

2017

Colville Confederated Tribes Gray Wolf Management Plan



*Prepared by Colville Confederated Tribes
Fish & Wildlife Department*

*Approved by: Colville Business Council
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Statement of Needs

On the Colville Reservation, gray wolves have been listed as a “Priority Species of Concern” since 1997 (Colville Confederated Tribes 2006), reiterated in 2006 as a “Priority 1 Species” under our list of “Priority Management Species and Habitats” (Colville Confederated Tribes 2006), and was reconfirmed as a Colville Tribal “Priority Species of Concern” in our current Colville Confederated Tribes Fish and Wildlife Department (referred hereon also as: CCTFWD) Management Plan 2012-2017 (CCTFWD 2012).

Given their Priority Species of Concern status, during implementation of the current F&W management plan, the CCTFWD identified the need to contribute to the recovery of gray wolves (*Canis lupus*) within the Colville Indian Reservation by conducting population assessments and developing a gray wolf management plan.

Goals established by CCTFWD to ensure sound management of natural resources will guide future decisions regarding wolf management. The CCTFWD is also committed to protecting all resources, native and non-native, that have been identified as culturally and spiritually significant to the tribes and their people.

In order to establish management goals and maintain a balance of predators and the subsistence needs of the Tribal Membership, this management plan is needed to guide future management.

Introduction

In 2012, public scoping meetings were held across the Reservation to inform Tribal members on the current status of wolves on Colville Tribal lands, answer questions on the myths and truths of wolves and to provide an opportunity for the public to communicate how they would like to see wolves managed on Tribal lands. Participants were representative of a broad range of perspectives and values with different conservation and management concerns and recommendations. A website-based questionnaire was also made available to the tribal membership to gauge public perception towards wolf management. There were a total of 226 participants who completed the online survey, which only represents roughly 2% of the enrolled Tribal Membership. Although the number of survey participants was not a large enough sample size to adequately represent overall Tribal Member values and attitudes towards wolves, it did provide initial insight toward the differing opinions among Colville Tribal Members and clearly manifested the need to develop the CCT Gray Wolf Management Plan.

The CCT Gray Wolf Management Plan was developed to guide management and conservation of gray wolves and their prey species on the North and South Half of the Colville Reservation. The primary goal of this plan is to outline strategies for conserving viable wolf populations that persist throughout time, while maintaining healthy ungulate populations capable of providing subsistence hunting opportunities to the Tribal Membership and their families.

Cultural Perspective

Historically, wolves were regarded for their power, intelligence, hunting ability, and devotion to other pack members (Ratti et al. 1999 - in Wiles et al. 2011). These and other values have been taught to generations of Native Americans through the telling of stories and legends. Wolves play an important role in creation stories and have significant parts in the spiritual life of some tribes, serving as spiritual guides for tribal members and providing spiritual power to warriors and hunters (Ratti et al. 1999 - in Wiles et al. 2011). Wolves are also featured in vision-quest stories, rituals, and ceremonial practices. For many tribes there is a regard that wolves help humans to prosper both physically and socially. Historically, the San Poil and the Nespelem caught wolves and used their pelts for robes or blankets (Ray 1933 – in Wiles et al. 2011).

These pelts were significant in that people sought to draw power and protection from the wolf. Important articles were sometimes kept in the pelt because the power of the pelt was thought to protect the important articles (R. Desautel, pers. comm.).

Another well-known and highly-respected Colville Tribal Elder, Barbara Aripa, states:

“My dad had four pelts, a black, gray, white and red one, and they were used as spiritual medicine during the winter dances. When I was a child, I used to ride horseback with my dad and sometimes we would see wolves, and they would never attack us. Our people lived in harmony with the wildlife, I don’t believe in shooting them, they were here long before cattle or anything else” (B. Aripa, pers. comm.).

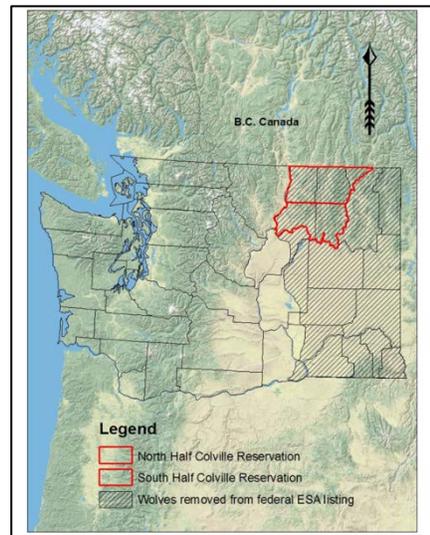
Legal Authority

Tribes are self-governing, sovereign entities by which the federal government relates to on a government-to-government basis and have the capacity to develop their own management plans independent of state jurisdiction (Federal Register 2005; Wolf management Plan for the Wind River Reservation 2007).

There is no requirement for federal approval of the CCTFWD Gray Wolf Management Plan as the U.S. Fish and Wildlife Service (USFWS) has not established federal recovery criteria for wolves in Washington (Wiles et al. 2011). There is no requirement for State approval of the plan without demonstrating a compelling need in the interest of conservation. According to the U.S. Supreme Court decision in *Antoine v. Washington*, the size of the take, the restriction of commercial fishing and hunting, and the like may be regulated by the State in the interest of conservation, provided the regulation meets appropriate standards and does not discriminate against the Indians (Colville Confederated Tribes 1999, 2006). The “appropriate standards” requirement means that the State must demonstrate that its regulation is a reasonable and necessary conservation measure and that its application to the Indians is a necessary conservation measure. The state restrictions “cannot abridge the Indians’ federally protected rights without demonstrating a compelling need” in the interest of conservation.

Comprehensive wolf management planning by all agencies involved will aid in promoting wolf populations in Washington State. However, the tribes have the legal responsibility and authority to protect our ecosystem in the best interest of the Tribal membership. With the approval of a wolf management plan, the CCT expect cooperation and support from state and federal agencies. The CCT are a sovereign nation, co-managing natural resources within the State of Washington on ceded territories and sole authority on Colville Reservation lands. The Colville Confederated Tribes Fish and Wildlife Department, on behalf of the Tribes, will continue to work through government-to-government relationships with Washington State to manage natural resources in a responsible manner and ensure our sovereignty is honored and recognized.

Figure 1. Map of the North and South Half of the Colville Indian Reservation and area of Federal delisting under the Endangered Species Act (ESA).



Current Legal Status of Wolves

Wolves were classified as endangered in Washington under federal law in 1973 (Endangered Species Act) and under state law in 1980 (WAC 232-12-014; Wiles et al. 2011). Currently, wolves in the western two-thirds of Washington are listed as endangered under federal law. In the eastern third of the state, which includes the North and South Half of the Colville Reservation,

they have been removed from federal listing (Fig. 1; Wiles et al. 2011). Wolves are listed as endangered under state law throughout Washington (Wiles et al. 2011).

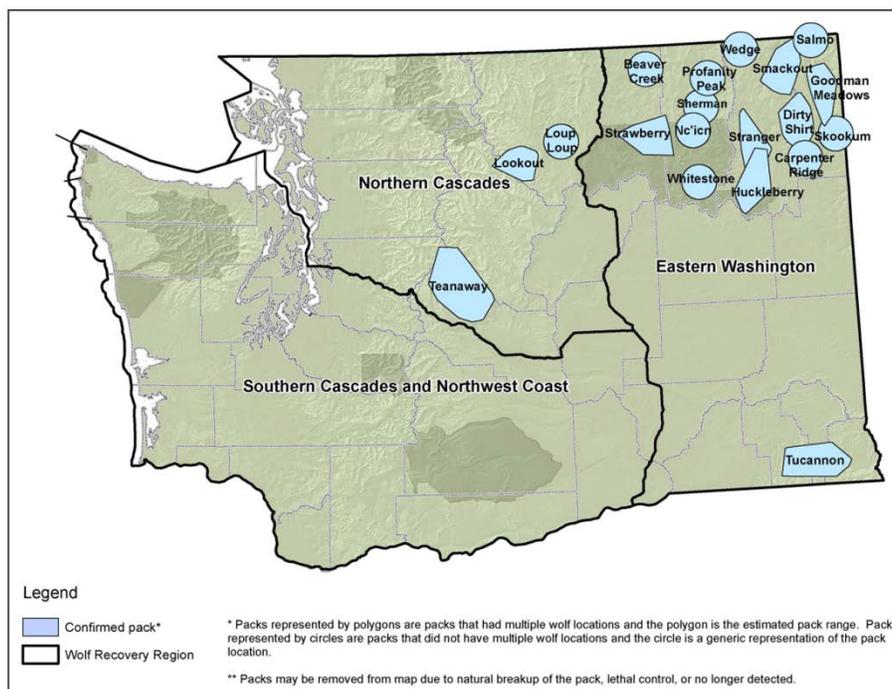
History

Washington

Historically wolves were common throughout Washington State, but declined rapidly between 1850 and 1900 with the expansion of ranching and farming from Euro-American settlers. Wolves were heavily persecuted during the last half of the 1800s and were eliminated from most areas by 1900 (Dalquest 1948). Poisoning, trapping, and shooting were common control techniques, and a bounty of \$15 per wolf was paid by the state in the early 1900s (Harding 1909).

Commercial fur trapping of wolves began as the Hudson’s Bay Company became established in the Northwest. Fort Colville recorded 5,911 wolf pelts from 1821 to 1859 (Laufer and Jenkins 1989). Wolves were reported as “thick” at Tshimakain mission; near present-day Ford in Stevens County (Wiles et al. 2011). Despite the fur trade, wolves remained common in many areas of Washington into at least the 1850s (Young and Goldman 1944). Wolves were essentially eliminated as a breeding species from the state by the 1930s (Young and Goldman 1944). Although wolf populations have been absent from Washington for more than 70 years,

Figure 2. Confirmed and suspected wolf packs in Washington. (WDFW website accessed on Jan. 16, 2017)



small numbers of individuals have periodically dispersed into the state during that time to the present (Wiles et al. 2011).

The first breeding pack to return to Washington was confirmed in 2008. As of March 2015, there were multiple confirmed packs in the state (Fig. 2). Three wolf packs, the Nc'icn, Strawberry, and Whitestone packs, occur primarily on the South Half Colville Reservation. The Wedge and Profanity Peak occur on the North Half Reservation and Canada. Colville Tribal lands (North and South Half) are geographically-central to much of the recent gray wolf activity within the northeast portion of the State. Survey efforts conducted during the summer of 2015 by CCTFWD biologists have identified repeated gray wolf activity in several new locations including both the North Half and South Half Reservation.

