more people shoot wolves rather than use bear spray - which is a choice that is available and the one used by people in Yellowstone NP. WDFW has never promoted this as a good alternative which would send a positive message that we do not need to kill wolves when we are afraid or when we see a wolf in our pasture. Instead, WDFW has okayed this and not promoted non-lethal methods and more used more education.

2C-d.)Pack size and membership related to indirect impacts of predator control that affect wolf population sustainability .

Studies are also highlighting the fact that pup, wolf and wolf pack survival depends on the pack and its size and composition and who the individual members are. Pack
members of different sexes and ages contribute differently to the over-all success of the pack and of individuals. This is something that WDFW seems to totally ignore in its current predator control. This is also ignored when recreational trapping and hunting is allowed. How will these issues be factored into sustainability models for wolves?

2C-e.) Prey availability and density and/or self-regulation as limiting factors for wolf populations that may make population control of wolves unnecessary.

Science has often suggested that prey availability is the main factor that limits and controls wolf numbers. Newer science shows that wolves - esp. when not hunted and killed by humans - self-regulate their populations even when prey densities are quite high as in Yellowstone NP. Does WDFW know if wolves in NE WA have been killing each other as a result of the close proximity between packs? Does WDFW the prey densities of esp. deer and elk but also other prey species in various wolf habitats in WA?

2C-f. Impacts of Livestock Grazing on wolf populations and sustainability

Does WDFW know how prey densities are impacted by livestock grazing at different times of the year? Does WDFW know if prey density changes between densities in the winter and spring when wolves breed and select den sites and have pups and in the summer when livestock is released onto grazing lands and sometimes near den and rendezvous sites?

Studies in the Rocky Mountains showed that wolf mortalities were related to the amount of livestock grazing in an area. More livestock meant greater wolf mortality either from legal predator control or poaching. Many of the best wolf habitats in WA State are also used for livestock grazing. This will mean greater wolf mortality in our state than in some states in the Rockies. Livestock also may affect prey animals that wolves depend on, both prey density and areas prey species choose to use. How do mule and white-tail deer, elk and moose respond to the presence of livestock? Does this depend on the terrain, the amount of wooded area, the amount of natural food, etc.? Studies have shown that prey

sometimes spend more of the time in edges of wolf territories to avoid wolves. In the edge areas between wolf territories, wolves are more apt to meet wolves from adjacent pacts and fact territorial disputes that may result in some wolves being killed. How might livestock operations change and limit habitat use and food choices for prey species and for wolves? Prey density and distribution across the landscape impact wolves in many ways including their prey selection. When livestock change these, wolves are more likely to prey on livestock. Then WDFW blames wolves and kills wolves.

2C-g.) **Fear of humans, wolf and prey densities.**

Many studies show that the "fear factor" changes wildlife behavior. Usually when this is discussed, it is about the prey animal's fear of predators like wolves. But it also applies to how a wolf's fear of humans may change wolf behavior. Many animals, when they see humans, especially when they are a species that is killed by humans, will change their behavior. Does WDFW understand the impact of this factor for both the prey species and wolves? Does this change prey and wolf densities and choices of areas to feed which could affect a wolf's prey selection. When livestock grazing brings additional humans and range riders into wolf territories in early summer after wolves have chosen den sites and had pups, does the sudden appearance of humans change prey density and alter wolf hunting behavior and prey selection? Isn't this likely since wolves in NE WA are subjected to human poaching, legal shootings and predator control? More hikers also use wolf habitats in the summer. How does this change prey and wolf density and wolf hunting behavior and prey selection? Humans can change prey and wolf densities and the way prey species and wolves use the landscape. These changes may mean lower survival for wolves and wolf packs and increase the chances of wolves prey on livestock.

2C-h.) Impact of Tribal Hunting of Wolves

How will models factor in tribal hunting? How predictable is number of wolves killed by tribal hunters in WA State? The Colville Nation currently has a year-around wolf hunting season without any limits. What other tribes may also choose this option? Killing some members of a pack and killing dispersing wolves who are often the most vulnerable may well have indirect impacts far beyond the direct loss of the wolves that are killed. How will these direct and indirect impacts be added to sustainability models?

2C-i.) Indirect impacts of all kinds of hunting and predator control

Studies continue to show that all kinds of lethal removal by humans have many indirect impacts beyond the direct impact of killing wolves. Killing wolves has been shown to change pack structure and pack functioning and pack success. It may change prey choices and the ability of the pack to reproduce the following year. It may even cause the pack to dissolve, especially if a breeder is killed. Loss of pack members may reduce the packs ability to defend its territory and adapt to changes in food sources. How will these variables be used in sustainability models in the EIS?

2C-j. Trail density also increases hunting success when hunting prey and wolves

Studies show that trails penetrating wildlife habitats increase hunting success in these areas over areas with few trails. Trails provided the needed access for some hunters including those on horseback. WA State has few wolf habitats that do not have many hiking and horse trails. This means higher chance of wolf mortalities from legal hunting and illegal poaching. How will the model factor in trail density?

2C-k. Availability and quality of public lands to provide good wolf habitats and the availability of natural and safe corridors for wolf dispersal between these wolf habitats.

Many experts are suggesting that WA State will have more problems with wolf recovery and sustainability than some other states have had such as Montana for several reasons. WA State is smaller in size. It has fewer areas and smaller areas of public lands that provide good wolf habitat. WA State has a larger human population and human development including agriculture have decreased the number and quality of corridors wolves can use for safe dispersal between the more isolated wolf populations that exist in NE WA, the length of the Cascades Mts, and the Olympic Peninsula.

Studies show that dispersing wolves are more likely to be killed by humans either through predator control, hunting, being killed on highways, or being poached. Dispersing wolves are more likely to die of natural causes too because they lack the support of a wolf pack.

A significant level of successful wolf dispersal is important for maintaining healthy wolf populations throughout wolf habitats in WA State over the long-term. How will the EIS and any delisting efforts address these problems? Will models developed in other states be useful in WA State? Will the EIS explain and address these issues using the best science?

Part 2: Translocation

Translocation addresses the lack of dispersal at this time in WA State between the three designated wolf areas in the 2011 Plan. Is this the right way to address this lack of adequate dispersal or is it a quick fix based on politics rather than the best science?

Does using translocation get us closer to understanding why more dispersal has not happened between these areas? Do we really even know why after 10 years that there has not been more dispersal? It was much faster in Yellowstone and other parts of the Northern Rockies. Perhaps it is due to factors that need to be addressed like lack of adequate safe corridors or excessive killing of wolves by WDFW, by poachers and/or by the tribes. Perhaps 10 years just is not long enough when a "recovering wolf population" like that in WA State still has wolves being killed by WDFW, the tribes and poachers, and some ranchers and people who claim to be afraid of wolves. WDFW has been saying that its predator control efforts, mostly in the Kettle Range, do not affect recovery. Could this be false? The Kettle Range is the largest wolf habitat area in NE WA that is nearest the North Cascades. Could less killing of wolves in this area mean more dispersal into the Cascades? Many suspect far more poaching is happening in Okanogan County and other parts of eastern WA than is being reported by WDFW. "Shoot -shovel -shut-up" is part of the accepted cowboy culture in eastern WA. Does it make sense to translocate wolves instead of trying to address underlying problems like these?

What happens if these problems are not addressed and wolves are simply moved from NE WA to SW WA? Will translocation remove the likelihood of WDFW identifying whether problems exist and what they are? If factors limiting dispersal are not identified and addressed, what does that mean for long-term viability of wolf populations in all parts of WA State? Will we end up with isolated wolf populations in several areas rather than connected wolf populations? How viable is this, long-term. Studies show that even in a national park as large as Mt. Rainier, population viability has been limited for some species that lack connectivity to other populations. What is the future for wolves on the Olympic Peninsula? Many factors suggest wolves might improve and strengthen prey species such as elk and deer and might restore the benefits found in complete ecosystems that have the apex predators such as grizzlies and wolves.

Is translocation based on the best science or is it really a political solution aimed at getting wolves delisted faster? I hope the EIS gives an honest and unbiased analysis and disclosure of reasons to translocate wolves rather than wait and find out why dispersal is not happening naturally.

When translocation is addressed in the EIS, will this include a full analysis and disclosure of what is required for the most successful efforts to move wolves, the cost of using these methods to the tax-payer and for the wolves that are moved and for the ecosystems were wolves are captured and removed? What are the risks to the wolves, those moved and those not moved who be depend on the ones that are moved? Is there an increased chance of livestock depredations for either the wolves that are moved to another location or for the related wolves who are not moved? Will the problems associated with the failure of wolves to disperse naturally still be addressed and resolved?

Part 3: Predators and Prey Species
Will wolf management consider predator-prey relationships?
Will wolf and prey behavior and wolf and prey density be considered?
Will the focus be on healthy ecosystems rather than management of single species?

Does WDFW plan to use what is known by the best science and observations about wolf-prey relationships when writing this EIS, when choosing the goals, when selecting the various alternatives, and when analyzing and disclosing impacts of these choices of goals and alternatives?

3A. Why would we expect WDFW to use all of the best available science in this EIS when it has failed to do this when writing and using the Protocols? The public no longer trusts WDFW.

I worry that this will not happen since WDFW failed to do this when writing and using the Protocol that it wrote and adopted with minimal input from the public and broader scientific community and with no peer-review by an unbiased panel of experts. Why would the public expect a change of course when WDFW writes this EIS? Instead of using the best science, WDFW's strategy has been one of ignoring most of the best science and the public and using public funds to defend court cases hoping the preferred treatment of agencies by our court system will win these cases. Isn't this one of the reason why most of the public does not trust or like WDFW? Isn't this so bad that WDFW said it was afraid to hold public open houses on scoping and instead resorted to stilted, tightly controlled and ineffective webinars? Trust is not developed by an agency that seldom meets with most of the public it is suppose to serve and manage wildlife for as a "public asset" and when it appoints people to its various advisory groups based on whether the person is pro-hunting and whether the person will not likely oppose what WDFW does very loudly and will instead go-along with whatever WDFW does to keep the seat at the table.

3B.) I'll suggest two books that would help WDFW staff when this EIS is written IF the writers of this EIS base this EIS on the best available science and observations on wolf behavior and not something else like politics.

I doubt WDFW would write the Protocols it has written or tell the public what it does when killing wolves - if WDFW based these on what is known about wolf behavior.

L. David Mech, Douglas W. Smith and Daniel R. MacNulty, "***Wolves on the Hunt: The Behavior of Wolves Hunting Wild Prey".*** University of Chicago, 2015.

> This book gives detailed information about studies and findings and observations of many of the leading experts on wolves in the Minnesota, Wisconsin and Michigan areas, Alaska and Denali National Park, and in the Northern Rockies and Yellowstone National Park. Sources include not only extensive work by the three authors, but also by other observers and researchers. How wolves hunt various prey species are discussed in this book, white-tailed deer, elk, etc.

Rick McIntyre, "***The Rise of wolf 8".*** Greystone Books, 2019.

Many experts say that Rick McIntyre probably has spent more time watching and carefully documenting wolf behavior, including hunting behavior, than anyone else, ever, anywhere. Readers of this book will gain a deep insight into how wolves behave as individuals and as members of packs. He also discusses new information with such depth that wolf and wolf pack behavior can be fully appreciated if not yet fully understood. Note: Wolves and their packs exhibit far too variable and complex behavior to probably ever be fully understood or predicted, which is no different than what is true of human behavior.

3C.) What would WDFW learn from these books and how does this apply to the EIS?

These books show us that basic wolf behavior means wolves will kill livestock if livestock is managed so that these domestic animals are more likely to be killed by wolves than wild prey. This issue needs to be addressed by looking at wolf behavior and having producers adapt their livestock management to wolf behavior rather than the opposite, trying to change wolf behavior.

Wolves are highly adaptable, opportunistic hunters who are capable and able to travel long distances each day to find suitable prey. While doing this wolves and/or wolf packs sift through the available prey in their territories often and regularly to select the prey they will try to kill. Prey selection is a balancing act of weighing factors such as these in the following list: (note: these many factors are interrelated with each other and overlapping.)
a.) prey density and availability at the time when food is needed,
b. will the prey size supply a sufficient amount of meat for the effort involved in capturing it,
c.) amount of risk to wolves of injury or death when killing the prey,
d.) how likely it is that the effort will end in success,
e.) the age, sex skills, breeding status, number and experiences of the individual wolves who are involved in the hunt,
f.) an opportunity presents itself when it finds the prey animal that gives the wolves an extra advantage such as terrain, deep snow, a young or small animal, an animal by itself, an injured or weak or old animal, an opportunity to hide and ambush the prey, etc.,
g.) chance of being attacked by a neighboring wolf pack in a territorial fight,
h.) how great the need is for food, and
k.) nearness to a den or rendezvous site when pups are not yet traveling with the pack.

3D. When the EIS considers livestock when writing the EIS, are these factors going to be considered?

a.) What non-lethal deterrents and grazing management practices will producers use so that their domestic animals are not the most available and most easily killed prey on the landscape?
b.) How will WDFW write Protocol that requires producers to manage livestock to prevent wolf attacks that are the result of natural hunting behavior that evolved over thousands of years?
c.) When will WDFW get over the idea that wolves who prey on livestock are somehow "bad wolves" when they are just hunting like real wolves? WDFW seems to have some idea about wolves "learning to hunt livestock" that is unnatural and evil, like this is an addiction, that wolves should know livestock is not a viable choice when selecting prey?
d. When is WDFW going to appreciate that hunting is not just a matter of the number of mouths to feed, that reducing pack size will end attacks on livestock?

e.) When will WDFW appreciate that its predator is a real "shot in the dark" that has as much chance of failing as being successful and for this reason it is not a good game plan because it involves killing a species the public does not want killed for reasons not based on science that shows a high success rate?
f.) When is WDFW going to admit that on large allotments like in the Kettle Range, on allotments with wooded areas, on allotments that have rough terrain, that dispersed livestock cannot ALL be adequately protected by range riders and undefined human presence and fox lights, etc. and so wolves should not be killed on these allotments? This is what most of the uproar is about with the situation in the Kettle Range - and several other areas.
g.) When will WDFW and the Dept. of Ag stop spending tax-payer's money on non-lethals in these areas where they do not work and then tell the public the non-lethals did not work so wolves need to be killed? The pubic pays for the non-lethals that don't work - this is expensive and not acceptable, and the public then sees WDFW kill wolves which is expensive and not acceptable, and the public pays for lawsuits and WDFW's defense in the lawsuits over this issue - which is expensive and not acceptable.

3E. When the EIS considers wolf management, is it going to consider prey management and behavior:

a.) wild prey management that provides enough wild prey food for wolves in key wolf habitats so wolves can survive in these areas without eating livestock. This may mean little or no human hunting in some wolf areas.
b.) wild prey habitat use relative to predators including cougar and bears and wolves - this needs to be factored in. For instance, wild ungulates will sometimes favor edges of wolf territories to avoid wolves since wolves avoid these edges so they will not encounter neighboring wolf packs and fights that could cause injury and deaths, or wild ungulates will have calves and fawns away from wolf core habitat areas, or prey may move out of higher elevation areas to avoid deep snow and wolves will follow these prey animals, and prey will seek more wooded areas when wolves are on the landscape, and wolves will use wooded areas for hiding and ambushing prey, etc.