Neighboring States and Provinces

Re-colonization of neighboring states to the east, including Montana, Idaho and Wyoming, was first documented in 1979. Wolves reentered the area near Glacier National Park in northwestern Montana from Alberta and continued to disperse from the park and neighboring areas of Canada and recolonized other parts of northwestern Montana over the next decade (USFWS 1987). In 1995 and 1996, wolves were reintroduced into Yellowstone National Park and central Idaho by the U.S. Fish and Wildlife Service (Bangs 1998). In 2002 the expanding wolf populations had met biological recovery levels set by the U.S. Fish and Wildlife Service for the northern Rocky Mountain States. Wolves in this region are currently distributed primarily in western Montana, central and northern Idaho, and northwestern Wyoming (USFWS 2011). Several packs in northern Idaho occur within about 30 miles of Washington, a distance from which wolves are capable of dispersing into Colville Reservation lands.

Wolves originally occurred throughout British Columbia (BC), but were eliminated from most of the southern portion of the province by 1930 and became fairly uncommon in remaining areas (Pisano 1979, Tompa 1983, Boitani 2003). BC populations fell to their lowest levels during the 1920s and 1930s and began to recover after a period of control in the 1950s. Most of British Columbia was again occupied by the early 1990s, with the exception of the southernmost mainland from Vancouver to Nelson (Hayes and Gunson 1995). Reoccupation of the East Kootenay region in the southeastern portion of the province did not occur until about 1980 (G. Mowat, pers. comm.).

Colville Confederated Tribes

Colville Tribal members reported occasional sightings on the Reservation from the 1930s to the 1990s (R. Desautel, pers. comm.). In 2008, while conducting forest carnivore snow track surveys, CCT Fish and Wildlife Department (CCTFWD) Staff documented three separate sets of large canine tracks consistent with that of gray wolf. During this same time period several local hound hunters and trappers began to report observing large canine tracks along the drainages of the San Poil River. Although wolf tracks and sightings had occasionally been reported over

the past several decades, this was the first indication of increased frequency of occurrence on the South Half Reservation.

In 2009, CCT biologists began deploying remote cameras in several of these locations, as well as areas where undocumented sightings had been reported. In addition, Tribal wildlife staff began collecting scat samples to test for and distinguish DNA signatures between gray wolf, wolf-dog hybrid, coyote, or dog. Collected scat samples were submitted to the Laboratory for Conservation and Ecological Genetics at the University of Idaho for analysis. A sample collected on the Colville Reservation in 2010 was confirmed to be gray wolf. DNA obtained from these samples was also later used to determine the likely ancestral origin in order to understand if wolves were naturally emigrating from B.C. Canada or dispersing from Idaho populations.

Nc'icn Pack

During the summer of 2011, remote cameras captured images of 2 unique individual gray wolves near 17 Mile Mountain on the South Half Colville Reservation. Scat sample collection from 2011 through 2012 contributed DNA from six individual wolves. In May of 2012 CCTFWD Staff identified a potential den site during howling surveys, when both adults and pups were detected. CCTFWD staff immediately began trapping and collaring efforts under the mentorship of Carter Niemeyer, retired USFWS wolf specialist.

Figure 3. Nc'icn female after being radio-collared.



In June of 2012, the Colville Tribes successfully trapped and deployed a GPS collar on a sub-adult female (Fig. 3) and a VHF collar on a sub-adult male. During the summer of 2012, a tribal member captured photographs of 3 pups on their personal remote cameras within the Nc'icn Pack territory. October of 2012 was the last contact with the sub-adult male with the VHF collar. His fate is unknown. During winter aerial telemetry surveys conducted from December to February of 2013, CCTFWD biologists remained unable to locate the radio-collared male, yet recorded a minimum observed number of 8 wolves for the Nc'icn pack. The Nc'icn packs territory is located east of the San Poil River with movements spanning both the North and South of the Half Reservation (Fig. 4).

In 2013-2014 the GPS collared female wolf that originally provided the Nc'icn packs home range data began travelling large distances to neighboring pack territories in what appeared to be a search for a mate or dispersal activity. In the late summer and fall of 2014 she began to permanently occupy habitat directly to the west of the Strawberry Packs home range (See Figure 1). She later travelled to the southwest into the Omak Lake Ridge Game Reserve before returning to her former Nc'icn territory. The collared Nc'icn female wolf was notorious for travelling large distances outside of her home range to areas that were later discovered to be occupied by wolves. According to the Nc'icn female's ability to locate new wolf territories, the Omak Lake Ridge and Wanacut Creek areas are good prospects for wolf occupancy. In January

of 2015, the collared Nc'icn female died during winter aerial capture and collaring efforts. (Krausz and Antoine 2015)

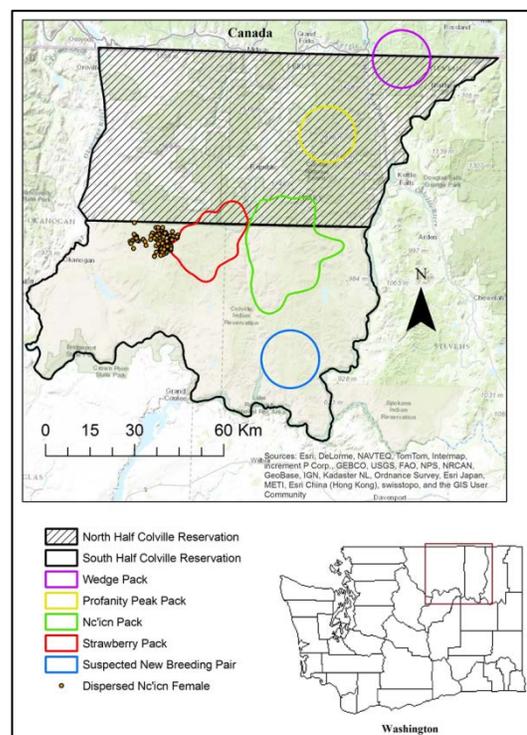
With no current collar data to assist, Nc'icn pack monitoring efforts during the 2015 summer field season were primarily remote camera based, with some limited tracking conducted in May prior to trapping efforts. The observed minimum known number of wolves photographed in 2015 was 4 adults with one pup and one possible sub-adult, totaling 5-6 wolves within the Nc'icn home range. With successful breeding activity documented in 2015, the Nc'icn pack may be a priority for trapping and collaring efforts in the future field seasons (Krausz and Antoine 2015).

Strawberry Pack

In 2010, CCT Forestry personnel reported several wolf sightings in the Stepstone Creek drainage. In September of 2011 a third wolf was identified on a remote camera deployed in the Roaring creek drainage and in January of 2012 a landowner reported capturing pictures of a wolf on a deer kill that was discovered on his property near the mouth of Kinkaid Creek. Scat samples collected near the kill site were sent to Dr. Lisette Waits at the Laboratory for Conservation and Ecological Genetics at the University of Idaho for analysis. Initial results found that this individual appeared to share 17% of its ancestry with dogs (Adams and Waits 2013). In order to determine if this individual was a hybrid Dr. Waits recommended that 10-20 gray wolf samples from British Columbia be analyzed as their database only contained Idaho gray wolf samples. The B.C Ministry of Environment contributed 25 gray wolf samples for analysis. Including the samples from BC changed the ancestry analysis results, which concluded that the individual was a gray wolf that may have emigrated from Canada (Adams and Waits 2013).

In August of 2012, a remote camera deployed by CCTFWD personnel captured a photo of 2 wolves in the Gold Creek drainage, centrally located between the Roaring Creek and Kinkaid Creek camera locations. Tribal wildlife staff began intensively surveying the surrounding area and identified a high frequency of wolf sign near Strawberry Mountain. In September of 2012, Tribal Wildlife personnel successfully trapped and deployed a GPS collar on an adult female (Fig. 5) on the newly confirmed Strawberry wolf group. In February of 2013, we initiated aerial captures in an effort to deploy an additional GPS collar in the Strawberry wolf group. We

Figure 4. Approximate or estimated home ranges for the five confirmed wolf packs within the Reservation and North Half as of December 2015. (Krausz and Antoine 2015)



located the collared adult female using aerial telemetry and identified a total of three adults in this wolf group and successfully net gunned and deployed a second GPS collar on an adult male.

During the spring of 2013, GPS collar data from the collared male and female from the Strawberry wolf group indicated denning activity. Wolf howling surveys conducted by tribal biologists during June of 2013 confirmed the presence of pups. Strawberry wolf pup numbers were estimated to be a minimum of 3. However, pups were not detected after December 31, 2013; meaning Strawberry pack did not have a successful breeding pair in 2013 according to the definition of a breeding pair. Animal locations obtained from deployed GPS collars continue to provide home range data, den and rendezvous site locations, and changes in current distribution and seasonal habitat use patterns for both the Nc'icn and Strawberry packs.

The breeding male's collar failed to continue functioning in 2015. The breeding female was re-collared in 2014 and again in 2015 and remains the only collared wolf in the Strawberry pack. Attempts to re-collar the breeding male and one additional un-collared pack member have been unsuccessful both from the air and using ground trapping. (Krausz and Antoine 2015)

Whitestone Pack

During the summer of 2014, the Colville Tribes' Wildlife Program confirmed the presence of a small pack of individuals in the Whitestone Lookout/Sclome Meadows/Friedlander Meadows area. From most of the documented sign, biologists confirmed 2 individuals through track surveys, howling responses, and remote camera sets. During 2014, a short trapping effort was initiated in areas of concentrated use (as determined by amount of sign), however no individuals were captured. The trapping effort was halted by the opening of the elk hunting season.

A longer trapping effort was initiated during the summer of 2015 with no success. There was sporadic fresh sign that continued to show presence throughout the trapping area concurrently with trapping days, however no wolves were trapped. The effort ended with the onset of the extremely active fire season of 2015 (Northstar Fire).

The entirety of the Whitestone Packs home range is still unknown at this time, as it is the only confirmed pack occurring on the Reservation that has not had a pack member captured and collared. DNA analysis and remote camera photo's suggest this pack has an observed minimum known number of two adult wolves. One of these adults was the former breeding male from the Nc'icn Pack, confirmed through DNA analysis in 2014. Breeding for the Whitestone Pack has not been documented to date. Reports of observed wolves, tracks and scat found within the suspected territory of these wolves is scattered with limited evidence of concentrated areas of use such as rendezvous sites or denning activity. With the limited number of individuals currently in the Whitestone pack, future trapping and collaring efforts will continue to be challenging and likely depend on the availability of wildlife staff. Monitoring efforts will continue through remote cameras, tracking and scat collection, in an effort to detect new

individuals and areas with a greater concentration of animal use, more suitable for trapping efforts. (Krausz and Antoine 2015)

Profanity Peak Pack

During the summer of 2014, the Colville Tribes' Wildlife Program confirmed the presence of a second new pack on the North Half near Profanity Peak. Individuals were confirmed through track surveys, howling responses, and remote camera sets. Multiple individuals were documented through differing howls, and biologists are confident that they heard pups. A limited trapping effort was planned; however the effort was abandoned due to WDFW interest and livestock owner interactions. Future Tribal trapping efforts may focus in this area to allow biologists to learn about their local ecology.

The Washington State Department of Fish and Wildlife (WDFW) was successful in collaring an individual in this pack in 2014.

Wedge Pack

During the winter of 2007-2008, the CCTFWD documented wolf activity in the "wedge" area (Steven's County portion of the North Half). Since then, the pack has been well-documented, until more recently. The Wedge Pack preyed upon livestock and as per WDFW protocol, an attempt was made by WDFW to use lethal control measures to eradicate the pack. This removal was not coordinated with CCTFWD, nor did the WDFW seek the approval of the CCTFWD before conducting the activities.

Since the removal by WDFW, the population demographics and dynamics of the Wedge pack are unknown. Future investigations into the response and reestablishment of the Wedge pack may be planned.

Wolf Ecology

The gray wolf is the largest North American canid with the average adult weighing between 32-55 kilograms. Males are typically larger than females; however diet, genetics, and general health can play a role in overall size. An average adult wolf has a shoulder height of 65 to 80 cm (25 to 31 inches) and a nose to tail length of 1.3 to 1.5 meters (4 to 5 feet). A wolf's pelt is long and coarse and can range in color from almost pure white to black; the most common pelt colors in the northern Rocky Mountains are grizzled gray and black (USFWS 1987). An identifying feature of the wolf is its tail, which is long and bushy and held erect rather than down like that of a coyote. Wolves are also distinguishable from other animals based on the types of vocal sounds wolves use to communicate with each other. These vocalizations include whines, growls and

Figure 5. GPS-collared female gray wolf from the Strawberry Pack.



barks but probably the most common and well known type of vocal communication is the howl (Mech and Boitani 2003).

Wolves have developed many physical and physiological adaptations that allow them to thrive in some of the harshest climates and most rugged terrains in North America. The legs of the wolf are long with large feet that allow them to travel quickly over varied terrain and across deep snow. The wolf's lean and muscular body is built for strength and speed. During pursuit of prey an adult wolf can average 25 miles per hour for several miles and 35 to 40 miles per hour for short bursts (Mech and Boitani 2003). Wolves have excellent hearing and an acute sense of smell, which is up to 100 times greater than humans (Meaney and Beauvais 2004). In the wild, a wolf's average lifespan is between 6 to 10 years of age, however in captivity they can live up to 18 years (Snyder 1991).

Wolves are highly social animals that exhibit hierarchical behaviors within packs and demonstrate a high degree of social cohesion and distribution of labor among the extended family members within their pack (Weiss 2005). A pack consists of an alpha male and female, a beta male and female and sometimes an omega wolf which is usually an older individual that no longer has a major role in the pack but is still tolerated and allowed to stay. Other members of the pack are made up of previous year's offspring and other relatives (Mech and Boitani 2003). Normally the alpha male and female are the primary breeders in a pack but subordinate males and females have been known to breed as well (Mech and Boitani 2003). Although the alpha male and female are usually the only ones that produce pups the entire pack takes part in raising the young. The breeding season begins in late January and after a gestation period of approximately 63 days 4-6 pups are born on average in late April or early May (USFWS 2007). The pups are born in a den, where they will stay for the first 6 to 8 weeks of their life. When the pups are first born they cannot see, hear or maintain warmth and they need constant care from their mother (Mech and Boitani 2003).

Dens in northwest Montana and the Canadian Rockies are typically found in areas located in valley bottoms, with flat to moderate slopes, close to trails, far from human habitation and activity, close to meadows and water (Meaney and Beauvais 2004). Landscape features such as elevation, slope, and proximity of fresh water had the greatest effects on den site selection (Mech and Boitani 2003). The dens can easily extend six to fourteen feet into the ground and it is common for the female to dig the den herself. At the end of the tunnel is an enlarged chamber where the newborn pups are born and kept until they are old enough to emerge (Kowalewski 2009). Once the pups emerge from the den they are moved to a rendezvous site where they are cared for by the pack. Rendezvous sites are characterized by well used wolf trails, beds, bones and scats (Claar et al. 1999). Rendezvous sites are a central location for the pack to gather and bring food to the pups until they are old enough to travel. A pack will use multiple rendezvous sites and will return to them year after year if the area is undisturbed and prey remains abundant.

Once the pups have reached adolescence and are between one to three years old they may disperse from their natal pack and set off on their own. A lone wolf that pairs with another

lone wolf may assume the roles of a breeding pair and may eventually setup and defend a territory of their own. Once a wolf pack has established a territory they are essentially non-migratory but they will move seasonally within their territory in response to snow levels and prey distribution (Meaney and Beauvais 2004). New territories are usually established within 50 to 100 km (31 to 62 miles) of their natal pack but dispersers have been known to move up to 800 km (500 miles). Because wolves are so mobile and can disperse several hundred kilometers re-colonization of historic ranges may occur at a fairly rapid rate (Claar et al. 1999).

Wolves are “habitat generalists” which means they are found across a wide range of climates and habitats and they are usually limited by something other than specific habitat features. When looking at what makes up typical or ideal wolf habitat there are three things to consider (USFWS 1987): 1) a sufficient year round prey base of ungulates, 2) suitable and relatively secluded denning and rendezvous sites, and 3) sufficient space with minimal exposure to humans. If an area is large enough to support gray wolves they will usually establish a territory in an area with a variety of topographic features. Forests, open meadows, rocky ridges, and lakes or rivers all comprise a pack's territory (Snyder 1991). Due to the wide ranging habits of their prey species and the fact that they stay within their territory year round wolf territories tend to be very large and can easily be 150 to 300 miles in size (USFWS 2007).

Wolves are top level predators and are designed for pursuing and taking down large prey including deer, elk, and moose. Wolves will often supplement their diet with other game such as beavers, ground squirrels, rabbits, upland game birds and waterfowl and other small mammals (Snyder 1991). Wolves are also opportunistic and will feed on animal carcasses and other scavenged material. Taking down large prey such as ungulates poses many physical risks for the wolf. In order to reduce these risks wolves employ many intelligent and complex hunting strategies. Individual wolves will work together as a unit when hunting large prey.

Wolves will select individuals of a herd that are sick, old or weaker than that of other members. One study showed that wolves select elk based on their vulnerability as a result of age, sex, and season and therefore kill primarily calves, old cows, and bulls that have been weakened by winter (Stahler et al. 2006). Selection of individual prey takes place through a sifting and sorting process that includes testing a herd for weak individuals by running them for various distances and pursuing those found to be weak or in poorer condition (Weiss 2005).

Studies in the greater Yellowstone area showed that most of the elk killed were calves, females, or individuals with low marrow fat. The seemingly healthy adult elk that were taken by wolves had an average age older than that of the local elk population (Meaney and Beauvais 2004). Necropsied remains of elk taken in Yellowstone reveal that many of the animals killed by wolves had age-related conditions, such as arthritis, disease, injuries or severely depleted fat reserves. By removing these unhealthy, aging, post reproductive-age individuals from the population the remaining herd becomes healthier, younger and more reproductively active (Mech et al. 1991).

As hunters, wolves have a relatively low success rate and many times will fail in their attempt to take down large prey. One study showed that for every twelve moose tracked, only one was caught and killed (Mech and Boitani 2003). An Idaho study showed that the kill rate of elk was one elk every 14 days (Meaney and Beauvais 2004) while another study in Yellowstone showed that wolves killed about 1 elk every 16 to 33 days (USFWS 2007).

Wolves play many critical roles in the overall health of an ecosystem and the balance that they maintain as apex predators benefits the ecosystem as a whole (Ripple et al. 2001). Wolves have been absent from the Washington landscape for so many years that the balance between wolves and their prey has had cascading effects on habitat, other wildlife species, and people of the area. As apex predators, the wolf's return will have impacts on ungulate herds across their range. These impacts will be revealed in a variety of ways such as healthier herds via removal of weak members of a herd and modified behavior due to increased predation risk. All of these changes will have a cascading effect on the environment such as decreased browsing on various plant species which could increase habitat for other species (Ripple and Beschta 2004).

In Yellowstone National Park, following the reintroduction of wolves there was a change in elk foraging behavior that positively impacted the growth of many plants, such as willows, aspens, and cottonwood. These ecological changes have had innumerable effects on the ecosystem as a whole. Benefits include providing nesting and roosting sites for song birds, root strength for soil erosion protection along streambeds, and food and building sources for beavers, with resultant dams that create cool, deep ponds needed by juvenile fish (Weiss 2005).

Wolves also benefit scavengers by providing a greater supply of carrion on the landscape (Mech and Boitani 2003). In Montana at least 12 scavenger species have been observed at wolf kills including grizzly bears, black bears, wolverines, bald and golden eagles, ravens, and magpies (Meaney and Beauvais 2004).

Lastly, wolves may also negatively influence (reduce) numbers of other predators such as coyotes. The reintroduction of wolves to Yellowstone National Park resulted in a 50-percent decline in coyote density and reduced the size of coyote packs. Reduced coyote populations, due to wolf presence, could increase the number of other wildlife species including upland birds, small mammals, and other carnivores such as pine martin and badger (Smith 2006).

Goals and Objectives

Overarching goals and objectives for all Colville Tribal Natural Resources are identified within the CCT Integrated Resources Management Plan (IRMP; Colville Confederated Tribes 1999), which outlines the standards and guidelines for management of natural resources on the Colville Reservation. In addition, the CCTFWD Interim Five Year Management Plan 2012-2017 (CCTFWD 2012) further outlines the goals and objectives specific to fish and wildlife resources on the Reservation. These documents function as the guiding framework for the CCTFWD Gray Wolf Management Plan.

From the Integrated Resource Management Plan (Colville Confederated Tribes 1999)

Desired Future Conditions

Through the “vision” goal setting sessions as part of this development process and public and agency scoping for this analysis, 17 desired future conditions for the Colville Tribes have been identified. This plan provides a process reflecting the Membership’s desire to move the Reservation towards these desired future conditions.