3F. What else would WDFW learn about basic wolf behavior by reading these books?

Individual wolf and wolf pack behavior is variable - like human behavior - depending on what individuals and packs are involved. Both packs and individuals matter. This is not simple. Young and sometimes female wolves are fastest and best during the chase part of the hunt while more mature males may be better at killing prey. Breeders have more investment in the hunt and may be more involved and take more risk. Younger wolves may travel greater distances. Breeding females are more likely to be with pups. When pups are tied to dens and rendezvous sites, it is harder for wolves to bring food back from kills far from these locations so more hunting may occur nearer these fixed sites. In the winter hunting changes as to location depending on where the prey is and deep snow becomes an advantage and may increase the number of kills. No two wolves are the same - Rick McIntyre makes this very clear. No two packs behave the same. The way wolf packs function depends on who is in the pack, their ages, sex, whether they are breeders, their personalities, etc.

Summary of this section: When and if all of these factors are known and recognized and used in wolf management, whether it is for predator control or when considering recreational hunting or trapping, or building sustainability models, WDFW would not make some of the decisions it has about killing wolves to address livestock losses. Wildlife managers using this kind of in-depth information do not say things like WDFW has: "we hope to change pack behavior", by reducing pack size we hope to stop livestock depredations, and the inference that wolves who attack livestock are bad wolves that should be killed - that they are somehow "tainted" and unaccepable.

Wolves who attack livestock have found themselves in a situation where livestock are the most available prey, the prey that is easiest to kill, the prey that can be killed with the least risk, and the prey that requires the least expenditure of time and effort.

When livestock animals are attacked, their owners and WDFW created this situation, not the wolves. The wolves are just behaving and using the skills that they have perfected over thousands of years to survive as large social carnivores who need to eat larger prey. They are responding to opportunities that occur in their habitat and they are adapting to whatever prey is most available and easiest to kill. Only humans interpret natural processes like this one between predators and their prey in moral terms using words like "good" and "bad".

Part 4: Why does WDFW want to focus on new EIS right now?

Why is an EIS for wolf "post-recovery"being started now while there are still many significant and unresolved problems that need to be addressed now, during the wolf "recovery" period?

Yes, I've heard the reasons given by WDFW - that the EIS process takes a long time and WDFW expects to be able to delist wolves sometime soon - after 2020.

Many of us do not support this decision to start an EIS now.
We'd prefer to see WDFW use its staff and money and time to address existing problems.
Is this a political decision made to please the few ranchers and hunters in WA State?

First:
Signs of WDFW's Problems
The Public's Distrust and Anger

1. WDFW should be aware that it has some serious problems with its management of wolves and this should be especially clear after two events this fall: a). The public was upset enough that many people finally asked Governor Inslee to step in and do something after years of failed efforts to ask WDFW to address these problems, b). WDFW was so afraid of the public it cancelled open houses planned for EIS scoping, again hiding behind a wall it has erected between itself and the public.

2. WAG, its members and how it functions, is key to these problems. WAG members obviously to not represent much of the public, yet the public has paid upwards of $2,000,000 in bills to keep WAG going. This $2 million is difficult to justify given the deterioration in public trust of WDFW and WAG over the last few years.

3. Most WAG members representing environmental and animal groups fail to represent or even discuss wolf issues with their so-called constituencies, so these are the people who went to Governor Inslee for help and these are the people paying for lawsuits, and these are the people who are thinking about writing citizen initiatives - instead of trying to attend WAG and Commission meetings and instead of trying to talk with WDFW staff.

4. The way WDFW has used and manipulated WAG and tried to falsely claim that WAG members fairly represent the public has increased public anger. Over the years as WDFW appoints new members, WAG becomes less representative of the public. In 2016 it was suppose to be 6 environmentalists, 6 ranchers and 4 hunters - which was a joke in 2016 when most WAG members were hunters or closely associated with hunting groups and many were ranchers. The use of the consensus model to make decisions further silenced meaningful discussions. Then WDFW took manipulation to a whole new level when it adopted the new Protocol in 2017 at a WAG meeting after throwing the WDFW version at WAG members after lunch with no chance to really discuss the contents or for the public to respond and comment. Some WAG members said they needed more time, some didn't understand it, but WDFW made sure it was accepted quickly. Since then, discussions of WDFW's Protocols have been limited and the public has no meaningful way to be involved.

4. Because of the public anger towards WDFW, WDFW sought and obtained legislation to further insulate itself from the public and to decrease its transparency even further by adding more items to the list of redacted info in public records requests. The reason given for this new legislation; fear of the public. Example: now we are told we will hear how WDFW is killing wolves when we see a copy of the year-end report on wolves it killed. That is a huge change from 2016 when we were still actually talking with Donny and others at WDFW.

5. Now WDFW has successfully built a wall around its wolf management program and the lack of transparency and outreach to meaningful discourse with the public has increased anger and outrage towards WDFW. This should be no surprise. Anger and distrust always increases when government agencies are not transparent and open with the public.

6. What are the public's choices now? Lawsuits? Asking the governor to intervene? Citizen initiatives?

7. Unfortunately wolf management is not the only issue the public has with WDFW. Several years ago Dr. Fred Koontz and others tried to raise issues about wildlife being public assets under the Public Trust Doctrine and efforts were made to bring change to WDFW. That effort largely failed. Many non-hunters are tired of seeing WDFW label animals as "game animals" and we are angrier about how many of these species are managed. We are angry that non-hunters are not even recognized as stakeholders in the Game Management Plan WDFW is using. The members of the Game Management Council are mostly hunters. The 97.58 % of the 7 1/2 million residents of WA State who don't hunt are interested in black bears, mountain goats, elk, deer, coyotes, ducks and swans and geese, etc. (Remember, only 2.42% of WA residents bought hunting licenses in 2018)

8. Financing WDFW has become a huge issue and this won't be resolved until WDFW changes. WAG is costing the public upwards of $2 million, yet WAG is mostly made up of small minority groups in WA State: hunters and ranchers. Wolves are not even hunted, they are an endangered species in WA State, yet WDFW loaded WAG with hunters - far more than 50% of the members hunt. Why? Most of the public money comes from taxes paid by - I'd guess - non-hunting folks who do not own cattle ranches. Why did WDFW decide to move wolf management to its game management team instead of having this handled by the endangered species team? Most of the public really does not believe we will get more say in what WDFW by giving WDFW more of our tax dollars because that is not what has happened with wolves - or anything else.

Just a Few of the Current Problems

1. Financing wolf management - as just mentioned.

2. Who will wolves be managed for - Ranchers? Hunters? The Non-Hunting Public?

3. The Protocol that is not based on the best science, is not even reasonable or meets the common sense test. One size fits all for use of non-lethals and number of depredations that triggers WDFW's killing of wolves? Use of tax-payers money for non-lethals with no accountability to the pubic on how this money is spent and whether the non-lethals worked? No real documentation of the use of non-lethals and no way for the tax-paying pubic to find out how the money was spent and who it went to? No meaningful way for the public to give input to WDFW on the Protocol? No unbiased peer-review of the Protocol before it is voted on by WAG?

4. WAG - costing upwards of $2 million and the pubic has no role to play as 18 people WDFW chooses fail to represent the public or even most environmentalists. CNW has changed into a partner with the Wildlife Federation, a hunting group, and it has become just another arm and propaganda machine for WDFW. Who is left on WA to speak up for the public that likes wolves?

5. A game management team managing wolves, people with a strong bias towards hunters and hunting as a good use of wildlife and little appreciation of what most of the public values and enjoys.

6. WDFW's killing wolves without even attempting to show how this is based on the best science and without reporting back on how successful this has been or sharing data on use of non-lethas that failed and a good analysis on how they were used and why they might have failed. The public is not even told how WDFW is killing wolves, or how much is being spent on this - we can wait until the end of the year for this limited info. We will never get a good assessment and evaluation and cost-benefit discussion on the producer's use of non-lethals before wolves were killed for this producer. Yet these wolves were "a public asset" that WDFW manages for the public - WDFW seems to miss that part. And now WDFW wants more of our money.

7. Education about how to live with wolves is badly needed in eastern WA. We have hikers shooting and killing wolves because they were afraid and this is okay? Ranchers are shooting wolves because wolves were on the landscape and this is okay? Don't wolves pretty much roam everywhere, covering most of their territories regularly? Wolves walk through and by prey when hunting and when not hunting. How dangerous are wolves to hikers? To children at bus stops or young people riding horses?

8. Poaching continues to be a problem - we don't know how much, but many of us suspect it is partly responsible for the lack of growth in wolf populations in the last few years and the lack of adequate dispersal between and throughout wolf habitats in WA State. More education and more law enforcement is needed. As shown in several studies, when the government supports and kills wolves, the public sees this as devaluing wolves and the public is more likely to think about poaching, illegally killing wolves. Is this what is happening in WA State? People have learned that it is okay to kill wolves?

9. Wolves are not dispersing as much as they need to for sustainable, healthy wolf populations throughout WA State. Why not? This needs to be figured out more than an EIS needs to be written right now.

10. Why is growth very slow now in the total wolf population and in successfully breeding packs

in WA State? This needs to be understood.

11. Why don't we see more wolves in south of I-90 in the Cascades? Will wolves ever live again in the Olympic Peninsula? Would this be beneficial to the ecosystems and other species living in these ecosystems? I saw more of the horrible hoof deformities in elk herds in the Olympics, small calves with huge, deformed hooves. What is wrong?

12. Does WDFW really understand prey populations that it manages well enough to manage them so wolves have enough to eat? Elk in the Skagit River Watershed? Why do they choose to live in the lowlands instead of migrating into the mts? Where is the good habitat for these elk during the winter and summer? Are they using these areas? How would wolves fit into this ? What about the deer and elk east of the crest in the North Cascades? Hunting removes many deer and cars hit more in the winter in the valleys. How will hunting have to be adjusted to leave enough wild prey for wolves to prevent them from killing livestock? Does WDFW know the prey densities and wolf densities in NE WA and how that is playing out over time? Are the prey moving or adjusting to wolves and if so, how and where? What are the major prey in each wolf area? What is the human harvest of these? The number taken by wolves? By other predators?

13. What does WDFW know about the wolves after collecting data for what, over 10 years? Are packs fighting over territories in NE WA? Are wolves being killed by wolves? By cougars? How many wolves are leaving WA and moving into B.C., Idaho and/or Oregon? How many wolves are coming from these three areas into WA State? What corridors are being used? Where is dispersal not occurring? How far west can wolves cross the Columbia River to move between WA and OR and how much of a barrier is the Columbia River?

14. What is the impact of tribal hunting? When will the public receive info on wolves killed by tribal members - pack, age, sex? How is this lethal removal affecting the packs? dispersal? the overall population? Is this lethal removal occurring on tribal land or off these lands? Will tribal members continue to have access to wolf collar data even when they hunt or are related to or friends with tribal members who hunt? How will WDFW protect wolf collar data?

15. How well is WDFW protecting wolf collar data from local citizens who may kill wolves? From the Ferry and Stevens County sheriffs and commissioners who more than once have said they are eager to take the law into their own hands and kill wolves?

16. How will WDFW resolve the problem of producers and their range riders using wolf collar data to find dead animals rather than to protect and care for their livestock? This problem occurs every year - why can't this be addressed?

17. When will WDFW figure out that if dead and injured livestock are not removed quickly and before wolves find them, these are basically acting as "unnatural bait" for wolves and they are not non-lethal deterrents? This seems so simple but the confusion continues with WDFW calling this "baiting" a good use of a non-lethal deterrent.

18. When will WDFW figure out that carcasses that are found and not removed are also "unnatural bait"? WDFW still allows producers to leave carcasses out on grazing lands if they are in remote or difficult to reach places - this is probably why the animal was killed in the first place - it was in too a remote area or too difficult of terrain for the range riders to find livestock.

19. When will WDFW devise a way to account for use of non-lethal deterrents and report this to the public who pays for these so we can evaluate how well our money is being spent? We'd like the details on use of range riders and human presence: exact hours, days, locations and number of livestock observed and where these were and the number of livestock not observed each day. If fox lights ae used, where, for how long, and how many livestock animals were protected by these and how many were not in that area and the cost?

20. When will WDFW understand that wolves usually hunt most in the late evening, night and early morning and have range riders and human presence actually with livestock during these hours instead of during the day?

21. When will WDFW understand that if a producer has 1500 cow/offspring units and 1480 are protected, but 20 are not - those 20 are not found by the range riders for days and not visited at night, blaming the wolves for killing those 20 is not reasonable or based on the best science? The Protocol still fails to recognize this and wolves are killed after how many attacks on livestock even though all 1500 units are not protected or even seen for days or even weeks?

22. When will WDFW admit that when livestock are dispersed across larger allotments, and especially when these have steep terrain and wooded areas, range riders are not effective and neither is human presence??? The public would like to not have to pay for things that don't work and then be told it is the fault of the wolves, not the producer who tried.

23. When will WDFW start protecting den and rendezvous sites? The science is pretty clear on this one. This was in the 2011 Plan.

24. When will WDFW stop lying about what it does and does not do - like removing salt blocks from near the Profanity Peak Pack - those were not removed until WDFW wanted to start trapping and killing wolves. We are not told when some ranchers had no range riders before this pack was killed and where the range riders were when they were hired and how many cow/offspring pairs are seen even daily or weekly. We know this producer loses cattle at the end of the season - he can't find them when he's suppose to get them off his allotments. We know his cattle are not all on the assigned allotments according to his grazing lease when they are suppose to be - he can't find them to move them when the time comes. In 2016 a number of the dead calves were not on the assigned allotments when killed in 2016 - so range riders probably were not either.

25. When is WDFW going to recognize and value its largest stakeholder group and the one that spends the most money in local communities - wildlife watchers? When will WDFW develop quality programs on and off WDFW lands for non-hunters - we will pay for them - like WDFW does for hunters? I live near the greatest killing field in the state - the Skagit River estuary - lots of WDFW land - and hunting club land. As soon as the waterfowl arrive, the hunting season begins and locals here call this area: "WDFW's killing fields". Yes, non-hunters like and could enjoy deer, elk, moose, geese, swans, coyotes - and wolves - if WDFW provided better opportunities for us - and we would pay.

So many unresolved problems need to be addressed.

Why not focus on resolving these instead of worrying about post-recovery?

Part 5
Role of wolves in Keeping Ungulate Populations Healthy

Will this EIS adequately address important ways that wolves and other predators maintain healthy prey populations:

A. Limiting the spread of diseases like CWD and maybe hoof deformities in elk by preying on the most vulnerable animals, those that are weak and sick, which human hunters seldom do and never do nearly as well as wild predators.

B. By limiting ungulate density and populations to keep them more balanced with the carrying capacity of ecosystems

C. By maintaining the unique defenses developed by prey species over thousands of years of natural selection while living with wild predators.

These factors must be considered when choosing the goals for wolf management and the number of wolves to maintain on public lands in WA State, when deciding what management practices to include in the various alternatives, and when providing a complete analysis and disclosure of various actions that might be in this EIS such as recreational hunting, ecosystem management of key wolf habitats, predator control, protection and development of dispersal corridors, etc.