2 of the 17 Desired Future Conditions:

- Suitable habitat conditions for desirable native and non-native species (flora and fauna) exist to maintain Reservation biodiversity that includes the diversity of natural genes, species and ecosystems, as well as the evolutionary process that link them (DFC #6, Klock 2001);
- Viable populations (numbers and distribution of reproductive individuals) of native and desired non-native species of wildlife, and their supporting habitats are maintained, while wildlife is provided in sufficient numbers to meet the cultural, subsistence and recreational needs of Colville Tribal Members (DFC #8, Klock 2001);

Integrated Resource Management Plan – Wildlife

- Management objectives

Contribute to the recovery and management of listed species (Federal or State: Endangered, Threatened, Candidate or Sensitive) populations and/or their habitats by restoring or protecting habitat quality, quantity, and effectiveness for listed species.

- Management directions

In full recognition of the ecological importance of individuals or groups of species with known viability concerns, Tribal management actions will not result in the extirpation of a species from the Reservation.

Wildlife populations on the Reservation will be monitored and modification will be considered if they change rapidly. When a wildlife population exhibits rapid increases or decreases, exceeding or dropping below population goals creating an ecological imbalance with their habitat, appropriate strategies (regulatory, harvest, or other) will be implemented to bring the population balance within their available habitat.

Terrestrial species habitat will be restored or maintained so that terrestrial species can move freely within and between blocks of habitat for the purpose of genetic interchange, emigration, and immigration.

From the CCTFWD Management Plan (CCTFWD 2012)

CCTFWD Strategic Objective #1. Ensure the sound management of fish (anadromous, resident and desired non-native), wildlife (native and desired non-native), and habitat resources (restoration, enhancement, and protection) within the external boundaries of the Colville Reservation and on the North Half and within the Tribes' U&A areas, where applicable.

Wildlife Goal - 1. Provide for subsistence and cultural use of wildlife by Tribal Members while maintaining healthy, self-sustaining game and nongame populations on the Reservation and the North Half.

WLG-1.O2. Establish annual Member hunting seasons, allowing for maximum sustainable harvest of game species.

- WLG-1.O2.t-1. *Recommend annual Tribal Member hunting seasons for the Reservation and the North Half, establishing time, place and bag limit regulations, based upon analysis of game species population status and trend.*

Wildlife Goal - 2. Ensure wildlife populations are maintained within the Tribe's Ceded and U&A Areas, to meet the cultural and subsistence needs of the Membership.

WLG-2.O1. Represent Tribal fish and wildlife interests pertaining to State and Federal resource management activities on the North Half, and within the Tribes' U & A Areas.

- WLG-2.O1.t-3. *Review and comment on Federal and State wildlife management plans and project proposals, including those pertaining to Threatened and Endangered (T&E) Species.*
- WLG-2.O1.t-5. *Set up meeting to discuss and comment on WDFW hunting season proposals for regions 1 and 2 annually.*
- WLG-2.O1.t-6. *Coordinate Tribal T&E species efforts with those of agencies responsible for resource management within the Tribe's ceded and U & A Areas.*

Wildlife Goal - 3. Contribute towards population recovery of Federal Threatened and Endangered (T&E) species, and other priority species that occur within the boundaries of the Colville Reservation. Colville Tribe has the right to accept or reject State Threatened and Endangered species.

WLG-3.O1. Restore native wildlife species throughout their historic range on the Reservation, where habitat exists or can be feasibly restored.

- *WLG-3.O1.t-1. Prioritize and implement population assessment, management and monitoring plans for T&E species on the Colville Reservation.*
 - *WLG-3.O1.t-2. Complete and implement population assessment, management and monitoring plans for other priority wildlife species occurring on the Colville Reservation.*
 - *WLG-3.O1.t-3. Provide opportunity for genetic exchange by maintaining connectivity between core habitat areas utilized by T&E and other priority wildlife species.*
- WLG-3.O2. Maintain, restore, and manage those habitats upon which T&E and priority species depend.
- *WLG-3.O2.t-1. Complete and implement habitat assessment, management and monitoring plans for priority habitats occurring on the Colville Reservation by 2015, which tie to the sensitivity map and prioritized by year.*
 - *WLG-3.O2.t-2. Incorporate findings from current scientific research on T&E species recovery efforts in assessing resource management proposals and in developing recommended mitigation measures.*
 - *WLG-3.O2.t-3. Manage recovery efforts for species with large area requirements (such as forest carnivores) cooperatively with agencies responsible for resource management within the Tribes' ceded and U & A areas.*
 - *WLG-3.O2.t-4. Identify and maintain habitats that provide functional linkages between populations.*

Wolf Conservation and Management

According to the CCTFWD Management Plan and reconfirmed by Tribal Member input (through a web-based survey, informational flyers, and public meetings), the management of gray wolves on the Colville Reservation is important to the Colville Tribal People. Wildlife managers must strike a balance between: 1) maintaining a subsistence culture dependent upon thriving ungulate populations capable of providing sustenance to the Tribal membership, and 2) the recovery of gray wolf populations. Understanding the relationship of gray wolves and ungulate populations and their movement patterns across the landscape will ultimately promote informed management decisions that will benefit both wolf recovery and the maintenance of existing ungulate populations that are vital to the people and culture. For gray wolf recovery to be a success on Colville Tribal lands, it is imperative to continually monitor gray wolf distribution and abundance in order to define annual gray wolf harvest quotas that will achieve the management needs of both wolf conservation and the maintenance of healthy thriving ungulate populations for the Tribal Membership.

Wolf Harvest

Upon approval of this plan, wolf harvest allocations may be set annually for the South Half Reservation depending on estimated wolf population demographics from the previous year's data collection efforts (see Appendices C and D.) Annual minimum estimated wolf numbers can be estimated using data from: 1) winter aerial telemetry surveys of packs with collared individuals, 2) confirmed DNA of individuals gathered from biological samples collected from April of the previous year to March of the following year, 3) Department-established remote camera photos identifying individuals, and 4) credible and confirmed reported field observations.

Long-term studies on population dynamics of gray wolves in North America have shown that annual natural mortality rates within a pack can approach 50% but averages 35% (Fuller 1989, Mech and Boitani 2003). This means that every year there is potential for half of the individuals in a pack to succumb to some source of natural mortality. Human-harvest of gray wolves was originally thought to be wholly compensatory (Haight et al. 2002). However, in the Northern Rocky Mountains, gray wolf populations were shown to decline once human-harvest surpassed a threshold of 24% of minimum estimated wolf population size (Creel and Rotella 2010). Twenty-four percent is the intrinsic growth rate of gray wolves. If human-harvest of gray wolves was wholly compensatory, then gray wolf populations should be able to withstand human-harvest rates of 35-50% and still maintain a stable population. Furthermore, in areas being recolonized by gray wolves, long-term population viability is likely below normal due to low immigration rates compared with areas where gray wolves persist in high densities (Fritts and Carbyn 2006).

Given that the North Half Reservation and South Half Reservation currently lie on the fringe of gray wolf expansion in Washington, low immigration rates should be expected. For example in recolonizing gray wolf populations, it was found that if a breeding animal died it took on average two years for that animal to be replaced (Brainerd et al. 2008, Borg et al. 2014) In areas that gray wolves are recolonizing, a human-harvest quota of 10% of the annual minimum estimated number of gray wolves is used to insure a stable to increasing wolf population. To maintain a viable wolf population on the North Half Reservation and South Half Reservation, a human-harvest quota of less than 24% is necessary once gray wolves fully recolonize the Colville Reservation and surrounding areas. Currently, CCTFWD biologists have determined gray wolves have recolonized the Colville Reservation and surrounding lands. Human-harvest quotas should be set at 20-24%. In the future, if it is the management goal of CCTFWD to decrease gray wolf populations, human-harvest quotas can be set in excess of 24% of the annual minimum estimated number of gray wolves.

When a wolf is harvested on the South Half Reservation, DNA samples will be taken from the harvested wolf in an attempt to identify the individual or pack lineage, based on genetic profiles already collected. Human-harvest of wolves will be allowed according to established Tribal Member Hunting Regulations. Incidental or accidental wolf harvest by hunters or trappers will be included in the annual harvest quota and reduce the overall legal harvest allocation for that year. As time progresses and gray wolf numbers increase, Tribal Member Seasons will be

modified to allow harvest of gray wolves on the North Half following established harvest guidelines. In all instances of wolf harvest on the Colville Reservation, allowable harvest methods may include any firearm, archery, and trapping depending on yearly Tribal Member Hunting Regulations.

Distribution of wolf parts

Wolves killed during management actions or that are turned in to or found dead by the CCTFWD will become the property of the CCT. Appropriate samples for biological studies and/or law enforcement investigation requirements will be collected. Some hides and skulls may be retained for educational purposes, as needed.

The CCTFWD will work in cooperation with the Colville Reservation cultural committee to establish guidelines on how to transfer wolf carcasses or the parts thereof to culturally appropriate persons and/or locations. These items will be available to Colville Tribal Members who desire them for cultural and/or religious purposes. A repository for these items needs to be established and will jointly determine how the items are to be distributed. Tribal members may request the items by directing their request to the CCTFWD Director or their delegate. Records of the distributions will be documented and reported.

Ungulate Conservation and Management

The CCTFWD has an objective to manage lands within the bounds of the South Half Colville Reservation to provide habitat capable of supporting stable to increasing deer, elk, and moose populations. Deer, elk, and moose populations within the South Half Colville Reservation are primarily monitored via winter aerial survey methods and sightability modeling (Buckland et al. 2000). Based on recent winter aerial surveys, mule deer and white-tailed deer populations combined are on a stable to slightly increasing trend. In addition, elk and moose populations are also on a stable to slightly increasing trend in populations of both species.

The CCTFWD seeks to guide management and co-management of gray wolves and their primary prey (deer, elk and moose) on the North and South Half of the Colville Reservation, respectively. The primary goals for management of gray wolves and their ungulate prey are to: 1) outline strategies for maintaining viable wolf populations that persist through time, while 2) maintaining healthy ungulate populations capable of meeting the cultural and subsistence needs of Colville Tribal Members and their families. Understanding impacts of gray wolves on ungulates is important within the framework of the CCT given the subsistence culture of the Colville Tribal Members.

One method to understand potential impacts of gray wolves on ungulates is by estimating annual predation rates by gray wolves on ungulates in a given area. To calculate predation rates of gray wolves on ungulate populations it is necessary to detail: 1) ungulate composition by number of individuals, 2) ungulate composition by biomass based on average body weights of young and adult individuals of each sex, and 3) gray wolf daily food requirements. Currently mule and white-tailed deer combined comprise roughly 85% of the individual ungulates on the

South Half Colville Reservation while elk and moose comprise 9% and 6% of the ungulate population, respectively.

Winter aerial surveys reveal roughly 25% of the estimated deer population on the South Half Colville Reservation are fawns; weighing on average 30 kg at the time of aerial surveys (Thompson et al. 1973). The remaining 75% of the winter deer population are does and bucks. It has been stated that adult mule deer weigh on average 68 kg and adult white-tailed deer weigh on average 60 kg (Wallmo 1981; Halls 1984), and from winter flight data there is roughly a 1:1 ratio of mule deer to white-tailed deer on the South Half Colville Reservation, however this ratio may fluctuate annually. Buck-to-doe ratios are largely unknown for the South Half Colville Reservation due to the large number of bucks that typically drop their antlers prior to winter aerial surveys.

Winter aerial surveys reveal roughly 20% of the estimated elk population are calves, potentially weighing on average 70 kg at the time of aerial surveys (Cook et al. 1996). Cow and bull elk account for 55% and 25% of the estimated elk population, respectively, on the South Half Colville Reservation. An average cow elk weighs 275 kg and an average bull elk weighs 325 kg (Toweill 2002).

Aerial winter surveys reveal roughly 25% of the estimated moose population are calves, potentially weighing on average 70 kg during winter at the time of aerial surveys. Cow and bull moose account for 45% and 30% of the estimated moose population, respectively, on the South Half Colville Reservation. An average cow moose weighs 300 kg and an average bull moose weighs 430 kg (Schwartz et al. 2007).

Thus, not considering bighorn sheep or pronghorn populations, mule and white-tailed deer combined account for 56% of the ungulate biomass on the South Half Colville Reservation while elk and moose account for 26% and 18% of the ungulate biomass, respectively. Taking these figures into account, it is possible to derive a general estimate of number of ungulates required to sustain an average gray wolf pack per year on the South Half Colville Reservation.

Given an average daily basal metabolic rate of 0.175kg/kg of wolf/day for gray wolves in North America (Mech and Boitani 2003), along with an average weight of 40 kg per adult gray wolf and an average of 7 gray wolves per pack (avg. pack size in 2013 in Washington, Oregon, Idaho, and Montana were 4, 8, 6, and 4, respectively), each gray wolf pack on the South Half of the Colville Reservation has the potential to consume an estimated 17,855 kg of prey per year. (It is acknowledged that only rarely are all individuals within a pack adults. Rather it is typical for 2-4 individuals to be yearlings and/or pups, which have lower daily basal metabolic rates which equates to less food consumption (Mech and Boitani 2003).)

Determining the greatest potential for prey consumption by a pack of gray wolves is informative to biologists tasked with managing ungulate species shared by subsistence based Tribal Members, gray wolves, and other predators. Given a suite of ungulate species to prey upon, it is likely that a given gray wolf pack will select for one ungulate species above the rest.

However, such selection is likely to vary from one gray wolf pack to the next and even within a gray wolf pack over time. However, mechanisms driving gray wolf pack prey selection patterns are not well understood and it is likely that gray wolves prey on whatever individuals of whatever species are vulnerable enough for them to kill with the least risk at any given time (Mech and Peterson 2003).

With these uncertainties concerning gray wolf pack prey selection, any attempt at estimating predation rates by gray wolf packs must assume gray wolf packs consume prey according to availability. If gray wolf pack predation rates are in line with available ungulate biomass by species then one gray wolf pack can be expected to consume the equivalent of: 83 mule deer and white-tailed deer fawns combined/year, 116 adult mule deer and white-tailed deer combined/year, 13 elk calves/year, 9 cow elk/year, 4 bull elk/year, 12 moose calves/year, 5 cow moose/year and 2 bull moose/year.

These yearly consumption rates per pack amount to five to six percent of each of the estimated elk, moose, and mule and white-tailed deer populations combined on the South Half Colville Reservation. Though this is unlikely, the wide spatial and temporal variability in gray wolf pack prey selection precludes a more exact estimate of number of ungulates taken per year based on gray wolf prey selection for various ungulate species (Mech and Boitani 2003).

It is likely that ungulate mortality due to gray wolves is neither fully compensatory nor additive with current sources of mortality, but is instead some combination of the two (Mech and Peterson 2003). Thus, it is unlikely that moose mortality rates on the South Half Colville Reservation, for example, will drastically increase due to presence of gray wolves. Overall, previous research indicates that gray wolves typically do not have a significant impact on ungulate populations and gray wolf predation generally does not cause declines in ungulate numbers (Thompson and Peterson 1988; Peterson et al. 1998; DelGiudice et al. 2006, 2009). However, local reductions in ungulate populations due to gray wolf predation have been reported (Hamlin et al. 2009). Though generally, reports detailing ungulate declines due to wolf predation also acknowledge that a multitude of factors are conspiring to reduce the given ungulate population of interest (Cunningham 2009).

With that said, it is possible that gray wolf predation could negatively impact localized ungulate populations on the South Half Colville Reservation. Significant declines in local ungulate populations could pose a decrease in ungulate populations in the area, impacting the subsistence culture of Colville Tribal Members. Therefore it is imperative that winter aerial surveys continue to be conducted to monitor ungulate populations on the South Half Colville Reservation. Any detection of significant declines in ungulate populations would need to be met with: 1) research investigating sources of mortality for the various ungulate species by sex and age, 2) suggested changes to ungulate harvest policies, and 3) a potential increase in predator control efforts. If gray wolves are found to be a significant source of mortality for sex and age classes important for ungulate population growth and maintenance then measures should be considered to preserve the subsistence culture of Colville Tribal Members.

Land Management

Land management on the Colville Reservation is unique in that there are multiple types of land ownership; each with their own laws and codes that govern the management of natural resources. Tribal Trust is land that is owned by the Tribe and is managed for the benefit of the membership as a whole. The CCTFWD is the lead managing entity for wildlife resources on Tribal Trust lands. Tribal Allotments are lands that were allotted to individual Tribal members and their families. These lands are managed by those families that own them but the overall management of wildlife resources still falls under the jurisdiction of the CCTFWD. Fee lands are lands within the bounds of the reservation that are owned by private persons or companies. Fee lands are subject to both tribal and state laws; however the management of wildlife resources is solely under the jurisdiction of the CCTFWD. Proposed land management activities that will be affected by or could potentially affect gray wolves on the reservation will be evaluated by the CCTFWD.

Land management activities on the reservation will be evaluated by a Tribal Biologist to assess their potential effects on gray wolves. It is the goal of our Department to prevent, reduce, or mitigate negative impacts to resident wildlife populations, including gray wolves, by working with other Natural Resource Departments to identify potential threats and recommend/implement alternative management techniques through adaptive management. Forest management, fire control, and grazing are the primary land management activities that have the potential to negatively affect resident wolf packs. Because gray wolves are habitat generalists and inhabit such large territories, most site-specific management activities will not have negative impacts on resident packs.

The effects of ORVs (off-road vehicles) have shown mixed results in their level of disturbance to wolves. At this time there are no proposed changes to ORV use on the reservation, however if at any time the CCTFWD determines there are negative impacts to wolves or wolf survival due to ORV use, amendments to this plan may be initiated.

Wolf-Livestock Conflicts

The domestication of animals that began some 12,000-13,000 years ago brought profound changes in the human view of wolves (Boitani 1995; Mech and Boitani 2003). Over millennia, selective breeding reduced the natural defenses of domesticated animals. Meanwhile, human societies developed more effective means of killing wolves (Mech and Boitani 2003). Depredations on livestock became the primary reason for attempts to exterminate the wolf; first in Europe and later in North America (Young and Goldman 1944). As settlers advanced westward, wolf-livestock conflicts increased. This conflict, along with a host of secondary factors, led to a 300 year effort to exterminate wolves in North America (Young and Goldman 1944). Currently, the potential for depredations on livestock continue to be a major problem in wolf conservation. Wolves prey on domestic animals in every country where the two coexist (Mech and Boitani 2003). In North America, reliable long-term data on livestock losses to wolves are available for Alberta, British Columbia, Minnesota, and Montana, and records are accumulating from Wisconsin, Idaho, and Wyoming. Although they are increasing in some of

those areas, wolf depredations involve less than 1% of available livestock and less than 1% of producers within wolf range experience losses to wolves each year (Mech and Boitani 2003).

One of the greatest concerns with the reestablishment of wolves into northeast Washington State, as well as the Colville Reservation, is the conflicts that could arise with domestic livestock. Permitted livestock grazing has been and will continue to be a range management practice within many areas of the Colville Reservation. Many of the Range Units have a high likelihood for reestablishment by gray wolves. To date, the CCTFWD have not documented livestock damages resulting from the reestablishment of wolves on the Colville Reservation. The Tribes understand that unmanaged wolf packs may eventually result in undesirable interactions with livestock. Management of wild ungulate populations at levels adequate to provide for subsistence harvest by Tribal Membership and to support desired wolf populations will benefit managers attempting to alleviate potential livestock conflicts.

It is the goal of the CCTFWD to resolve conflicts before they become major issues. This requires quick response to all complaints related to wolf activity. At this time, the CCTFWD and the CCT are not providing financial compensation for livestock injured or killed by wolves or any other wildlife species. The CCTFWD will work with livestock owners to solve issues as they arise. The release of livestock into an area where denning is occurring has the potential to result in negative interactions between livestock and wolves. In order to reduce these impacts the CCTFWD will work with the Bureau of Indian Affairs (BIA) Range Program, BIA Leasing Program, and local livestock producers to provide recommendations regarding livestock management in areas where there are known dens. Overall, when livestock are released onto Range Units, they are subject to numerous fates, just like native wildlife, including injury and/or death. Thus, owners are encouraged to manage their livestock accordingly.

CCT Wolf-Livestock Conflict Response

- 1) CCTFWD response, according to draft CCT Response Guidelines, to all reported wolf complaints related to livestock damage will be to attempt to determine if injury/death was caused by gray wolves, other wildlife species, or domestic animals (see Appendix A).
- 2) After following the Response Guidelines and it is determined that injury/death was caused by gray wolves on the property of the livestock owner, the CCTFWD will assess the scope of the issue and develop site-specific strategies to address the issue. The CCTFWD may use multiple strategies to prevent, limit, or remove the threat including the following strategies: providing educational materials, recommending solutions to landowners to address the issues (i.e. relocation of carcass dump sites), use of non-lethal deterrents (i.e. fladry, range riders, guard dogs, hazing), trapping, relocations (where appropriate), lethal removals, or other methods deemed appropriate by the CCTFWD Program Director.