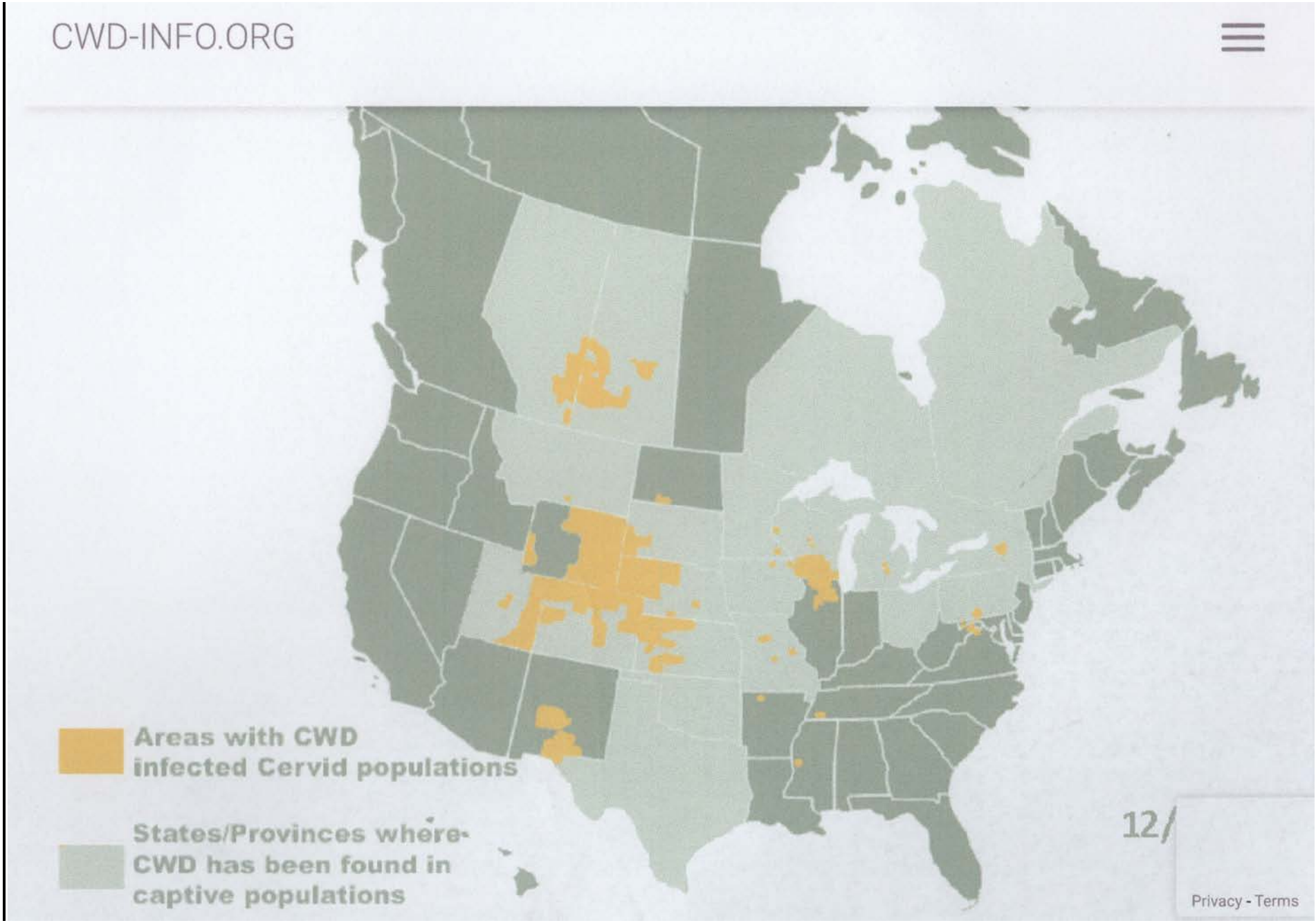
A. Limiting the spread of diseases and other abnormalities that might occur in prey species.

As Chronic Wasting Disease (CWD) spreads into more states, there has been a lot of discussion about the role of predators, especially wolves, and scavengers, in limiting the spread of such diseases. There are many questions still to be answered but the consensus among the leading wildlife biologists and ecologists in the Rocky Mountain area is that wild predators and scavengers most likely limited the spread of diseases like CWD for thousands of years.

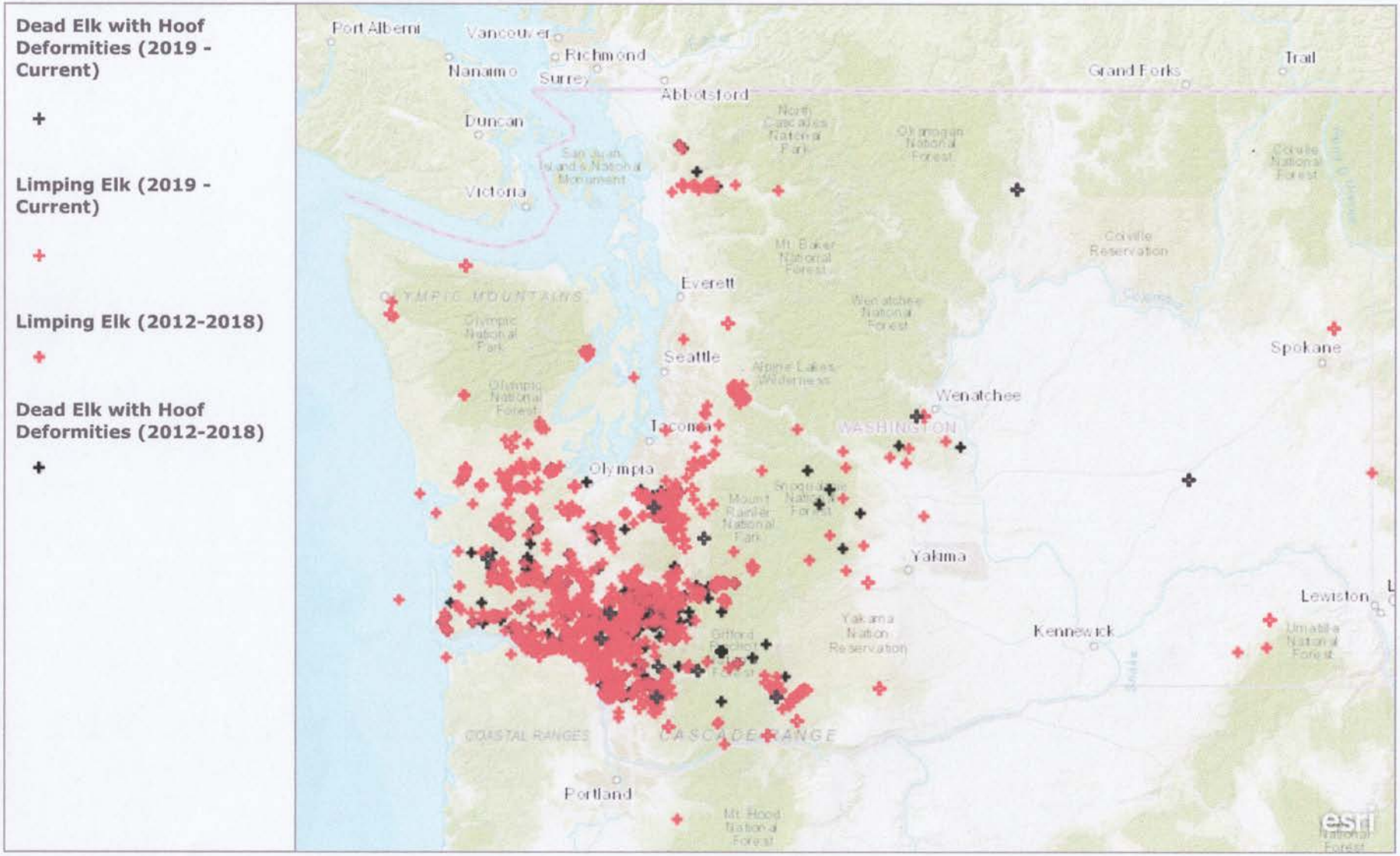
Isn't this kind of information important to consider in the EIS? While CWD has not yet shown up in WA State, it is now in SE Idaho and is moving quickly towards the east and west. In the early 1900s it was as low as one percent in the Rocky Mountain National Park. In 2008, female elk in this park have been infected with CWD at rates of between 6 and 13% and today this is the leading cause of death in adult female elk. (See the first map - on the next page for CWD.)

WA State is seeing the spread of another serious abnormality in its elk populations, hoof deformities that may be caused by bacteria. It is widespread in SW WA and cases are appearing in the northern end of the Olympic Peninsula and Puget Sound in the Skagit River elk population, as well as in the Blue Mountains. If WA had a healthy wolf population in these areas, would we be seeing the spread of this hoof disease in our elk? (See second map after the first one.)

Many are also saying that we are seeing and will see an increase in various diseases because of the way humans are managing ungulate populations. Using human hunters to control ungulate populations is a poor substitute for natural predators like wolves who constantly sift through prey species looking for an animal that shows any kind of weakness.


CWD-INFO.ORG
Areas with CWD infected Cervid populations
States/Provinces where CWD has been found in captive populations
12/
Privacy - Terms

Elk Hoof Disease - Incidental Obs - View



Elk Hoof Disease - Incidental Observations - View

The Previous Maps

Map of CWD.
The map showing areas where CWD is found show that it is now common up to but not in Yellowstone National Park. Why? It is a huge concern that the billion dollar tourist industry based on seeing wildlife in Yellowstone NP and of tourism this generates outside the park boundaries will suffer if ungulate and predator populations drop rapidly due to CWD.

Map of the Elk Hoof Disease
This map shows that SW WA is ground zero right now for this disease. Would this have happened if wolves were living in these ecosystems alongside these elk populations?
SW WA has large areas of public lands. Human recreational hunting has replaced most of the natural elk predation that use to be from wolves and cougar. SW WA also contains areas where wildlife is protected from hunting, as in Mt. Rainier National Park, yet these areas have no wolves and cougar that are killed when they leave park boundaries. What will this lack of natural wild predators mean for the health of these wild ungulates?

What some of the experts have been saying about the role of wolves in limiting and controlling the spread of diseases in ungulate species

L. David Mech, Douglas Smith and Daniel MacNulty described this process well for wolves hunting deer, elk, bison and other prey in "*Wolves on the Hunt*". Mech has said this:

"In the main, the preponderance of scientific evidence supports the view that wolves generally kill the old, the young, the sick and the weak. There's so much documented file data behind it.They are killing amimals that most people would say, 'That animal looks pretty healthy to me', but in fact it isn't. Based upon everything I've seen over the course of my career, I generally stand behind the assertion that wolves make prey populations healthier. The evidence is oversheling."

(from this article**: "***The Undeniable Value of Wolves, Bears, Lions and Coyotes in Battling Disease", b*y Todd Wilkinson.

Many experts support this view including Dr. Gary J. Wolfe, professional biologist and former project manager of the CWD Alliance founded by a number of sportsmen's groups in the Rocky Mts, who said:

"While I don't think any of us large carnivore proponents are saying that wolf predation will prevent CWD, or totally eliminate it from infected herds, it is ecologically irresponsible to not consider the very real possibility that wolves can slow the spread of CEW and reduce its prevalence in infected hers. We should consider wolves to be 'CWD border guards', adjusting wolf hunting seasons accordingly, and let wolves do their job of helping cull infirm animals from the herds."

Likewise, Kevin Van Tighem, a hunter and former superintendent of Banff National Park as said this:

"Humans can invent any fairy-tale reason they want to despise wolves and justify their elimination, but that doesn't change the fundamental time-tested nature of the species. I don't know of a single credible biologist who would argue that wolves, along with other predators and scavengers, aren't important

tools in devising sound strategies for dealing with CWD. It can be rationally argued that wolves provide the best line of defense since they are confronting infected animals"

Scientist Dr. Valerius Geist said in Colorado about the spread of CWD in that state:

"Wolves will certainly bring the disease to a halt. They will remove infected individuals and clean up carcasses that could transmit the disease."

Some experts argue that having a whole spectrum of predators in the ecosystem is also important, the entire "predator guild" including cougars, bears, coyotes, fox, etc. In 2006, researcher N. Thompson Hobbs wrote: "*A Model Analysis of Effects of Wildlife Predation on the Prevalence of Chronic Wasting Disease in Elk Populations of Rocky Mountain National Park*".

Hobbs argued that wolves may be the first ones to find and kill elk infected with CWD since they are skilled at selecting out individual animals that show any slight vulnerability. This increased mortality reduces the life-span of infected individuals which shortens the length of time of transmission to other animals. Many other animals serve as the clean-up crew, stealing or scavenging carcasses of animals killed by wolves, including grizzly and black bears and coyotes. Another researcher from the Colorado Division of Wildlife's scientific research center, Caoline E. Krumm, showed that cougar also were selecting and killing mule deer that were infected with CWD after studying sites where cougar had killed 108 mule deer. (*"Mountain lions prey selectively on prion-infected mule deer". 2010.* She concluded that like wolves, cougars may also learn to recognize and actively select out mule deer with CWD. (prion) She suggested that predators would help minimize prion contamination. However, questions were raised about whether cougars could be effective if they were the only main predator. She recommended a full predator-guild might be needed to control disease - a whole guild with each species constantly sifting through available prey for the sick animals in the habitats they most often frequent, which is often different from those used by wolves, and using their own individual hunting styles.

The American-Canadian mammal biologist Dr. Paul Paquet has also weighed in on this issue. He has monitored the geographic range and expansion of CWD-diseased ungulates relative to the presence of long-established wolf populations since this disease was first confirmed decades ago. Like the map of CWD on a previous page shows, areas with well-established and consistently active and high wolf densities have not seen the impact of CWD like areas with few or no wolves. Paquet has said this:

"To date and in general, CWD has not thrived where wolf populations are active, although the disease has appeared on the margins of these populations. A simple mapping of the distribution of wolves and CWD is very instructive. I have not mapped the distribution of all large predators and CWD, but that would be an instructive exercise. In particular, a comparison of diverse multi-prey and multi-predator systems like Yellowstone ."

Some anti-wolf, anti-predator states such as Wyoming and Montana have tried to control CWD through human hunting while they have maintained as small of wolf populations as possible due to the anti-wolf sentiments of ranchers and some hunters. So far these efforts using human hunters have not affectively controlled CWD. This is because human hunters seldom select out diseased animals and most they most likely would not notice subtle weaknesses during the early stages of the disease which are seen by wolves as shown in numerous studies. At best, removal of animals with CWD is random.

Meanwhile, studies of wolf hunting skills repeatedly show that wolves are out there constantly sweeping the landscape 365 days a year rooting out sick animals. Norman Bishop who worked in the National Park Service for 36 years said wolves are the best weapon against CWD. In *"Wolves on the Hunt"*, the authors presented dozens of accounts that showed most wolf hunts are unsuccessful, that 80% fail, and each means a wolf could be injured or killed. This is why wolves cover large distances sifting through available animals as they look for one that shows some weakness. They have been doing this for thousands of years. Wolves will find and eliminate the individual ungulates that are just beginning to show signs of weakness and sickness.

Before retiring from the Fish and Wildlife Service, Michael Jimenez, a leading wolf researcher, questioned the real need for the level of predator control that is allowed in many areas. He and others quote government statistics. In 2014, there were an estimated 1800 wolves in roughly 313 packs across Wyoming, Idaho, Montana, Oregon and Washington. In that year there were only these confirmed kills of livestock in this entire area: 140 cattle, 172 sheep, 4 dogs, 1 horse and 1 donkey. In that vast area there were millions of cattle and sheep and dogs and horses - and thousands of ranchers and farmers. Meanwhile, thousands upon thousands of domestic cattle and sheep die each year from disease, calving and lambing, severe weather like drought and frigid temperatures or deep snowfall, wildfires, accidental injuries while grazing or being shipped, eating poisonous plants, lightning strikes, and from loose or feral dogs. Of the 313 some wolf packs, only 62 were involved in livestock depredations and most of these ended up with only a few animals being killed.

Yet, few states have allowed wolves to return to levels that are probably needed to successfully control most diseases in prey populations. Why? Will WA State follow states like Wyoming where wolves and other predators are fair game to kill with snowmobiles, airplanes, motor vehicles or any other method and where wolf density is kept as low as possible?

The Stakes are high

The stakes may high when ungulate populations suffer major losses from diseases. There will be less hunting. Tourism based on wildlife such as that seen in parks such as Yellowstone NP will go down. Some hunters will quit trying to hunt. And the number and health of predators who depend on these ungulate species for food will fall and this may increase the likelihood of wolves preying on livestock. In 2018, the WA State legislature allocated $3 million to WSU for a two year study on elk hoof disease. In 2015, volunteers surveying southwestern WA elk herds found at least one limping elk in 48% of the herds. An aerial survey in 2017 found 28% of the herds had elk who were limping. In 2017, hunters in Willapa Hills found 10% of harvest elk had deformed hooves and it was 17% in the Mount St. Helens' area.

B.
A healthy, established and consistent wolf population may keep prey density within the carrying capacity of ecosystems.

Before the first wolves were released into Yellowstone NP in 1995, elk populations in the Northern Range of Yellowstone and surrounding area were on a sharp decline for many reasons, including over-hunting and several years of severe drought and ecosystems with far more elk than the natural ecosystems could support. Yellowstone NP had a maximum number of 19,000 elk at one point and ecosystems were stressed as seen in plant communities in riparian areas,

in aspen woodlands and large sagebrush communities favored by pronghorn. There is little debate over whether this national park can withstand the impacts of 19,000 elk, though some folks still argue over the reasons for the decline in elk numbers and many hunters still blame wolves for the decline's impact on their sport, recreational hunting.

Wolves have become well established in the Northern Range of Yellowstone for over 25 years and elk numbers have remained at fairly steady levels and recreational hunting occurs outside the park boundaries, though not at the level that was allowed before elk numbers plummeted. Ample research shows that wolves and other predators do check the density of their prey species, whether it is coyotes hunting rodents or wolves hunting elk. Human hunting and loss of winter habitat and other important wildlife habitats outside the park boundaries has also limited the density of prey species, including elk, bison and pronghorn. These factors are still a source of much debate and few good solutions for wildlife, for prey or predator species. Even wildlife in a park as large as Yellowstone National Park are affected by wildlife management outside the park boundaries and these issues need to be addressed.

C.
Predators have kept prey species healthy for thousands of years, shaping their behavior, their bodies and their ability to adapt.

. How many elk wolves can kill each year is limited by the natural selection process that continued for thousands of years - until humans ended this process. Ungulate species developed and fine-tuned various adaptations in their bodies and behavior to escape from being killed by wolves. Pronghorn lived with far faster predators than wolves and developed speed that eliminates they from being wolf prey most of the time. Bison developed socially cooperative behavior. When attacked by wolves, they will often
use a group strategy to defend themselves and calves which is usually successful. Elk have sharp hooves and the males have antlers so these animals can sometimes defend themselves and even injure or kill wolves if they stand their ground. Healthy adult elk can also outrun most wolves unless they are caught at a disadvantage as with deep snow. For thousands of years these predators and prey have shared ecosystems and interacted with each other to further perfect their skills as prey species and predators. Usually wolves can only kill the young, the old, the weak or sick, the inexperienced animal who makes bad choices, or one found in a compromising situation like terrain. As this dance goes on, each becomes stronger, healthier and better adapted.

Until humans replaced the functions of wild predators in natural ecosystems
and became the main hunters of ungulate populations,
and WDFW became the wildlife managers rather than wild predators,
and
and until humans changed and destroyed the natural ecosystems
and the natural processes that shaped these wild ungulates and predators.

6.

Extending the deadline on scoping comments because there were not enough comments from rural eastern WA raises an additional important issue

On this issue, comparing this process with that for the EIS on Game Management is useful.

Very few residents of WA State were involved in the EIS on Game Management. It is mostly a document written for and by hunters who are or are not on the staff of WDFW. This did not bother anyone. That no other stakeholders were even considered in the management of wonderful species many of us would love to see when we are hiking and we they are species that many of us believe they are important parts of ecosystems and should be thought of in this way rather than as "game animals" to kill for fun. This includes species like doves and mergansers to coyotes and black bear and cougars. Yet WDFW has chosen to keep the historic and out-dated concept that these are nothing more than "game species" that are managed for the 2.42% of the residents of WA State who chose to buy any kind of hunting license in 2018.

That WDFW tried to classify wolves as "game animals" when they were still listed as "endangered" by the state and federal government clearly shows that WDFW is clinging to a very old and out-dated way of managing wildlife even for endangered. This effort was strongly opposed and stopped.

That WDFW moved management of wolves to the "game management team" - when they were listed as endangered by the state and federal government is also very telling. WDFW was successful in making this change because many of us were not aware that this was done, though we are well aware of the implications for wolf management.

Let's look at WDFW's Game Management Plan - and this is where WDFW will try to put wolves in this EIS on wolf management after recover. I've copied some of the Final EIS and also a page from Hunting Regs for some species I care about, including coyotes and bobcats.

1. Look at its goals.

The goals are totally all about providing quality hunting experiences for the small group of residents who find joy in killing animals. It does not even recognize that WDFW's largest stakeholder group according to USFWS statistics is wildlife watchers. We don't exist. WDFW has no clue as to the impacts of this Plan on non-hunters and does not seem to care. In discussing this with a staff member who manages black bear and cougar, he seemed surprised that people who don't hunt do not enjoy hiking and wildlife watching and camping with hunters who are killing the very animals we want to see and enjoy. It was amazing to see his lack of any recognition that he and his fellow hunters impact us in many ways - yet we are the majority of the residents of WA State.

For me, a non-hunter who does not believe killing animals for fun is ethical, this ends hiking on the south side of Mt Baker on Aug 1st, and this is a great area that is close to my home. These trails cross prime black bear habitats so hunters frequent this area. Black bear happen to be one of my favorite species. I visit Yellowstone often and watch them - mostly grazing on new grasses

in early summer and berries later. Sometimes the trails are just barely snow-free on Aug.1st when black bear hunting begins on the south side of Mt. Baker. When my neighbors tried to hike one of our favorite trails in this area in August they came upon bear hunters who shot one of two black bear cubs - hikers were crying and extremely upset. Anti-hunting graffiti shows up at this trailhead because of things like this.

The same thing is true in the Skagit Valley Flats which are very close to my house in Anacortes. Hunting season begins in early fall just when the ducks and geese are beginning to arrive. All of the public lands and WDFW lands are open to hunting. I'm an avid bird watcher and photographer. I cannot use these areas until the end of hunting season. Hunting ends at the end of January. When I then use these areas, I find badly wounded ducks and geese which is extremely upsetting. They can't fly and are trying to survive unable sometimes to even walk well. Locals use the WDFW lands in this area as off-leash dog parks which further ruins wildlife watching. Trails are few and not marked and often don't seem to go anywhere that makes sense. It is obvious that the area is primarily managed for hunting and the rest of the year there is little management and the areas are misused and the remaining wildlife have little protection.

2. Look at its claim that it is based on science.

What does WDFW really know about the impacts of a year around hunting season with no limits on coyotes What does WDFW really know about the impacts of no bag limits on bobcats, fox and raccoons? What science does WDFW use about the natural history of these species and the impacts of indiscriminate hunting on their lives? Isn't it all about estimates of the number of these animals and whether these numbers can withstand what amount of hunting?

Does anyone in WDFW realize that coyotes are very social, that like wolves, they live in family groups and include extended families when they are not indiscriminately killed as is done in WA State? Does anyone in WDFW know that these groups, really "packs" is the right word, have very different behavior where they are hunted than where they are left alone? Does anyone in WDFW know that studies have shown coyotes are less likely to prey on livestock when they are left alone to develop and defend territories? And coyotes do this - when left along.

Yet WDFW has a year-around hunting season on coyotes with no bag limits.

And yes, too many rural residents who hunt still subscribe to the out-dated belief that all predators are bad and should be shot on sight. And they do kill coyotes whenever they see them thinking this is good. WDFW's hunting regs encourage this. And I see these people when I hike. They are everywhere shooting at coyotes whenever they can just because they can. I've seen this in the most remote areas of the Pasayten Wilderness where coyotes don't bother anyone - horse groups kill them. And actually very few manage to avoid the many horse groups and as a person who has taken 3 week backpack trips into the Pasayten, I can tell you that wildlife in even this relatively remote wilderness are heavily impacted by hunting - as are people like me who stay out of it after high hunt begins at the first of September. The pointless shooting in the summer months is bad enough.

On the next two pages, I have copied a statement about WDFW's goals and that it uses science from WDFW's Final EIS on Game Management and a page from the hunting regulations on species such as coyotes.

The overall goals are to protect, sustain, and manage hunted wildlife, provide stable, regulated recreational hunting opportunity to all citizens, protect and enhance wildlife habitat, and minimize adverse impacts to residents, other wildlife, and the environment.

With all of these issues, it is understood that the implementation of strategies are conditioned first on meeting game population objectives. Science is the core of wildlife management, supporting WDFWâ€™s legislative mandate to preserve, protect, and perpetuate wildlife populations while maximizing recreation.

Science and the professional judgment of biologists is the foundation for all objectives and strategies identified in this plan. At times, the science may not be as strong as managers would like. In those instances, management actions will be more conservative to minimize the potential for significant negative impacts to hunted wildlife species. Chapter 2 focuses on the science and management of hunted species and lays out how those populations will be monitored to ensure perpetuation of these species over the long term.

Small Game and Other Wildlife Seasons

A small game license is required for hunting all small game, except forest grouse and coyotes which can be hunted with a big game or small game license.

Small Game and Other Wildlife Seasons

Small Game Species	Bag Limit	Season Dates	Notes and Exceptions
Bobcat	None	Statewide: Sept. 1 - Mar. 15	Sealing of pelt required. Bobcat may not be hunted with dogs. **Pelt Sealing Requirements:** Successful hunters/trappers must contact a WDFW office for pelt sealing and submit the associated harvest report to the department by April 20, 2020. The bobcat hide must not be frozen so a seal may be attached. No one may possess an open WDFW bobcat seal unless it has been cut by a licensed taxidermist or fur dealer who has received and invoiced the pelt for processing.
Fox	None	Statewide: Sept. 1 - Mar. 15	CLOSED within the exterior boundaries of the Mt. Baker-Snoqualmie, Okanogan, Wenatchee, and Gifford Pinchot National Forests.
Raccoon	None	Statewide: Sept. 1 - Mar. 15	
Cottontail Rabbit and Snowshoe Hare	5/day, see notes	Statewide: Sept. 1 - Mar. 15	Possession limit: 15 straight or mixed bag.
Forest Grouse	4/day, to include not more than 3 Blue Grouse, 3 Spruce Grouse, and 3 Ruffed Grouse	Statewide: Sept. 1 - Dec. 31	Possession limit: 12 grouse; to include not more than 9 Blue Grouse, 9 Spruce Grouse, and 9 Ruffed Grouse. Forest grouse may be hunted with either a big game or small game license.
Crow	None	Statewide: Sept. 1 - Dec. 31	Crows in the act of depredation may be taken at any time.
Coyote	None	Year round.	Coyote may not be hunted with dogs. A small game or big game hunting license is required.
Lynx, Fisher, Pygmy Rabbit, Jackrabbit, Ptarmigan, Sage Grouse, and Sharp-tailed Grouse	Closed statewide, year-round.		
Beaver, Badger, Weasels, Marten, Mink, Muskrat, and River Otter	May only be taken by trapping during the trapping season (Nov. 1 - Mar. 31). Trappers must contact a WDFW office for pelt sealing of river otter and submit all harvest reports to the Department by April 20, 2020.		

Forest Grouse Wing and Tail Collection

Successful forest grouse hunters are requested to submit a wing and tail from each forest grouse harvested. Wings and tails should be placed in a paper bag (one bag for each bird) and can be brought to any WDFW District or Regional office. The wings and tails can also be deposited in collection barrels placed around the state. Paper bags are available at each collection barrel. Check the WDFW website or contact a district office to find out if there are collection barrels in your area.

Night Hunting, Hound Hunting and Permits During Deer and Elk Hunting Seasons

Hunting at night:

- Night Hunting for Bobcat is prohibited in the following GMUs that fall within the Lynx management zones: 101, 105, 111, 113, 117, 203, 204, 215, 218, 224, 233, 242 through 247, 250, 426 and 450.
- It is unlawful to hunt bobcat and raccoon at night during modern firearm deer or elk general seasons that occur in October and November in eastern and western Washington.
- Hunting big game with the aid of an artificial light, spotlight, or night vision equipment is prohibited. Night vision equipment includes electronic light amplification devices, thermal imaging devices, and other comparable equipment used to enhance night vision. Coyote may be hunted at night with lights year round, EXCEPT it is unlawful to hunt coyote at night during modern firearm deer or elk general seasons that occur in October and November in eastern and western Washington.

Hound hunting:

- The use of dogs to hunt black bear, bobcat, coyote, and cougar is prohibited year-round.
- Dogs may be used to hunt raccoon, EXCEPT it is unlawful to hunt raccoons with dogs during modern firearm deer or elk general seasons that occur in October and November in eastern and western Washington.

Hunting Contest Permits:

- A hunting contest permit is required for all hunt contests. Please refer to the WDFW hunting contest permit website at wdfw.wa.gov/licenses/hunting/hunt-contest .

That WDFW still allows hunting contests for any species is shocking in what is suppose to be a progressive state that has few hunters.

Last I looked, it is $35 to get a permit to organize a hunt that people join to see who can kill the most of a given species, often coyotes. Other far less progressive states have outlawed these contests. Citizens will need to stop this by going to our legislators in Olympia or through another citizen initiative because our WDFW will not do the right thing.

That beaver are still trapped for their fur when extensive research has shown they are vital to riparian health is amazing. We need beaver far more for ecosystem health and for recovery of salmon species than we need their furs. So who is WDFW managing beaver for????

Will protecting beaver also require another citizen initiative or going to our legislators? Most likely because of the out-dated thinking in the WDFW.

What science is the management of these species based on?

******

Finally, what does this have to do with an EIS on Wolf Management?

I believe WDFW will try again to classify wolves as a "game animal" and it will manage them as it does coyotes and mountain goats - using a livestock model with the primary goal of providing hunting opportunities for the small number of people - and trophy hunters are really a small number of people in WA State.