Wolf-Human Interactions

Public safety and interaction with wolves are important topics of concern for Tribal Membership. Since wolves have not been documented within the bounds of the Colville Reservation for many decades, local residents may lack direct experience with wolf behavior, leading toward feelings of uncertainty or feelings of increased risk. The following section will address the public's safety, interaction, and possible future conflicts with wolves.

Human Safety

The history of wolf attacks varies depending on the country and century. In the United States and Canada, early explorers and trappers seldom recorded wolf presence and rarely regarded wolves as dangerous (Mech and Boitani 2003). Looking at wolf populations across the world there are currently an estimated 10,000-20,000 in Europe, 40,000 in Russia, and approximately 60,000 in North America (Linnell 2002). Given these numbers, there are only 4 recorded cases of people being killed in Europe, 4 in Russia, and 2 in North America by non-rabid wolves over the past 50 years (Linnell 2002). The two deaths within North America occurred in 2007 and 2010 in Saskatchewan and Alaska, respectively (USFWS 2011). The number of non-lethal wolf attacks in North America has also been rare, with approximately 15 over the past 100 years, in which the majority of these animals had been habituated to human food and garbage, thus losing a fear of humans (Linnell 2002). In comparison, there are an estimated 4.7 million domestic dog bites per year in the United States, of these 800,000 individuals seek medical attention, 386,000 resulting in emergency treatment, and about 16 die (Center for Disease Prevention 2013). In regard to human-wolf interactions, the likelihood of a confrontation is very rare.

A recent scientific worldwide review of wolf attacks on humans found that the vast majority of wolf attacks on humans were due to the offending animal being infected with rabies (Linnell 2002). Although wolves are not a reservoir for this disease, spill over from other canines and wildlife is still evident and accountable for these attacks (Linnell 2002). Due to the low occurrence of rabies in the United States, attacks by rabid wolves are extremely rare. Since the 1980s when wolves were reintroduced, no such attacks have occurred in Idaho, Montana or Wyoming (McNay 2002). In cases where non-rabid wolves attacked humans, the cause of attack was attributed to: 1) the offending animal having become accustomed to humans by way of food or constant human presence, 2) captive wolves and wolf-dog hybrids exhibiting defensive behaviors after being cornered, and 3) wolves exhibiting territorial behavior towards dogs and the dog owner tried to intervene (Linnell 2002). From 1969 to 2001, there have been 29 documented cases of unprompted wolf attacks. In 6 of these cases, the individual was accompanied by dogs and another 19 were attributed to habituated wolves (McNay 2002).

When a wolf loses their fear of humans and becomes habituated, there is an increased possibility of an attack or injury. Habituation can occur with or without conditioning with food and in locations where wolves consistently encounter people (McNay 2002). In many of the recent North American wolf attacks, the suspected wolf was previously seen stealing various items (clothing, gear) out of camping sites and at times obtaining food items (Groom et al. 2006). These wolves were in and around campsites, exhibiting uncommonly bold behavior,

months before any human attacks occurred. If the public had treated these animals as a wild predator instead of a novel attraction, these serious attacks could have possibly been prevented (Groom et al. 2006). Preventing habituation of the wolves located on the Colville Reservation is a key to ensuring human safety. Cooperation between the public and the CCTFWD is vital to the continued safety of both humans and wolves. Notifying the CCTFWD of any suspicious wolf activity is crucial to early intervention of potential wolf problems and will increase human safety on the reservation. Feeding of wildlife is discouraged.

Interaction with wolves

Within the bounds of the Colville Reservation, individuals that participate in outdoor activities are the most likely people to encounter a wild wolf. These individuals may include hunters and gatherers, hikers, trappers, forest workers, rural residents, and individuals who work outdoors or within the natural resource fields (i.e. CCTFWD staff, Forestry staff, etc.). Any member of the public that spends an increased time outdoors, specifically in timbered areas, should be knowledgeable about wolf behavior and what to do in the unlikely situation where a wolf is encountered.

Within Idaho, Montana and Wyoming between 1987 and 2011, there were 144 documented dog losses due to wolves (USFWS 2011). On the Colville Reservation, hunting with dogs is an important part of the culture and interactions between hunting dogs and wolves can be a serious concern. It has been noted in other states that hunting dogs are more susceptible to wolf attacks due to them normally being at distance from the human handler.

Hunting with and/or maintaining dogs as pets on the Colville Reservation is a popular activity and will continue even with wolves present. To help minimize potential negative interactions between dogs and wolves, owners should take these precautions:

- Members of the public that live within wolf territory should not leave their dogs outside overnight unless housed in a sturdy kennel.
- Dogs should be kept within visual/auditory range of their owners during walks or while hunting.
- Dogs should not be allowed to run loose; rather they should be on a leash, tether, or within a fenced yard.
- Train dogs not to approach wildlife, unless used for hunting.
- Avoid leaving dog food outside at night.

Wolf Hybrids

Wolves within the boundaries of the Colville Reservation have the capability to hybridize with other canid species including domestic and feral dogs. While this is a possibility, hybridization

should be avoided to maintain biological integrity of the animals and maintain safety of the public. Wolf hybrids can be more dangerous due to their larger size, lack of shyness to humans, and natural wild predatory instincts, thus causing an increased unpredictability (Mech and Boitani 2003). In North America from 1981 to 1999, wolf hybrids killed at least 13 children and injured around 43 other individuals (Linnell 2002). Due to this extreme potential for threats to human safety, CCTFWD will move toward banning the breeding of or owning of wolf hybrids and/or pet wolves within the bounds of the Colville Reservation through the modification of Tribal Code.

Disease

Echinococcus granulosus is a tapeworm that requires two mammalian hosts to survive. It is found worldwide in canine species including coyotes, dogs, foxes, and wolves (Foreyt et al. 2009). The intermediate form of this tapeworm is found within the lungs and liver of even-toed, wild or domestic ungulates (Mech 2003). When a canine, the final host, ingests an infected animal (intermediate host), the tapeworm will attach to the intestinal wall of the canine and continue growth into an adult. The adult parasite is then shed in the feces (Mech and Boitani 2003). A recent study in Idaho and Montana found that over half of the wolves tested were positive for this tapeworm (Foreyt et al. 2009).

There is the rare possibility that humans can become the intermediate host; known as hydatid disease. The disease in humans is obtained by drinking water or eating vegetation infected by the tapeworm eggs (Foreyt et al. 2009). Transmission to humans can also occur if infected canine scat is handled, and the parasite is transferred to the handler and then ingested (Center for Disease Prevention 2012). The likelihood of spreading the disease by handling ungulate meat or carcasses is highly unlikely unless it has been contaminated with canine feces and adequate hygiene is not used (Foreyt et al. 2009). Hydatid disease in humans is extremely rare and not a significant concern on the Colville Reservation. However, caution should be taken and good hygiene practices should always be used when handling dead or live wild animals or their secretions. Caution should also be taken with domestic dogs to ensure that pets are not infected. Domestic animals should not be allowed to roll or feed on wolf/canine scat or feed on any portion of an ungulate carcass (Center for Disease Prevention 2012).

Public Education and Outreach

An essential part of gray wolf conservation is a well-informed public; therefore it is a priority of the CCTFWD to provide education opportunities and outreach. This outreach effort has and will continue to provide an avenue for the public to access factual and up to date information pertaining to the Colville Reservation's resident wolf packs to promote a general knowledge and understanding of wolves. (to access this information, visit your local CCTFWD office.)

Prior to the wolf packs being established, the CCTFWD began providing education and outreach opportunities for the public. This occurred through several public meetings across the Colville Reservation where questions were answered and information about wolves was provided. The CCTFWD used these meetings as a way to guide wolf management decisions and gain valuable

information from the public on their beliefs of how wolves should be managed on the Colville Reservation. Outreach has also been conducted at local Pow-Wows and other community events. The CCTFWD also released an informative pamphlet on wolf ecology, identification, and history.

A wolf reporting form was established in 2011 to gather information and assist CCTFWD biologists in responding to inquiries from the public. The wolf reporting form is available upon request from CCTFWD biologists and the CCTFWD main office. The form assists managers in keeping records of potential wolf sightings. The Tribal Membership and general public are encouraged to continue using this form to submit reports of potential wolf sightings.

In late 2012, the CCTFWD conducted an online survey to help guide the management of wolves on the Colville Reservation. Although the response was low (n=226), the CCTFWD attempted to use the responses to aid in the development of the CCT Wolf Management Plan.

As the re-establishment of the wolf continues on the Colville Reservation, public education and outreach needs to continue into the future in order to keep the Tribal Membership informed with meaningful and up-to-date information on present conditions as well as the potential effects that wolves may be having on the ungulate populations and local ecosystems. The CCTFWD will continue to hold public meetings to keep tribal members informed about current wolf activity on the reservation. This outreach approach needs to be adaptive and flexible to reflect the ever changing status of wolf conservation, management strategies, and funding. Education opportunities may take place as one-on-one visits with landowners, wolf education lectures in local schools or public meetings, or by other means as deemed necessary by the CCTFWD.

To ensure that the outreach effort is supported by knowledgeable staff, the CCTFWD will encourage all CCTFWD staff to stay informed on relevant, local wolf issues. CCTFWD staff will continue to participate in trainings and conferences to increase the knowledge and understanding of wolves in order to properly educate the public. Through the pro-active outreach approach, CCTFWD staff members will make the effort to provide education to local schools, community groups, and other interested parties where appropriate. Furthermore, education is a two-way street, and CCTFWD would greatly benefit from Tribal Members relating their cultural and traditional knowledge, experiences, encounters, concerns, and general thoughts on gray wolves to CCTFWD personnel.

Future surveys of the Tribal Membership may be conducted in order to determine the success of educational outreach by CCTFWD, determine current attitudes toward wolves and the level of social tolerance, and also how to proceed with proposed future management actions for wolves. In addition, they may help guide future educational outreach opportunities.

Research

Additional scientific knowledge of gray wolf ecology and the ecological responses to the re-colonization of gray wolves continues to be needed in Washington. Potential trophic cascades are reported in some regions (Ripple et al. 2001), including ungulate and vegetative responses to wolves (Ripple and Beschta 2004). Threats to prey species and livestock have been a growing concern in the area (Hamlin et al. 2009). However, the long-term effects of the return of the gray wolf to our landscape and economy are yet to be understood.