Will WDFW use the best available science on wolves when it hasn't on coyotes or other species?

Will WDFW consider the life history of wolves when it hasn't for coyotes?

Will WDFW consider the importance of these species in ecosystem functioning when it hasn't for coyotes and other species?

Will WDFW consider how lethal removal of wolves changes wolf family and pack structures and their behavior and prey choices when it has not considered this for coyotes?

7.

How will the EIS address management of multiple predators, including human hunters, wolves, and the other natural wild predators such as cougar and coyotes and bears?

What does WDFW really know about the role of scavengers in these systems?

What does WDFW really know about predator-prey density and relationships?

And what does WDFW know about the impacts of livestock grazing on all of these species, predators, prey including ungulates and scavengers?

Or is WDFW just taking shots in the dark when managing individual species and setting harvest levels for hunting seasons?

What happens to wolf packs when, after they have chosen a den site in the spring and they have puppies in this den, and then suddenly in June over 1,000 cow/offspring pairs are released into this ecosystem?

**

Multiple wild predators and scavengers

Has WDFW ever used real science about the complex relationships between various wild predators and scavengers when managing cougar or black bears or coyotes or fox? WDFW has increased the number of cougar and manipulates the hunts and number of for black bears killed to please hunters and private timber companies. Now wolves live in some of these areas. What does WDFW know about how these natural predators and scavengers use ecosystems and how human recreational hunting affects this use and these inter-relationships? What about coyotes? Do wolves impact the number and success and predation of coyotes? How many wolf kills are taken over by other predators or vice-versa? What about lynx, bobcats, and badgers? How much wild prey is needed to keep these ecosystems functioning and healthy before these predators turn to domestic livestock, or move, or become sick or die? How many ungulates and other prey species are left over to be killed through recreational hunting and trapping, illegal poaching, tribal hunting, or to be hit by vehicles and trains or shot to protect crops or minimize impacts to private property, or killed by domestic dogs, etc. Even the relationship between wolf and coyote densities is not well-understood. Since re-introduction wolves in Yellowstone NP, wolves killed enough of the well-established and often large coyote packs to reduce the total coyote by about a half. Those were the early reports. Now after 24 years, some believe the coyote population may be back to nearly the same size as before but coyote pack size is smaller and coyotes have changed their behavior and some actually benefit by having wolf-killed carcasses to feed on when they get a chance. Again, this raises more questions about how ecosystems function and the best scientists and ecologists are no longer sure how this works over the long-term. Also the number of coyotes that lived in Yellowstone before humans became involved is not known. Perhaps this is the number that is more important - if humans were not interfering with the system by killing animals that leave the protection of the park.

(Early reporting on impact of wolves on coyotes in Yellowstone: Kim Murray Berger and Eric Gese, *"Does interference competition with wolves limit the distribution and abundance of coyotes?"* 2007.

Multiple wild prey including ungulates

Does WDFW know which wild prey are being hunted by what wolves and where? Is there a preferred prey species for wolves in some areas or are all prey used or is use dependent on the prey density of various species? For instance, in the Kettle Range, how many prey species are used by wolves and what are the prey densities of these species when livestock are grazed versus when no livestock is being grazed, and in each season of the year? Would this information provide insight into wolf attacks on livestock and perhaps change predator control and human hunting and trapping harvest levels? Just about every wolf study shows that wolves select prey that is most readily available with the least expenditure of energy and the least risk of injury or death to the wolves, distance from den sites when pups cannot travel, the prey animal offers a distinct opportunity for success - and how hungry the wolves are when they find prey animals.

What is the impact of human hunting and trapping seasons on wolves, on other predators and on prey species?

What happens to prey availability - of various prey species - when hunting seasons roll around and many more people are in the ecosystems hunting, driving roads? shooting gun? What is the impact of dispersed camping off USFS roads versus camping in campgrounds? Does these change prey behavior? Does this change the wolf behavior and the wolf's ability to hunt and/or to find prey? Do wolves, other predators, and/or prey species change how they use ecosystems when hunting beings? Do they move to different areas to avoid hunting? How is this impacted by road density? By trail density? By use of dogs in hunting? Is poaching, illegal killing of wolves, greater during hunting seasons? Is it greater during trapping seasons? Does this occur near roads or trails?

What is the impact of human recreational uses on wolves and prey species and other predators, including impacts caused by hiking, backpacking, camping, wildlife watching, photography, horse-back riding, mt bike riding, etc.?

Are these impacts related to trail density and/or road density? Are they greater from dispersed camping than camping in designated campgrounds? Which kinds of recreation are most popular and where and how does each affect predator and prey densities and use of ecosystems?

Livestock Grazing

While WDFW only can control livestock grazing on its own WDFW lands - which is an issue - WDFW does control most wildlife populations through hunting and trapping, predator control, and killing of wildlife species to protect crops and private land and property, and it can limit illegal poaching. This leaves WDFW in a position where it should be using science-based information on how wildlife species respond to livestock grazing. When dozens or hundreds or even several thousand cattle or sheep are released onto grazing lands owned by the USFS, BLM, DNR or private lands, in whatever season, how does this affect habitat choices by prey and predator species? Does it change prey density in small areas or over large areas? Does it change predator behavior and density? Are wild animals attracted or displaced? Do the livestock change the availability or use of plants to eat and use of riparian areas and water sources? What is the impact of salt blocks? I know deer are really attracted to salt blacks put out for horses.

Does the time of year matter? If wolves choose their den site and have pups in spring before the livestock are brought in, which is the case in many areas, how does this impact the wolves if livestock are grazing near the den site? What affect does human presence have on wolves and prey species? Do range riders and other non-lethal deterrents and lethal deterrents change prey behavior and wolf behavior? If so how, and how much?

Before the EIS can propose ideas for management of wolves, isn't a good science-based knowledge needed on how ALL these species interact and how each may impact the others?

Shouldn't there be a science-based discussion of how human hunting and trapping and livestock graving affect all of these animals, not only wolves but also the prey they need to survive?

Isn't WDFW responsible for managing all of these species for all residents of WA State rather than just for the 2.42% of the residents who purchase hunting licenses?

This information is not easy to obtain, the necessary tools are lacking and natural ecosystems are far more complex to easily understand.

In the Greater Yellowstone Region, including in the national park, wildlife managers tried to manipulate wildlife numbers using very simplistic thinking and short time frames.

The history of wildlife management in the Greater Yellowstone Region and within Yellowstone National park offer much information that should be useful in this EIS when choosing goals and alternatives. The following information is a summary of this management and the huge swings in wildlife populations, including those of wolves, coyotes, elk, grizzlies, pronghorn, cougar, etc.

This information could be summarized by saying that human wildlife managers do not yet understand who natural ecosystems work or how the processes shape wildlife populations or wildlife behavior. Scientists still don't have the right tools and ways to measure the variables. Time-lines and geographic scales used by many studies are not adequate since many ecosystem processes move over longer time periods and over wider areas than those covered by most studies. Far more variables are probably involved than have been understood by wildlife managers. Trying to figure this all out will take many years of studies of natural ecosystems and few of these remain to study. Do we have an opportunity to create more of these natural ecosystems in WA State by managing all wildlife species in large areas of land using natural processes? I think so if WDFW could realize that its current management practices are no longer relevant for most of the residents of WA State.

Broad summary of wildlife management in the Greater Yellowstone Region

Note on info about wildlife in Yellowstone NP: most wildlife species move in and out of the national park with the seasons to obtain necessary resources and avoid severe weather, or to disperse. This could be true if wolves were protected in some parts of WA State.

The history of management of many wildlife species in the Greater Yellowstone Region including management within Yellowstone National Park, provides information that could be useful in this EIS and helpful when drawing up management plans for many species of wildlife in WA State. Currently, WDFW seems stuck in a management system that is out-dated and mostly based on providing quality hunting experiences for the tiny group of residents who buy hunting licenses in WA State.

Going back 100 years, in the Greater Yellowstone Region, most game managers, including those managing wildlife within Yellowstone NP, thought they could manage wildlife better than nature and the natural ecosystem process. They "culled" this species or that species in attempts to manage these wild systems. Back 100 years, most wildlife managers agreed that everything would be better if the predators were eliminated, and wolves were totally gone from the area by the 1930s through shooting and introducing a deadly form of mange. Native ungulates were raised using basic husbandry models including winter feeding and predator control. Then some species became so numerous wildlife managers worried that the "the range", the ecosystems, were no longer healthy. Then many elk, bison and pronghorn were shot and trapped to see if vegetation would improve. By the 1960s, elk numbers were reduced by maybe 75%, to about 4000 animals. In 1969, Yellowstone National Park changed to a natural wildlife management model and ungulates were hunted outside the park. By the 1990s, elk numbers climbed to 19,000 in the national park, far above what anyone believed was within the carrying capacity of the ecosystems. Many ecosystems showed the impact of intense elk grazing, aspen woodlands, large sagebrush ecosystems, riparian areas, etc. Coyotes were plentiful and some lived in large family groupings with multiple generations all supporting and raising the pups as a social and group effort similar to that found in wolves. Alien grasses are found in many local areas. Natural fire was usually suppressed for many years until management changed to a more natural approach. Meanwhile, the climate is becoming warmer and drier with shorter winters. How important are these factors?

By 2002, the Greater Yellowstone Region had at least 216 wolves before pups were born living in 14 packs in or mostly within the national park and 14 packs outside the park boundaries. About 77 of the Yellowstone wolves were in the Northern Range. Growth in wolf numbers within the park has slowed and even dipped in some years suggesting all good wolf habitats are occupied. Some packs have grown very large and split into different packs while other packs have been forced into lesser habitats in the peripheral areas. Elk are still the primary prey of wolves. Most adults female elk killed by wolves are very old. Bison are also killed and this number is increasing. Wolves killed many coyotes when they first established territories resulting in a 50% decrease in coyote density from 1996-1998 and the average pack size of coyotes dropped from 6 to 3.8 animals. Litter sizes increased but did not offset losses to wolves. Data is still out on the impact on pronghorn. Some believed fewer coyotes would mean higher survival rates of fawns which coyotes prey heavily on. After 25 years, coyote numbers have rebounded though pack sizes stayed small. Perhaps 25 years is not long enough to make guesses about the impacts of one species on another. Coyotes are also scavengers and they have benefited from wolf kills and often find and feed on these carcasses. More recent studies show numbers help determine who is dominate between coyotes and wolves; observers have seen wolves chased and carcasses claimed when coyotes out-number wolves. This is especially true when there is only one wolf at a carcass. Coyotes trying to scavenge wolf kills are also sometimes killed. Grizzly bears have mainly benefited by living with wolves. They claim many wolf kills, sometimes soon after the kill is made, limiting wolf access to these sources of food. This has forced wolves to make more kills. Cougars have slowly increased across the Northern Range. They tend to use different habitats, more wooded and steeper terrain. Observers have reported wolf pups being killed by cougar and cougar kittens being killed by wolves. Yellowstone seems to be maintaining good populations of weasels, marten and badger but lower levels of fishers, wolverines, red fox, lynx, bobcats and otter. Coyotes often kill fox. Wolf predation on moose has been low but moose populations have been low in the Northern Range since the first of 1988 destroyed much of the good older subalpine fir forests used

by moose. Few wolf kills on bighorn sheep have been recorded. White-tailed deer habitat in the park is limited and numbers have always been small. Wolves have not changed this. Mule deer are more abundant and migrate outside the park in winter where they are hunted. Beaver are not abundant in the park and only one wolf pack is known to regularly prey on beaver. Information is sketchy on wolf caused beaver mortality.

Will wolves stabilize prey fluctuations in Yellowstone? If so, how long might this take? How many wolves can Yellowstone National Park support? Predictions before wolves were introduced ranged from 50 to 120 wolves. Elk numbers are hard to predict because many elk migrate outside the park boundaries in the winter where they are hunted. Yellowstone NP and Greater Yellowstone has the entire guild of major and minor predators so it is far more complex than Isle Royale. Others suggest that natural processes do not end up creating stable numbers of predators and prey, that numbers perhaps vary widely as these populations react to each other and the many other forces that shape their survival and behavior such as weather and climate.

Some researchers predicted an elk to wolf ratio to eventually be about 166 in Yellowstone. In 2002 it was 154. Scientists expect many more fluctuations in numbers of wolves and other species that have been directly or indirectly impacted by wolves. Most agree on one thing - more time and much better science is needed to understand these relationships. The report written in 2002 is already out-dated and more changes keep occurring each year. (Article by Douglas W. Smith, Rolf O. Peterson and Douglas B. Houseon, "*Yellowstone after Wolves*". 2002.

Like in Yellowstone, wildlife managers in Isle Royale have tried managing wildlife and they have seen many failures as moose and wolf numbers have increased and fallen. They continue this with the latest artificial reintroduction of more wolves after previous attempts failed. Because of climate change, there is no longer winter ice to provide a way for dispersal on and off Isle Royale so now it is truly a small, island ecosystem. Most likely this experiment will fail too and the wolves and moose are left to deal with this.

In Isle Royale, during a wolf-free era, the moose population increased to what many believed was above the carrying capacity of the island ecosystem. The Park tried unsuccessfully to introduce zoo-raised wolves. Then wolves returned naturally crossing on winter ice in the late 1940s. Moo0se density grew and peacked in the early 1970s and then ended with severe winters and an increase in wolves. Wolves then crashed in the 1980s, going from 50 to 14 in 2 years from accidental introduction of canine parvovirus by humans. Moose numbers then exploded until starvation after one of the most severe winters on record. Tree rings on Isle Royale show the rise and fall of the island's wolf population. Trees flourished when wolf numbers were high and moose numbers were low. One third of the island's balsam fir trees were able to escape moose browsing because of their thick, high density stands. After a century, Isle Royal moose and the forests have not reached an equilibrium. While wolves shaped moose numbers, long term studies are needed to really understand how the ecosystem really works. The higher moose density was thought to be the result of having only one major predator, wolves.

Because the best scientists are now saying that they really don't understand how natural ecosystems and natural processes work, and they can't even identify and measure all of the factors involved in these systems,

isn't this a good argument for protecting natural ecosystems and managing wildlife species as part of these ecosystems rather than the usual single species management based on a model used for livestock production that most state wildlife managers use?

8.

How can wolves be managed to not only maintain sustainable numbers but to also protect the role of wolves as apex predators?

The EIS should address this issue since one of the main reasons to conserve wolves is to benefit by the role they play as predators in ecosystems.

Sometimes this is referred to as "ecosystem functionality".

How will the EIS address these concepts as goals and alternatives are chosen and impacts are analyzed and disclosed?

Many concepts related to this issue are discussed in this article by Andres Ordiz, Richard Bischof and Jon Swenson, "*Saving large carnivores, but losing the apex predator?. Biological Conservation*, 2013. I'll name a few of these.

1. Too often hunting and predator control are part of management of large predators like wolves, but does this reduce the effectiveness of the role played by these predators in ecosystems, such as their role in reducing the spread of diseases in ungulates or keeping ungulate populations within carrying capacity. The ability of predators to perform these roles may be reduced by human hunting of wolves and predator control. This is because both prey species and predators make behavioral adjustments when they are hunted or otherwise killed by humans. Predators respond to being killed by humans in a way similar to the "landscape of fear" described for prey species and natural predators. Human killing of wolves may reduce wolf density and wolf social structures to a point where wolves no longer play a significant role and/or prey choices of wolves and other behavioral changes occur that reduce the wolf's role.

2. Research does not show that allowing hunting of wolves and other predators is an effective way to achieve more social acceptance of these species except for a positive affect in a very small portion of the total number of people who enjoy trophy hunting and the negative affect may be far greater since far more people do not view trophy hunting as a valid use of wildlife. Yet many fish and game departments still use this as one of their stated goals.

3. Research also shows that hunting wolves to reduce livestock depredations seldom achieves this goal since hunters seldom kill the wolves that are responsible for the depredations and they may, instead, increase the likelihood of livestock attacks. Just reducing the total number of wolves has not been shown to be effective unless wolf numbers are reduced to below a sustainable number.

4. Hunting of wolves also kills far more wolves than is easy to predict by managers who are trying to maintain sustainable numbers because of indirect impacts that are not easy to measure.

These include things like deaths of juveniles after humans kill key adults who were providing food and knowledge that enabled more of the juveniles to not only survive the first year, but to also reproduce themselves and so this knowledge was passed on to still another generation. Killing of a single key wolf in a pack may also cause the pack to dissolve or be unable to defend its territory which may result in the death of additional wolves and more dispersal. Dispersing wolves are more apt to die probably because they are in areas they do not know and they lack the support of a pack.

5. Some studies have shown wolves will change hunting areas and den sites from those that are ideal to other sites to avoid humans when they are hunted. Wolf territories often have borders that are created by humans - roads, main trails, and farms. This can lower the survival rates of wolves, just as it can impact the health and survival of prey species that are hunted. Some avoid the best habitats in the fall when they the best foods the most to survive the winter, reducing their chances of surviving the winter.

6. Human hunting in essence, demotes wolves from the role to apex predators to that of a smaller, diminished role, that of a secondary predator. This may give coyotes an advantage over wolves since they can live in smaller packs and survive by eating smaller prey.

7. Some of these issues can be avoided by creating large areas where wolves are not hunted by humans so they may fully participate in their role as apex predators. This may require a change in human hunting of prey species in these areas too, which may please most of the public who do not hunt but not the small minority of WA residents who do hunt. This will allow prey density to respond to a healthy wolf density so natural processes can shape the ecosystem rather than humans trying to do this with limited knowledge of how to do it well.

8. There is no good answer for what wolves are best to hunt since breeding pairs and packs are needed for stable packs and territories while dispersing wolves are needed to colonize new areas, to restock other areas, to take the place of individual members of wolf packs that die from whatever cause and to exchange genes.

An article referenced in the above article also offers ideas that are useful in the EIS, "*Human activity mediates a trophic cascade caused by wolves*", by Hebblewhite, White, Nietvelt, McKenzie, et al., 2005. This study looked at the impact of humans and how this can reduce the ability of wolves to behave as apex predators in ecosystems. The authors studied wolves in Banff National Park and found that humans greatly reduced wolf density in one of the best wolf habitats in Banff, the Bow Valley, while wolf density was high in less ideal habitats. Over time, the positive benefits of wolves on such things as growth of riparian plants and song birds and beaver density were not seen where humans reduced wolf densities and/or use below a level that wolves could effectively have an impact on these.

Another article referenced in the first article also offers important ideas for the EIs. It is by Nils Stenseth and Erin Dunlop, "*Unnatural selection*". 2009. The authors showed that human harvesting changed observable traits over time. Their study covered many species including sockeye salmon, bighorn sheep and marine snails and gingseng. Some changes were rapid while others occurred slowly. We have seen this in Chinook salmon in the Salish Sea. Chinook weighing 100 lbs were once common - as when my dad was fishing in the 1940s. Now people are thrilled to catch one that weights 25 lbs. Is this perhaps related to special adaptations of residents to eat Chinook - they needed large prey due to their size - and now large Chinook are rare if not

extinct. Not only size changes were noted by the authors, but also habitat selection and life-histories. Authors suggest genetic changes may occur which may be impossible to restore. These changes occur for a number of reasons, including the level of human harvest which may be beyond what is natural and the way human harvesters select the animals they kill which may be very different from those chosen by natural hunters. Added to the human harvest is the natural mortality that is always occurring and accidental losses as occurs on highways where many wildlife species die. This study suggests that before humans harvest wildlife, managers should understand all of the possible ways it might affect wildlife behavior, genes, and the ability to adapt as well as impacts on the interactions between wildlife species. Should wildlife management be changing wildlife genetics, behavior, social structure, etc.? Many think not, especially since wildlife managers have a very limited knowledge of these and how they function in real ecosystems.

9.

What science supports WDFW's claim that some wolves are bad and need to be killed?

This is one of WDFW's claims when killing wolves and one that has made WDFW's management of wolves very controversial since wolves should be managed using the best science.

This question was explored by John Linnell, John Odden, Martin Smith, at el., in this article:
"Large carnivores that kill livestock: do "problem individuals" really exist?",

These are some of their key points in this article.

The authors looked at data on livestock depredations from many areas which included predators other than wolves, such as livestock predation by jaguar, leopard, lions, bears, and cougars. The questions raised by the authors apply to all kinds of predator control wherever it occurs.

1. The most important factor discussed for all predators was "livestock husbandry" and the role it plays in predator attacks on domestic livestock. The authors concluded that when livestock are free-ranging and mostly unattended in large carnivore habitats, there is unlikely to be any individual differences in animals that do or do not prey on livestock. This is because livestock is simply easier to kill than most wild prey so any normally-behaving predator will likely choose domestic animals over wild prey at least some of the time. The likelihood of this happening increases with more density of livestock and more frequent encounters with livestock. The availability, the authors suggested, have less to do with attacks on livestock. Authors stressed that conditions where availability of easy prey is high will result in higher levels of predation. This has been shown to be true in parts of WA State were cow/offspring groups graze dispersed and mainly unprotected, especially during the hours when most wolf kills are made- late evening and night and early morning.

2. When livestock are fenced, bunched together, and guarded by dogs and/or humans, the authors suggest some individual predators may be more likely to learn how to prey on these livestock animals and take the risks presented by dogs or humans. Learning how to navigate the risks and kill livestock in these situations requires learning a series of skills that not all predators might have, bypassing shepherds and/or dogs, crossing physical barriers or fladry,

or lights, etc. Young animals may take more risks and try more new behaviors but older animals may develop better skills and females are sometimes more cautious so may be less likely to attack guarded animals.

3. On so-called "surplus killing" authors argue that this is a part of natural behavior of most carnivores who, if given the chance, will kill more than they can immediately eat. This is because their natural history includes hiding and/or coming back to their carcasses over and over during the following days. Like humans, they have developed the foresight to plan ahead for a rainy day. So if prey is plentiful and easy for whatever reason, storms, deep snow, etc., predators may kill more than they need the day of the kill. In areas with multiple scavengers and large scavengers such as grizzly and black bears, predators may have trouble defending and using one carcass until it is gone, as is happening in Yellowstone NP.

4. The authors thought it reasonable to believe that not all individual predators are alike any more than any two dogs or people are the same. However, they cautioned that most predator control does not target individuals, but instead, like WDFW, just kills whatever animals they can kill. The animal responsible for the individual behavior of killing livestock is not likely the animal that is killed during most predator control efforts. This means these efforts are not science-based and they are not likely to have be effective since they are random killings. Efforts to be more selective when conducting predator control is also seldom better than random such as using carcasses since any member of the pack or another species may feed on a carcass. Only livestock protection collars might be selective though the authors cautioned that this method should not be used where livestock are dispersed and not adequately protected, This is because it is normal and likely that most normal predators will attack livestock in this kind of setting. Basically, all predators would need to be constantly removed - as WDFW continues to do in the Kettle Range on the Diamond M Allotments.

And this accurately describes why many of us are very angry with WDFW's claim that it uses the best available science, that the Profanity Peak Pack was just a bad pack, and that it uses the best available science.

To:
Lisa Wood, SEPA Coordinator
WDFW Habitat Program/Protection Division
WDFW
P.O. Box 43200
Olympia, WA 98504

From:
Martha Hall
2617 16th Street
Anacortes, WA 98221
pondfrog.mh@gmail.com

Martha Hall

Additional Scoping Comments
on the
EIS for Wolf Post-Recovery Planning and Management

Note: I sent a packet of scoping comments for this EIS to WDFW (Lisa Wood and Julia Smith) before the first deadline, Nov. 1, 2018. These are additional, more miscellaneous issues than those brought up in my first comments which were in four sections, each focused on a single main concept. This is my intended Section 5 which raises a variety of questions that should be considered in the EIS and its goals and alternatives.

Part One: Delisting
What will the criteria be? Will delisting be addressed in this EIS?
Will the 2011 Plan's Goals for delisting be Used or will newer information be used?
What criteria and factors should be included when choosing models for sustainable and viable wolf populations in WA State?

Will this EIS include goals and alternatives that includes delisting wolves in Washington State or will delisting be decided outside this EIS ?

1. Is this EIS going to address delisting issues and if so how?

1A. The following information that WDFW provided to the public when asking for scoping comments on this EIS suggests that WDFW may be considering delisting as soon as 2020 and WDFW may delist using either of two choices given in WAC 220-610-110:

Information from WDFW to the public for scoping:
WAC 220-610-110 offers two ways for WDFW to delist wolves, either by reaching the goals in the recovery plan or by determining wolves are no longer in danger of failing, declining, or are vulnerable to misc. factors that might mean they will again be listed. A Periodic Status Review is used to determine this. Delisting would include a public process.

1B. Many of us believed WDFW was following its 2011 WA Wolf Recovery Plan's goals for delisting rather than delisting through a status review. If delisting is addressed in this EIS, please explain why one method and process would be better than other and the advantages and

disadvantages of each method; the 2011 Plan's goals, a status review, and/ or another method and process.

1C. Whatever method is used for delisting, please address why the chosen method is best for the 7 1/2 million people in WA State, of which only 2.42% purchased any kind of WA hunting license in 2018. Why is it better for these 7 1/2 million people than for the even fewer probably are livestock producers. The EIS should address wolves as a "public asset" and explain how management actions will benefit ALL of the people of WA State including WDFW's largest stakeholder group, wildlife watchers, as well as hikers, campers, nature study and research.

1D. When the goals for recovery in the 2011 WA Wolf Recovery Plan were peer reviewed, there was not solid agreement that these goals were even minimally adequate for having a viable, sustainable wolf population.

Will there be a broad peer review process for all actions proposed for delisting efforts in the DEIS so the most-recent best science will be considered? We all know the goals in the 2011 were based as much on what environmentalists could obtain through negotiations with ranchers and hunters as they were based on the best science. How will the DEIS choose goals, through the best available science or through a highly political process where a small minority have a huge voice in what WDFW does? The strength of these two small minorities in WA state, hunters and ranchers, is obvious in many of WDFW's actions, including who WDFW's appoints to WAG - mostly people with an interest in hunting and/or ranching and/or often both, and appointments to the Game Management Council which is largely hunters even though most people in WDFW's largest stakeholder group, wildlife watchers, love to see game species such as black bears when hiking. Even the fact that WDFW still calls a group of animals it manages "game animals" is proof that the agency has changed little in its thinking about wildlife and its value to all residents of WA State. It is an agency still stuck in the old days when people did call wildlife species "game animals" and while it changed its name from "fish and game" to "fish and wildlife" it has not changed its thinking or its focus which is using wildlife mainly to satisfy the wishes of 2.42% of the residents. This has not changed even though WDFW keeps asking for more of our pubic tax dollars. Taxation without representation has never been popular in this country.

1E. The DEIS will be able to use a lot of new science and also new information that has been collected about WA wolves since they returned to WA in 2008.

Will all of this information be used in an unbiased way and will it be in the DEIS? For instance, the WA wolf population grew rapidly at first, but in the last two years growth has been 6% (2017) and 3% (2018). Yet recent news from WDFW like that used in the scoping process has highlighted a growth rate of 28% which is hardly an accurate account of what has been happening in the last two years. Seems like accuracy would require an acknowledgement that something has really changed in the last 2 years and isn't this more important than recovery rates 5 years and more in the past when recovery rates were expected to be high?

2. Much has changed since the 2011 Wolf Recovery Plan was written including new studies that have more provided additional science and thinking on delisting. Please address this newer science and thinking in the EIS when choosing goals and alternatives including the following paragraphs and discussions.

2A.) Social wolf recovery and management. This kind of recovery and management means that managers, WDFW, recognize and manage wolves to maintain "natural wolf packs" as well as individual wolves.

This is based on the science that shows that for wolves, the wolf pack is a critical factor in their overall fitness and ability to adapt to changes. These are negatively impacted when wolves live in unnatural packs that are impacted by indiscriminate lethal removal by humans for predator control, hunting, fear shootings and poaching.

Science strongly supports this kind of wolf management over a livestock model that WDFW uses for most "game animals". This requires the Status Review to consider if wolves and wolf packs are being shaped by natural processes or by WDFW's management plan. Some who have advocated for this kind of recovery have referred to it as "social recovery and management". It is focused on maintaining sustainable wolf populations through natural processes rather than using the livestock model that uses human harvests through hunting to please a small minority of our residents. A significant body of science shows that when humans manage wolf populations through hunting and predator control, wolf and pack behavior are very different - as seen in MT, ID and WY as compared to large national parks such as Yellowstone NP. Will delisting efforts look at these issues
rather than just focusing on the old numbers game of wildlife management based on sustainable populations with harvesting by humans?

2B.) More recent discussions have focused on what is called "ecological-related recovery and management", which has an entirely different focus than the kind of management used WDFW which is a numbers game based on sustainable populations.

In this kind of recovery and management, the focus is on ecosystem management and allowing wolves and other wildlife species to live in natural ecosystems where natural processes that occur when wolves and prey species share habitat and regulate each others' populations in predator-prey interactions along with other forces like climate and fire, rather than having humans manipulate their populations.

2C.) Newer studies and information raise questions about older viability and sustainability models and suggest that the following factors are important to consider when delisting wolves.

2C-a.) Road Density. One main factor that several studies have shown to be closely related to human-caused wolf mortality is road density in wolf habitat areas. More roads, including forest service roads, result in more wolves killed not only by hunters, but also by poachers. At last one study showed that wolves will still den near roads regardless of this factor because they must live near the best habitats to survive and raise pups and this is often has roads. Road density is an especially serious problem for wolves - and other wildlife - in WA State because we have far more road density than other states with wolves, ID, MT, WY. How will this be dealt with in the EIS and in calculating viability for delisting?

2C-b.) Management and mangement changes in wolf areas adjacent to WA State: ID, OR, and Canada as factors in wolf population sustainability.

The main sources of new wolves for WA state are B.C.and perhaps Alberta, Canada and the states of Idaho and Oregon. Both of these use heavy harvest levels because more of their residents hunt and/or they manage wildlife to have large numbers of elk and small numbers of predators to please hunters and/or ranchers, and in the case of BC, to protect woodland caribou populations that have been declining because of roads, snowmobiles, ski areas, and loss of old growth forests. Their large wolf harvests could be one reason why the growth in WA wolf populations has slowed down to only 6% and 3% in the last two years. How many wolves will they supply in the future? Will this number continue,

meaning their wolf populations will remain what they were when WA State wolves increased at rates of 20 and 30%? How will WDFW factor in these issues when determining viable and sustainable populations?