Research in the region should be guided by management questions that would lead to the long-term effective recovery and active management of the gray wolf within its historic range. Although gray wolf re-colonization has always been a highly disputed topic, data should be collected to document the actual response of prey species to the return of an apex predator. Additionally, ecological responses that could potentially lead to the recovery of stressed habitats should be documented. Significant predator-predator interactions could also prove to be important to wildlife management. However, any potential project should be highly-scrutinized before inception due to potential biases or preconceived ideas of what the data should portray. In addition, the benefit to the Tribal Membership should be considered as well as other identified management needs of all proposed research before it is approved or implemented.

Numerous studies could be developed to document these interactions, yet funding for wolf research has proved to be limited and extremely competitive. Federal de-listing of gray wolves on the Colville Reservation and North Half Reservation is anticipated to reduce federal funding opportunities in these areas, but this result is yet to be determined. As an iconic symbol of population recovery, many Non-Governmental Organizations may be willing to fund studies that promote the positive ecological functions associated with gray wolf presence on the landscape.

Considering that any management strategies that might enhance the prey base in the area could potentially enhance the recovery of gray wolves, a funding strategy that seeks grant money for prey species management or habitat enhancement could result in potential wolf recovery. Various funding opportunities are listed below:

- USFWS
 - Tribal Wildlife Grant (TWG)
- Natural Resource Conservation Service (NRCS)
 - Wildlife Habitat Incentives Program (WHIP) Grant
 - Environmental Quality Incentives Program (EQIP) Grant
 - Wetland Reserve Program (WRP)
 - Conservation Reserve Program (CRP)
 - Grassland Reserve Program (GRP)
 - Conservation Stewardship Program (CSP)

- Conservation Innovation Grants (CIG)
- Washington State Dept. of Fish and Wildlife (WDFW)
 - Federal Aid in Wildlife Restoration Act (Pittman-Robertson)
 - Aquatic Lands Enhancement Account (ALEA) Volunteer Cooperative Grant Program
 - Cooperative Endangered Species Conservation Fund (Section 6 ESA)
 - Non-highway and Off-Road Vehicle Activities Program (NOVA)
- Department of the Interior
 - Fish, Wildlife and Plant Conservation Resource Management (15.231)
- The Nature Conservancy
- Safari Club International
- The Mule Deer Foundation
- The Rocky Mountain Elk Foundation
- The Wild Turkey Federation
- Pheasants Forever
- Audubon Society

Reporting and Evaluation

The continued collection, evaluation, and reporting of population recovery data are key elements toward developing and utilizing the best management strategies in gray wolf recovery in Washington. With various tribal, state-wide, regional, and national gray wolf recovery goals in existence, an assertive effort needs to be made to compile the most accurate and accessible data sets. Data collected by CCTFWD will be maintained in a format that can effectively support recovery goals for each entity individually and can continue to provide large-scale recovery information.

The CCTFWD promote regional data coordination and actively participate in standardized data reporting. The Colville Tribes will continue to report all collected and verified data in an attempt to supply adequate information to the region to accurately compile the Northern Rocky Mountain Wolf Recovery Program Interagency Annual Report each year. Annual survey data will be evaluated by the Tribes, and the results reported to the USFWS may include:

- Population Demographic Data,
 - Number of confirmed packs and/or breeding pairs,
 - Number of known individuals per pack/group,
 - Number of collared individuals per pack/group,
 - Number of observed pups,
 - Number of pups recruited to population,
 - Number of known dispersals,

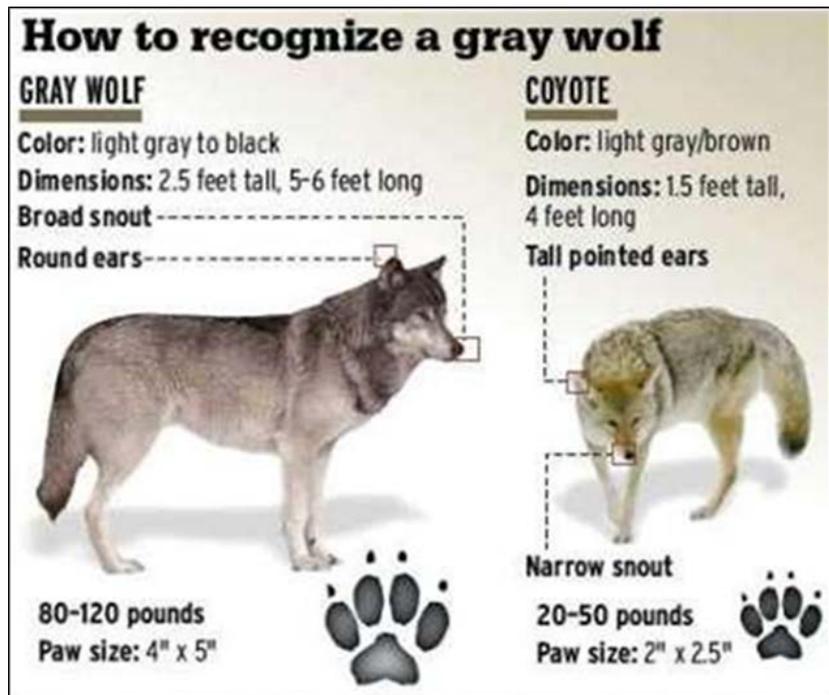
- Number of missing, collared individuals,
- Number of documented wolf mortalities,
 - Number of legally harvested individuals,
 - Number of harvests linked to population control efforts,
 - Number of illegally harvested individuals,
 - Number of natural occurring deaths of gray wolves,
 - Number of deaths observed for unknown reasons,
- Home Range maps and description of size,
- Number and species of confirmed livestock depredations by gray wolf,
- Total amount of Federal funding spent on wolf recovery by the Colville Tribes,

Data will be submitted annually to the USFWS as requested. Data are voluntarily submitted by the Colville Tribes to support collaborative efforts and regional management goals, however data deemed confidential or that which is not appropriate for agency and/or public use might not be considered for submittal unless approved by the Colville Business Council or delegate. Caveats may be requested by the Tribes when submitting data and shall be strictly followed. Nothing in this document requires the Colville Tribes to report any data to any other entity.

Planned Management Actions

1. Monitor gray wolf populations within the Colville Reservation, North-half, and Aboriginal Territories.
 - a. Maintain a remote-camera grid to support population data collection.
 - b. Continue to collect biological samples to aid in population surveys.
 - c. Establish a minimum number of GPS-collared animals to provide data for managers.
 - d. Participate/coordinate active studies of wolf ecology.
2. Monitor ungulate response to gray wolf recolonization.
 - a. Monitor/collect kill site data to determine diet of gray wolves.
 - b. Continue aerial big-game surveys to monitor ungulate populations.
3. Educate the Tribal Membership and/or General Public about gray wolves.
 - a. Identification.
 - b. Ecology/Study results.
 - c. General ecological facts.
 - d. Conflict reduction strategies.
 - e. Risks.
4. Establish an annual harvest allocation based on population goals.(See Appendices C & D)
 - a. Use harvest rates of 20-24% in areas that are considered recovered.
 - b. Use harvest rates of 10% in areas that are recovering.

- c. Utilize established Wildlife Management Zones, as needed, in harvest allocation and/or management.
 - d. Maintain mandatory reporting of all wolf harvest.
- 5. Investigate, document, and/or provide support to reduce damages to resources or property.
 - a. Respond to complaints.
 - b. Respond to reports of safety concerns.
 - c. Educate and cooperate with livestock operators to minimize damages.
- 6. Report on annual wolf management.
- 7. Coordinate and assist in establishing a clear Colville Tribal wildlife parts distribution protocol.
- 8. Continue to coordinate with appropriate agencies, groups, or public about regional wolf management concerns.
- 9. Review/modify current Tribal Codes to actively manage gray wolves.
 - a. Wolf/dog hybrids.
 - b. Harvest regulations/methods.
 - c. Federal and Tribal transport requirements.
 - d. Damage claims.



Source: United States Fish and Wildlife Service

Definitions

Annual Minimum Wolf Population Estimate – The number of individual wolves documented from March of a given year to April of the following year using various survey techniques including DNA analysis of scat, remote camera photographs, and visual observation of wolves from land or air.

Compensation – monetary payment to offset or replace the economic loss for a death or injury to livestock or other animals due to wolf activity.

Depredation – any death or injury of livestock, as defined in this plan, caused by a predator.

Dispersal – generally refers to the natural movement of an animal from one area to another.

Extirpated – a wildlife species that no longer occurs in the wild in a certain geographic region, but exists elsewhere.

Fladry – a method of non-lethal wolf deterrent that involves attaching numerous strips of flagging material along a fence or other device for the purpose of keeping wolves out of an area occupied by livestock.

GPS Collar – A collar placed on wildlife that uses the Global Positioning System (GPS) to record the geographical location of a given animal wearing a collar via satellite communication and then remotely transmits that geographical location to a network server for data retrieval purposes.

Hybrid – the offspring of a mating between a wolf and a dog, a wolf and a hybrid, a dog and a hybrid, or two hybrids.

Livestock – cattle, pigs, horses, mules, sheep, llamas, goats, guarding animals, and herding dogs.

Pack of wolves – a group of wolves, usually consisting of a male, female, and their offspring from one or more generations. For purposes of monitoring, a pack is defined as a group of two or more wolves traveling together in winter.

Rendezvous site – a specific resting and gathering area occupied by wolf packs during summer and early fall after the natal den has been abandoned. A wolf pack will usually move from the natal den site to the first rendezvous site when the pups are 6-10 weeks of age (late May-early July). The first rendezvous site is usually within 1-6 miles of the natal den site. A succession of rendezvous sites are used by the pack until the pups are mature enough to travel with the adults (usually September or early October).

Successful breeding pair – an adult male and an adult female wolf with at least two pups surviving to December 31 of a given year.

Ungulate – any wild species of hoofed mammal, including deer, elk, moose, pronghorn, bighorn sheep, mountain goat, and caribou.

VHF Collar – A collar placed on wildlife that emits a Very High Frequency (VHF) radio signal at a pre-specified frequency that can be detected using a hand-held receiver connected to a directional antenna.

Viable population – a wildlife population that is able to maintain its size, distribution, and genetic variation over time without significant intervention requiring human conservation actions.