2C-c.) Illegal poaching as a factor in sustainability models.

Many studies have raised questions about how to factor into population viability and sustainability the impact of the illegal killing of wolves. We don't even know how much of this is happening. Some suspect it is far more than is known. In WA, could poaching explain some of the sudden slow-down in our wolf population? Could it explain the failure of more wolves to successfully disperse from BC and NE WA to the Central and North Cascades? Many of us who are quite familiar with the culture of hatred towards wolves in Okanogan County suspect a lot of shoot-shovel-and shut up goes on in this county. Studies also show hunting and predator control may increase poaching because these practices tend to de-value wolves in the public's thinking - government killing and sponsored killing of wolves makes it appear that it is really okay to kill wolves. We're seen more instances of poaching in NE WA as WDFW kills wolves and we've seen more people shoot wolves rather than use bear spray - which is a choice that is available and the one used by people in Yellowstone NP. WDFW has never promoted this as a good alternative which would send a positive message that we do not need to kill wolves when we are afraid or when we see a wolf in our pasture. Instead, WDFW has okayed this and not promoted non-lethal methods and more used more education.

2C-d.)Pack size and membership related to indirect impacts of predator control that affect wolf population sustainability .

Studies are also highlighting the fact that pup, wolf and wolf pack survival depends on the pack and its size and composition and who the individual members are. Pack
members of different sexes and ages contribute differently to the over-all success of the pack and of individuals. This is something that WDFW seems to totally ignore in its current predator control. This is also ignored when recreational trapping and hunting is allowed. How will these issues be factored into sustainability models for wolves?

2C-e.) Prey availability and density and/or self-regulation as limiting factors for wolf populations that may make population control of wolves unnecessary.

Science has often suggested that prey availability is the main factor that limits and controls wolf numbers. Newer science shows that wolves - esp. when not hunted and killed by humans - self-regulate their populations even when prey densities are quite high as in Yellowstone NP. Does WDFW know if wolves in NE WA have been killing each other as a result of the close proximity between packs? Does WDFW the prey densities of esp. deer and elk but also other prey species in various wolf habitats in WA?

2C-f. Impacts of Livestock Grazing on wolf populations and sustainability

Does WDFW know how prey densities are impacted by livestock grazing at different times of the year? Does WDFW know if prey density changes between densities in the winter and spring when wolves breed and select den sites and have pups and in the summer when livestock is released onto grazing lands and sometimes near den and rendezvous sites?

Studies in the Rocky Mountains showed that wolf mortalities were related to the amount of livestock grazing in an area. More livestock meant greater wolf mortality either from legal predator control or

poaching. Many of the best wolf habitats in WA State are also used for livestock grazing. This will mean greater wolf mortality in our state than in some states in the Rockies. Livestock also may affect prey animals that wolves depend on, both prey density and areas prey species choose to use. How do mule and white-tail deer, elk and moose respond to the presence of livestock? Does this depend on the terrain, the amount of wooded area, the amount of natural food, etc.? Studies have shown that prey sometimes spend more of the time in edges of wolf territories to avoid wolves. In the edge areas between wolf territories, wolves are more apt to meet wolves from adjacent pacts and fact territorial disputes that may result in some wolves being killed. How might livestock operations change and limit habitat use and food choices for prey species and for wolves? Prey density and distribution across the landscape impact wolves in many ways including their prey selection. When livestock change these, wolves are more likely to prey on livestock. Then WDFW blames wolves and kills wolves.

2C-g.) **Fear of humans, wolf and prey densities.**

Many studies show that the "fear factor" changes wildlife behavior. Usually when this is discussed, it is about the prey animal's fear of predators like wolves. But it also applies to how a wolf's fear of humans may change wolf behavior. Many animals, when they see humans, especially when they are a species that is killed by humans, will change their behavior. Does WDFW understand the impact of this factor for both the prey species and wolves? Does this change prey and wolf densities and choices of areas to feed which could affect a wolf's prey selection. When livestock grazing brings additional humans and range riders into wolf territories in early summer after wolves have chosen den sites and had pups, does the sudden appearance of humans change prey density and alter wolf hunting behavior and prey selection? Isn't this likely since wolves in NE WA are subjected to human poaching, legal shootings and predator control? More hikers also use wolf habitats in the summer. How does this change prey and wolf density and wolf hunting behavior and prey selection? Humans can change prey and wolf densities and the way prey species and wolves use the landscape. These changes may mean lower survival for wolves and wolf packs and increase the chances of wolves prey on livestock.

2C-h.) Impact of Tribal Hunting of Wolves

How will models factor in tribal hunting? How predictable is number of wolves killed by tribal hunters in WA State? The Colville Nation currently has a year-around wolf hunting season without any limits. What other tribes may also choose this option? Killing some members of a pack and killing dispersing wolves who are often the most vulnerable may well have indirect impacts far beyond the direct loss of the wolves that are killed. How will these direct and indirect impacts be added to sustainability models?

2C-i.) Indirect impacts of all kinds of hunting and predator control

Studies continue to show that all kinds of lethal removal by humans have many indirect impacts beyond the direct impact of killing wolves. Killing wolves has been shown to change pack structure and pack functioning and pack success. It may change prey choices and the ability of the pack to reproduce the following year. It may even cause the pack to dissolve, especially if a breeder is killed. Loss of pack members may reduce the packs ability to defend its territory and adapt to changes in food sources. How will these variables be used in sustainability models in the EIS?

2C-j. Trail density also increases hunting success when hunting prey and wolves

Studies show that trails penetrating wildlife habitats increase hunting success in these areas over areas with few trails. Trails provided the needed access for some hunters including those on horseback.

WA State has few wolf habitats that do not have many hiking and horse trails. This means higher chance of wolf mortalities from legal hunting and illegal poaching. How will the model factor in trail density?

2C-k. Availability and quality of public lands to provide good wolf habitats and the availability of natural and safe corridors for wolf dispersal between these wolf habitats.

Many experts are suggesting that WA State will have more problems with wolf recovery and sustainability than some other states have had such as Montana for several reasons. WA State is smaller in size. It has fewer areas and smaller areas of public lands that provide good wolf habitat. WA State has a larger human population and human development including agriculture have decreased the number and quality of corridors wolves can use for safe dispersal between the more isolated wolf populations that exist in NE WA, the length of the Cascades Mts, and the Olympic Peninsula.

Studies show that dispersing wolves are more likely to be killed by humans either through predator control, hunting, being killed on highways, or being poached. Dispersing wolves are more likely to die of natural causes too because they lack the support of a wolf pack.

A significant level of successful wolf dispersal is important for maintaining healthy wolf populations throughout wolf habitats in WA State over the long-term. How will the EIS and any delisting efforts address these problems? Will models developed in other states be useful in WA State? Will the EIS explain and address these issues using the best science?

Part 2: Translocation

Translocation addresses the lack of dispersal at this time in WA State between the three designated wolf areas in the 2011 Plan. Is this the right way to address this lack of adequate dispersal or is it a quick fix based on politics rather than the best science?

Does using translocation get us closer to understanding why more dispersal has not happened between these areas? Do we really even know why after 10 years that there has not been more dispersal? It was much faster in Yellowstone and other parts of the Northern Rockies. Perhaps it is due to factors that need to be addressed like lack of adequate safe corridors or excessive killing of wolves by WDFW, by poachers and/or by the tribes. Perhaps 10 years just is not long enough when a "recovering wolf population" like that in WA State still has wolves being killed by WDFW, the tribes and poachers, and some ranchers and people who claim to be afraid of wolves. WDFW has been saying that its predator control efforts, mostly in the Kettle Range, do not affect recovery. Could this be false? The Kettle Range is the largest wolf habitat area in NE WA that is nearest the North Cascades. Could less killing of wolves in this area mean more dispersal into the Cascades? Many suspect far more poaching is happening in Okanogan County and other parts of eastern WA than is being reported by WDFW. "Shoot -shovel -shut-up" is part of the accepted cowboy culture in eastern WA. Does it make sense to translocate wolves instead of trying to address underlying problems like these?

What happens if these problems are not addressed and wolves are simply moved from NE WA to SW WA? Will translocation remove the likelihood of WDFW identifying whether problems exist and what they are? If factors limiting dispersal are not identified and addressed, what does that mean for long-term viability of wolf populations in all parts of WA State? Will we end up with isolated wolf populations in several areas rather than connected wolf populations? How viable is this, long-term. Studies show that even in a national park as large as Mt. Rainier, population viability has been limited for some species that lack connectivity to other populations. What is the future for wolves on the

Olympic Peninsula? Many factors suggest wolves might improve and strengthen prey species such as elk and deer and might restore the benefits found in complete ecosystems that have the apex predators such as grizzlies and wolves.

Is translocation based on the best science or is it really a political solution aimed at getting wolves delisted faster? I hope the EIS gives an honest and unbiased analysis and disclosure of reasons to translocate wolves rather than wait and find out why dispersal is not happening naturally.

When translocation is addressed in the EIS, will this include a full analysis and disclosure of what is required for the most successful efforts to move wolves, the cost of using these methods to the tax-payer and for the wolves that are moved and for the ecosystems were wolves are captured and removed? What are the risks to the wolves, those moved and those not moved who be depend on the ones that are moved? Is there an increased chance of livestock depredations for either the wolves that are moved to another location or for the related wolves who are not moved? Will the problems associated with the failure of wolves to disperse naturally still be addressed and resolved?

Part 3: Predators and Prey Species
Will wolf management consider predator-prey relationships?
Will wolf and prey behavior and wolf and prey density be considered?
Will the focus be on healthy ecosystems rather than management of single species?

Does WDFW plan to use what is known by the best science and observations about wolf-prey relationships when writing this EIS, when choosing the goals, when selecting the various alternatives, and when analyzing and disclosing impacts of these choices of goals and alternatives?

3A. Why would we expect WDFW to use all of the best available science in this EIS when it has failed to do this when writing and using the Protocols? The public no longer trusts WDFW.

I worry that this will not happen since WDFW failed to do this when writing and using the Protocol that it wrote and adopted with minimal input from the public and broader scientific community and with no peer-review by an unbiased panel of experts. Why would the public expect a change of course when WDFW writes this EIS? Instead of using the best science, WDFW's strategy has been one of ignoring most of the best science and the public and using public funds to defend court cases hoping the preferred treatment of agencies by our court system will win these cases. Isn't this one of the reason why most of the public does not trust or like WDFW? Isn't this so bad that WDFW said it was afraid to hold public open houses on scoping and instead resorted to stilted, tightly controlled and ineffective webinars? Trust is not developed by an agency that seldom meets with most of the public it is suppose to serve and manage wildlife for as a "public asset" and when it appoints people to its various advisory groups based on whether the person is pro-hunting and whether the person will not likely oppose what WDFW does very loudly and will instead go-along with whatever WDFW does to keep the seat at the table.

3B.) I'll suggest two books that would help WDFW staff when this EIS is written IF the writers of this EIS base this EIS on the best available science and observations on wolf behavior and not something else like politics.

I doubt WDFW would write the Protocols it has written or tell the public what it does when killing wolves - if WDFW based these on what is known about wolf behavior.

L. David Mech, Douglas W. Smith and Daniel R. MacNulty, "***Wolves on the Hunt: The Behavior of Wolves Hunting Wild Prey***". University of Chicago, 2015.

This book gives detailed information about studies and findings and observations of many of the leading experts on wolves in the Minnesota, Wisconsin and Michigan areas, Alaska and Denali National Park, and in the Northern Rockies and Yellowstone National Park. Sources include not only extensive work by the three authors, but also by other observers and researchers. How wolves hunt various prey species are discussed in this book, white-tailed deer, elk, etc.

Rick McIntyre, "***The Rise of wolf 8***". Greystone Books, 2019.

Many experts say that Rick McIntyre probably has spent more time watching and carefully documenting wolf behavior, including hunting behavior, than anyone else, ever, anywhere. Readers of this book will gain a deep insight into how wolves behave as individuals and as members of packs. He also discusses new information with such depth that wolf and wolf pack behavior can be fully appreciated if not yet fully understood. Note: Wolves and their packs exhibit far too variable and complex behavior to probably ever be fully understood or predicted, which is no different than what is true of human behavior.

3C.) What would WDFW learn from these books and how does this apply to the EIS?

These books show us that basic wolf behavior means wolves will kill livestock if livestock is managed so that these domestic animals are more likely to be killed by wolves than wild prey. This issue needs to be addressed by looking at wolf behavior and having producers adapt their livestock management to wolf behavior rather than the opposite, trying to change wolf behavior.

Wolves are highly adaptable, opportunistic hunters who are capable and able to travel long distances each day to find suitable prey. While doing this wolves and/or wolf packs sift through the available prey in their territories often and regularly to select the prey they will try to kill. Prey selection is a balancing act of weighing factors such as these in the following list: (note: these many factors are interrelated with each other and overlapping.)

a.) prey density and availability at the time when food is needed,
b. will the prey size supply a sufficient amount of meat for the effort involved in capturing it,
c.) amount of risk to wolves of injury or death when killing the prey,
d.) how likely it is that the effort will end in success,
e.) the age, sex skills, breeding status, number and experiences of the individual wolves who are involved in the hunt,
f.) an opportunity presents itself when it finds the prey animal that gives the wolves an extra advantage such as terrain, deep snow, a young or small animal, an animal by itself, an injured or weak or old animal, an opportunity to hide and ambush the prey, etc.,
g.) chance of being attacked by a neighboring wolf pack in a territorial fight,
h.) how great the need is for food, and
k.) nearness to a den or rendezvous site when pups are not yet traveling with the pack.

3D. When the EIS considers livestock when writing the EIS, are these factors going to be considered?

a.) What non-lethal deterrents and grazing management practices will producers use so that their domestic animals are not the most available and most easily killed prey on the landscape?
b.) How will WDFW write Protocol that requires producers to manage livestock to prevent wolf attacks that are the result of natural hunting behavior that evolved over thousands of years?

c.) When will WDFW get over the idea that wolves who prey on livestock are somehow "bad wolves" when they are just hunting like real wolves? WDFW seems to have some idea about wolves "learning to hunt livestock" that is unnatural and evil, like this is an addiction, that wolves should know livestock is not a viable choice when selecting prey?
d. When is WDFW going to appreciate that hunting is not just a matter of the number of mouths to feed, that reducing pack size will end attacks on livestock?
e.) When will WDFW appreciate that its predator is a real "shot in the dark" that has as much chance of failing as being successful and for this reason it is not a good game plan because it involves killing a species the public does not want killed for reasons not based on science that shows a high success rate?
f.) When is WDFW going to admit that on large allotments like in the Kettle Range, on allotments with wooded areas, on allotments that have rough terrain, that dispersed livestock cannot ALL be adequately protected by range riders and undefined human presence and fox lights, etc. and so wolves should not be killed on these allotments? This is what most of the uproar is about with the situation in the Kettle Range - and several other areas.
g.) When will WDFW and the Dept. of Ag stop spending tax-payer's money on non-lethals in these areas where they do not work and then tell the public the non-lethals did not work so wolves need to be killed? The pubic pays for the non-lethals that don't work - this is expensive and not acceptable, and the public then sees WDFW kill wolves which is expensive and not acceptable, and the public pays for lawsuits and WDFW's defense in the lawsuits over this issue - which is expensive and not acceptable.

3E. When the EIS considers wolf management, is it going to consider prey management and behavior:

a.) wild prey management that provides enough wild prey food for wolves in key wolf habitats so wolves can survive in these areas without eating livestock. This may mean little or no human hunting in some wolf areas.
b.) wild prey habitat use relative to predators including cougar and bears and wolves - this needs to be factored in. For instance, wild ungulates will sometimes favor edges of wolf territories to avoid wolves since wolves avoid these edges so they will not encounter neighboring wolf packs and fights that could cause injury and deaths, or wild ungulates will have calves and fawns away from wolf core habitat areas, or prey may move out of higher elevation areas to avoid deep snow and wolves will follow these prey animals, and prey will seek more wooded areas when wolves are on the landscape, and wolves will use wooded areas for hiding and ambushing prey, etc.

3F. What else would WDFW learn about basic wolf behavior by reading these books?

Individual wolf and wolf pack behavior is variable - like human behavior - depending on what individuals and packs are involved. Both packs and individuals matter. This is not simple. Young and sometimes female wolves are fastest and best during the chase part of the hunt while more mature males may be better at killing prey. Breeders have more investment in the hunt and may be more involved and take more risk. Younger wolves may travel greater distances. Breeding females are more likely to be with pups. When pups are tied to dens and rendezvous sites, it is harder for wolves to bring food back from kills far from these locations so more hunting may occur nearer these fixed sites. In the winter hunting changes as to location depending on where the prey is and deep snow becomes an advantage and may increase the number of kills. No two wolves are the same - Rick McIntyre makes this very clear. No two packs behave the same. The way wolf packs function depends on who is in the pack, their ages, sex, whether they are breeders, their personalities, etc.

Summary of this section: When and if all of these factors are known and recognized and used in wolf management, whether it is for predator control or when considering recreational hunting or trapping, or building sustainability models, WDFW would not make some of the decisions it has about killing

wolves to address livestock losses. Wildlife managers using this kind of in-depth information do not say things like WDFW has: "we hope to change pack behavior", by reducing pack size we hope to stop livestock depredations, and the inference that wolves who attack livestock are bad wolves that should be killed - that they are somehow "tainted" and unaccepable.

Wolves who attack livestock have found themselves in a situation where livestock are the most available prey, the prey that is easiest to kill, the prey that can be killed with the least risk, and the prey that requires the least expenditure of time and effort.

When livestock animals are attacked, their owners and WDFW created this situation, not the wolves. The wolves are just behaving and using the skills that they have perfected over thousands of years to survive as large social carnivores who need to eat larger prey. They are responding to opportunities that occur in their habitat and they are adapting to whatever prey is most available and easiest to kill. Only humans interpret natural processes like this one between predators and their prey in moral terms using words like "good" and "bad".

Part 4: Why does WDFW want to focus on new EIS right now?

Why is an EIS for wolf "post-recovery"being started now while there are still many significant and unresolved problems that need to be addressed now, during the wolf "recovery" period?

Yes, I've heard the reasons given by WDFW - that the EIS process takes a long time and WDFW expects to be able to delist wolves sometime soon - after 2020.

Many of us do not support this decision to start an EIS now.
We'd prefer to see WDFW use its staff and money and time to address existing problems.
Is this a political decision made to please the few ranchers and hunters in WA State?

First:
Signs of WDFW's Problems
The Public's Distrust and Anger

1. WDFW should be aware that it has some serious problems with its management of wolves and this should be especially clear after two events this fall: a). The public was upset enough that many people finally asked Governor Inslee to step in and do something after years of failed efforts to ask WDFW to address these problems, b). WDFW was so afraid of the public it cancelled open houses planned for EIS scoping, again hiding behind a wall it has erected between itself and the public.

2. WAG, its members and how it functions, is key to these problems. WAG members obviously to not represent much of the public, yet the public has paid upwards of $2,000,000 in bills to keep WAG going. This $2 million is difficult to justify given the deterioration in public trust of WDFW and WAG over the last few years.

3. Most WAG members representing environmental and animal groups fail to represent or even discuss wolf issues with their so-called constituencies, so these are the people who went to Governor Inslee for help and these are the people paying for lawsuits, and these are the people who are thinking about writing citizen initiatives - instead of trying to attend WAG and Commission meetings and instead of trying to talk with WDFW staff.

4. The way WDFW has used and manipulated WAG and tried to falsely claim that WAG members fairly represent the public has increased public anger. Over the years as WDFW appoints new members, WAG becomes less representative of the public. In 2016 it was suppose to be 6 environmentalists, 6 ranchers and 4 hunters - which was a joke in 2016 when most WAG members were hunters or closely associated with hunting groups and many were ranchers. The use of the consensus model to make decisions further silenced meaningful discussions. Then WDFW took manipulation to a whole new level when it adopted the new Protocol in 2017 at a WAG meeting after throwing the WDFW version at WAG members after lunch with no chance to really discuss the contents or for the public to respond and comment. Some WAG members said they needed more time, some didn't understand it, but WDFW made sure it was accepted quickly. Since then, discussions of WDFW's Protocols have been limited and the public has no meaningful way to be involved.

4. Because of the public anger towards WDFW, WDFW sought and obtained legislation to further insulate itself from the public and to decrease its transparency even further by adding more items to the list of redacted info in public records requests. The reason given for this new legislation; fear of the public. Example: now we are told we will hear how WDFW is killing wolves when we see a copy of the year-end report on wolves it killed. That is a huge change from 2016 when we were still actually talking with Donny and others at WDFW.

5. Now WDFW has successfully built a wall around its wolf management program and the lack of transparency and outreach to meaningful discourse with the public has increased anger and outrage towards WDFW. This should be no surprise. Anger and distrust always increases when government agencies are not transparent and open with the public.

6. What are the public's choices now? Lawsuits? Asking the governor to intervene? Citizen initiatives?

7. Unfortunately wolf management is not the only issue the public has with WDFW. Several years ago Dr. Fred Koontz and others tried to raise issues about wildlife being public assets under the Public Trust Doctrine and efforts were made to bring change to WDFW. That effort largely failed. Many non-hunters are tired of seeing WDFW label animals as "game animals" and we are angrier about how many of these species are managed. We are angry that non-hunters are not even recognized as stakeholders in the Game Management Plan WDFW is using. The members of the Game Management Council are mostly hunters. The 97.58 % of the 7 1/2 million residents of WA State who don't hunt are interested in black bears, mountain goats, elk, deer, coyotes, ducks and swans and geese, etc. (Remember, only 2.42% of WA residents bought hunting licenses in 2018)

8. Financing WDFW has become a huge issue and this won't be resolved until WDFW changes. WAG is costing the public upwards of $2 million, yet WAG is mostly made up of small minority groups in WA State: hunters and ranchers. Wolves are not even hunted, they are an endangered species in WA State, yet WDFW loaded WAG with hunters - far more than 50% of the members hunt. Why? Most of the public money comes from taxes paid by - I'd guess - non-hunting folks who do not own cattle ranches. Why did WDFW decide to move wolf management to its game

management team instead of having this handled by the endangered species team? Most of the public really does not believe we will get more say in what WDFW by giving WDFW more of our tax dollars because that is not what has happened with wolves - or anything else.

Just a Few of the Current Problems

1. Financing wolf management - as just mentioned.

2. Who will wolves be managed for - Ranchers? Hunters? The Non-Hunting Public?

3. The Protocol that is not based on the best science, is not even reasonable or meets the common sense test. One size fits all for use of non-lethals and number of depredations that triggers WDFW's killing of wolves? Use of tax-payers money for non-lethals with no accountability to the pubic on how this money is spent and whether the non-lethals worked? No real documentation of the use of non-lethals and no way for the tax-paying pubic to find out how the money was spent and who it went to? No meaningful way for the public to give input to WDFW on the Protocol? No unbiased peer-review of the Protocol before it is voted on by WAG?

4. WAG - costing upwards of $2 million and the pubic has no role to play as 18 people WDFW chooses fail to represent the public or even most environmentalists. CNW has changed into a partner with the Wildlife Federation, a hunting group, and it has become just another arm and propaganda machine for WDFW. Who is left on WA to speak up for the public that likes wolves?

5. A game management team managing wolves, people with a strong bias towards hunters and hunting as a good use of wildlife and little appreciation of what most of the public values and enjoys.

6. WDFW's killing wolves without even attempting to show how this is based on the best science and without reporting back on how successful this has been or sharing data on use of non-lethas that failed and a good analysis on how they were used and why they might have failed. The public is not even told how WDFW is killing wolves, or how much is being spent on this - we can wait until the end of the year for this limited info. We will never get a good assessment and evaluation and cost-benefit discussion on the producer's use of non-lethals before wolves were killed for this producer. Yet these wolves were "a public asset" that WDFW manages for the public - WDFW seems to miss that part. And now WDFW wants more of our money.

7. Education about how to live with wolves is badly needed in eastern WA. We have hikers shooting and killing wolves because they were afraid and this is okay? Ranchers are shooting wolves because wolves were on the landscape and this is okay? Don't wolves pretty much roam everywhere, covering most of their territories regularly? Wolves walk through and by prey when hunting and when not hunting. How dangerous are wolves to hikers? To children at bus stops or young people riding horses?

8. Poaching continues to be a problem - we don't know how much, but many of us suspect it is partly responsible for the lack of growth in wolf populations in the last few years and the lack of adequate dispersal between and throughout wolf habitats in WA State. More education and more law enforcement is needed. As shown in several studies, when the government supports and kills wolves, the public sees this as devaluing wolves and the public is more likely to think about poaching, illegally killing wolves. Is this what is happening in WA State? People have learned that it is okay to kill wolves?

9. Wolves are not dispersing as much as they need to for sustainable, healthy wolf populations throughout WA State. Why not? This needs to be figured out more than an EIS needs to be written right now.

10. Why is growth very slow now in the total wolf population and in successfully breeding packs in WA State? This needs to be understood.

11. Why don't we see more wolves in south of I-90 in the Cascades? Will wolves ever live again in the Olympic Peninsula? Would this be beneficial to the ecosystems and other species living in these ecosystems? I saw more of the horrible hoof deformities in elk herds in the Olympics, small calves with huge, deformed hooves. What is wrong?

12. Does WDFW really understand prey populations that it manages well enough to manage them so wolves have enough to eat? Elk in the Skagit River Watershed? Why do they choose to live in the lowlands instead of migrating into the mts? Where is the good habitat for these elk during the winter and summer? Are they using these areas? How would wolves fit into this ? What about the deer and elk east of the crest in the North Cascades? Hunting removes many deer and cars hit more in the winter in the valleys. How will hunting have to be adjusted to leave enough wild prey for wolves to prevent them from killing livestock? Does WDFW know the prey densities and wolf densities in NE WA and how that is playing out over time? Are the prey moving or adjusting to wolves and if so, how and where? What are the major prey in each wolf area? What is the human harvest of these? The number taken by wolves? By other predators?

13. What does WDFW know about the wolves after collecting data for what, over 10 years? Are packs fighting over territories in NE WA? Are wolves being killed by wolves? By cougars? How many wolves are leaving WA and moving into B.C., Idaho and/or Oregon? How many wolves are coming from these three areas into WA State? What corridors are being used? Where is dispersal not occurring? How far west can wolves cross the Columbia River to move between WA and OR and how much of a barrier is the Columbia River?

14. What is the impact of tribal hunting? When will the public receive info on wolves killed by tribal members - pack, age, sex? How is this lethal removal affecting the packs? dispersal? the overall population? Is this lethal removal occurring on tribal land or off these lands? Will tribal members continue to have access to wolf collar data even when they hunt or are related to or friends with tribal members who hunt? How will WDFW protect wolf collar data?

15. How well is WDFW protecting wolf collar data from local citizens who may kill wolves? From the Ferry and Stevens County sheriffs and commissioners who more than once have said they are eager to take the law into their own hands and kill wolves?

16. How will WDFW resolve the problem of producers and their range riders using wolf collar data to find dead animals rather than to protect and care for their livestock? This problem occurs every year - why can't this be addressed?

17. When will WDFW figure out that if dead and injured livestock are not removed quickly and before wolves find them, these are basically acting as "unnatural bait" for wolves and they are not non-lethal deterrents? This seems so simple but the confusion continues with WDFW calling this "baiting" a good use of a non-lethal deterrent.

18. When will WDFW figure out that carcasses that are found and not removed are also "unnatural bait"? WDFW still allows producers to leave carcasses out on grazing lands if they

are in remote or difficult to reach places - this is probably why the animal was killed in the first place - it was in too a remote area or too difficult of terrain for the range riders to find livestock.

19. When will WDFW devise a way to account for use of non-lethal deterrents and report this to the public who pays for these so we can evaluate how well our money is being spent? We'd like the details on use of range riders and human presence: exact hours, days, locations and number of livestock observed and where these were and the number of livestock not observed each day. If fox lights ae used, where, for how long, and how many livestock animals were protected by these and how many were not in that area and the cost?

20. When will WDFW understand that wolves usually hunt most in the late evening, night and early morning and have range riders and human presence actually with livestock during these hours instead of during the day?

21. When will WDFW understand that if a producer has 1500 cow/offspring units and 1480 are protected, but 20 are not - those 20 are not found by the range riders for days and not visited at night, blaming the wolves for killing those 20 is not reasonable or based on the best science? The Protocol still fails to recognize this and wolves are killed after how many attacks on livestock even though all 1500 units are not protected or even seen for days or even weeks?

22. When will WDFW admit that when livestock are dispersed across larger allotments, and especially when these have steep terrain and wooded areas, range riders are not effective and neither is human presence??? The public would like to not have to pay for things that don't work and then be told it is the fault of the wolves, not the producer who tried.

23. When will WDFW start protecting den and rendezvous sites? The science is pretty clear on this one. This was in the 2011 Plan.

24. When will WDFW stop lying about what it does and does not do - like removing salt blocks from near the Profanity Peak Pack - those were not removed until WDFW wanted to start trapping and killing wolves. We are not told when some ranchers had no range riders before this pack was killed and where the range riders were when they were hired and how many cow/offspring pairs are seen even daily or weekly. We know this producer loses cattle at the end of the season - he can't find them when he's suppose to get them off his allotments. We know his cattle are not all on the assigned allotments according to his grazing lease when they are suppose to be - he can't find them to move them when the time comes. In 2016 a number of the dead calves were not on the assigned allotments when killed in 2016 - so range riders probably were not either.

25. When is WDFW going to recognize and value its largest stakeholder group and the one that spends the most money in local communities - wildlife watchers? When will WDFW develop quality programs on and off WDFW lands for non-hunters - we will pay for them - like WDFW does for hunters? I live near the greatest killing field in the state - the Skagit River estuary - lots of WDFW land - and hunting club land. As soon as the waterfowl arrive, the hunting season begins and locals here call this area: "WDFW's killing fields". Yes, non-hunters like and could enjoy deer, elk, moose, geese, swans, coyotes - and wolves - if WDFW provided better opportunities for us - and we would pay.

So many unresolved problems need to be addressed.

Why not focus on resolving these instead of worrying about post-recovery?