Literature Cited

- Adams J., and L. Waits. 2013. Species identification and assessment of hybrid origin of suspected gray wolf fecal and hair samples. Final Report. Laboratory for Ecological, Evolutionary and Conservation Genetics, University of Idaho.
- Bangs, E. E., S. H. Fritts, J. A. Fontaine, D. W. Smith, K. M. Murphy, C. M. Mack, and C. C. Niemeyer. 1998. Status of gray wolf restoration in Montana, Idaho, and Wyoming. *Wildlife Society Bulletin* 26:785-798.
- Boitani, L. 2003. Wolf conservation and recovery. Pages 317-340 in L. D. Mech and L. Boitani, eds., *Wolves: behavior, ecology, and conservation*. University of Chicago Press, Chicago, Illinois.
- Borg, B. L., S. M. Brainerd, T. J. Meier, and L. R. Prugh. 2014. Impacts of breeder loss on social structure, reproduction and population growth in a social canid. *Journal of Animal Ecology* DOI: 10.1111/1365-2656.12256.
- Brainerd, S. M., H. Andren, E. E. Bangs, E. H. Bradley, J. A. Fontaine, W. Hall, Y. Iliopoulos, M. D. Jimenez, E. A. Jozwiak, O. Liberg, C. M. Mack, T. J. Meier, C. C. Niemeyer, H. C. Pedersen, H. Sand, R. N. Schultz, D. W. Smith, P. Wabakken, A. P. Wydeven. 2008. The effects of breeder loss on wolves. *Journal of Wildlife Management* 72:89-98.
- Buckland, S. T., D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, and L. Thomas. 2000. *Introduction to Distance Sampling*. Oxford University Press. 448 pp.
- Center for Disease and Prevention. 2012. Dog Bite: Fact Sheet. Retrieved from <http://www.cdc.gov/HomeandRecreationalSafety/Dog-Bites/dogbite-factsheet.html>.
- Center for Disease and Prevention. 2013. Parasites – Echinococcosis. Retrieved from <http://www.cdc.gov/parasites/echinococcosis/>.
- Claar, J. J., N. Anderson, D. Boyd, M. Cherry, B. Conard, R. Hompesch, S. Miller, G. Olson, H. Ihsle Pac, J. Waller, T. Wittinger, and H. Youmans. 1999. Carnivores. Pages 7.1– 7.63 in Joslin, G. and H. Youmans, eds. *Effects of recreation on Rocky Mountain wildlife: A Review for Montana*. Committee on Effects of Recreation on Wildlife. Montana Chapter of The Wildlife Society. 307 pp.
- Clausnitzer, R. R., and B. A. Zamora. 1987. *Forest Habitat Types of the Colville Indian Reservation*. Department of Forestry and Range Management, Washington State University, Pullman, Washington, USA.
- Colville Confederated Tribes. 1999. *Integrated Resources Management Plan Phase II: Goals, Objectives, Standards, and Guidelines*. Colville Confederated Tribes Natural Resources Department. Nespelem, WA. 207 pp.

- Colville Confederated Tribes. 2006. Fish and Wildlife Resource Management Plan and Five-Year Implementation Schedule 2007-2011. Colville Confederated Tribes Fish and Wildlife Department. Nespelem, WA. 50 pp.
- CCTFWD. 2012. Colville Confederated Tribes Fish and Wildlife Interim Five Year Management Plan 2012-2017. Colville Confederated Tribes Fish and Wildlife Department. Nespelem, WA. 43 pp.
- Cook, J. G., L. J. Quinlan, L. L. Irwin, L. D. Bryant, R. A. Riggs, and J. W. Thomas. 1996. Nutrition-growth relations of elk calves during late summer and fall. *Journal of Wildlife Management* 60:528-541.
- Creel, S., and J. J. Rotella. 2010. Meta-analysis of relationships between human offtake, total mortality and population dynamics of gray wolves (*Canis lupus*). *PLoS ONE* 5:e12918.
- Cunningham, J. 2009. Hunting season/quota change supporting information: species, elk; region, 3; hunting district, 310; year, 2009. Montana Fish, Wildlife & Parks, Helena, Montana.
- Dalquest, W. W. 1948. Mammals of Washington. University of Kansas Publications, Museum of Natural History 2:1-444.
- DelGiudice, G. D., J. Fieberg, M. R. Riggs, M. Carstensen Powell, and W. Pan. 2006. A long-term age-specific survival analysis of female white-tailed deer. *Journal of Wildlife Management* 70: 1556-1568.
- DelGiudice, G. D., K. R. McCaffery, D. E. Beyer, Jr., and M. E. Nelson. 2009. Prey of wolves in the Great Lakes region. Pages 155-173 in A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, eds. *Recovery of gray wolves in the Great Lakes region of the United States: an endangered species success story*. Springer, New York, New York.
- Federal Register. 2005. Endangered and Threatened Wildlife and Plants: Regulation for Nonessential Experimental Populations of the Western Distinct Population Segment of the Gray Wolf. Volume 70 Number 4. Pages 1286-1311.
- Foreyt, W. J., M. L. Drew, M. Atkinson, and D. McCauley. 2009. *Echinococcus granulosus* in gray wolves and ungulates in Idaho and Montana, USA. *Journal of Wildlife Diseases* 45:1208-1212.
- Fritts, S. H., and L. N. Carbyn. 2006. Population viability, nature reserves, and the outlook for gray wolf conservation in North America. *Restoration Ecology* 3:26-38.

- Fuller, T. K. 1989. Population dynamics of wolves in north-central Minnesota. *Wildlife Monographs* 105:3-41.
- Groom, M. J., G. K. Meffe, and C. R. Carroll. 2006. *Principles of Conservation Biology*, third edition: (Case Study) Wolf habituation as conservation conundrum. Sinauer, Sunderland, MA.
- Haight, R. G., L. E. Travis, K. Nimerfro, and L. D. Mech. 2002. Computer simulations of wolf removal strategies for animal damage control. *Wildlife Society Bulletin* 30:844–852.
- Halls, L. K. 1984. *White-tailed deer: ecology and management*. Stackpole books. 864 pp.
- Hamlin, K. L., R. A. Garrott, P. J. White, and J. A. Cunningham. 2009. Contrasting wolf-ungulate interactions in the greater Yellowstone ecosystem. Pages 541-577 in R. A. Garrott, P. J. White, and F. G. R. Watson, editors. *The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies*. Academic Press, San Diego, California.
- Harding, A. R. 1909. *Wolf and coyote trapping: an up-to-date wolf hunter's guide, giving the most successful methods of experienced "wolfers" for hunting and trapping these animals, also gives their habits in detail*. A. R. Harding Publishing Company, Columbus, Ohio.
- Hayes, R. D., and J. R. Gunson. 1995. Status and management of wolves in Canada. Pages 21-33 in L. N. Carbyn, S. H. Fritts, and D. R. Siep, eds. *Ecology and conservation of wolves in a changing world*. Occasional Publication Number 35, Canadian Circumpolar Institute, University of Alberta, Edmonton, Alberta.
- Hruska 1997.
- Kowalewski, D. 2009. The anatomy of a wolf den: a field report. *Electronic Green Journal* 1(28) retrieved from: <http://escholarship.org/uc/item/7d6366ss>.
- Krausz, E. and D. Antoine. 2015. 2015 Tribal Wildlife Grant (Time Extension) FINAL Wolf Monitoring Report. Tribal Wildlife Grant - end of project technical report. Submitted to: United States Fish and Wildlife Service. Colville Confederated Tribes Fish and Wildlife Department. Nespelem, WA. 14pp.
- Lance, N. J. 2009. Application of Electrified Fladry to Decrease Risk of Livestock Depredations by Wolves (*Canis lupus*). Thesis. Utah State University.
- Laufer, J. R., and P. T. Jenkins. 1989. A preliminary study of gray wolf history and status in the region of the Cascade Mountains of Washington State. Wolf Haven America, Tenino, Washington.

- Linnell, J. D. C., R. Anderson, Z. Anderson, L. Balciauskas, J. C. Blanco, L. Boitani, S. Brainder, U. Breitenmoser, I. Kojola, O. Liberg, J. Loe, H. Okarma, H. C. Pedersen, C. Promberger, H. Sand, E. J. Solberg, H. Valdmann, and P. Wabakken. 2002. The fear of wolves: a review of wolf attacks on humans. NINA Oppdragsmelding 731:1-65.
- McNay, M. E. 2002. A case history of wolf-human encounters in Alaska and Canada. Technical Bulletin 13, Alaska Department of Fish and Game, Juneau, Alaska.
- Meaney C., and G. P. Beauvais. 2004. Species assessment for gray wolf (*Canis lupus*) in Wyoming. US Department of the Interior, BLM. Cheyenne, Wyoming.
- Mech, L. D., and L. Boitani. 2003. Wolves: Behavior, Ecology, and Conservation. University of Chicago Press. 428 pp.
- Mech, L. D., and R. O. Peterson. 2003. Wolf-prey relations in L. D. Mech and L. Boitani, eds. *Wolves: Behavior, Ecology, and Conservation*. University of Chicago Press. 131-160 pp.
- Mech, L. D., T. J. Meier, and J. W. Burch. 1991. Denali Park wolf studies: implications for Yellowstone. Transactions of the North American Wildlife and Natural Resources Conference 56:86-90.
- Musiani, M., and E. Visalberghi. 2001. Effectiveness of fladry on wolves in captivity. Wildlife Society Bulletin 29:91-98.
- Peterson, R. O., N. J. Thomas, J. M. Thurber, J. A. Vucetich, and T. A. Waite. 1998. Population limitation and the wolves of Isle Royale. Journal of Mammalogy 79:828-841.
- Pisano, R. 1979. Does the Cascade wolf survive? Oryx 15:185-190.
- Ratti, J. T., M. Weinstein, J. M. Scott, P. Avsharian, A.-M. Gillesberg, C. A. Miller, M. M. Szepanski, and L. K. Bomar. 1999. Feasibility study on the reintroduction of gray wolves to the Olympic Peninsula. Department of Fish and Wildlife Resources and Idaho Cooperative Research Unit, University of Idaho, Moscow, Idaho.
- Ray, V. F. 1933. The Sanpoil and Nespelem: Salishan peoples of northeastern Washington. University of Washington Publications in Anthropology 5:1-237.
- Ripple, W. J., and R. L. Beschta. 2004. Wolves, elk, willows, and trophic cascades in the upper Gallatin Range of southwestern Montana, USA. Forest Ecology and Management 200:161-181.
- Ripple, W. J., E. J. Larsen, R. A. Renkin, and D. W. Smith. 2001. Trophic cascades among wolves, elk and aspen on Yellowstone National Park's northern range. Biological Conservation 102:227-234.

- Schwartz, C. C., A. W. Franzmann, and R. E. McCabe. 2007. Ecology and Management of the North American Moose. University Press of Colorado. 776 pp.
- Stahler D.R., D.W. Smith, and D.S. Guernsey. 2006. Foraging and feeding ecology of the gray wolf (*Canis lupus*): lessons from Yellowstone National Park, Wyoming, USA. *The Journal of Nutrition*, 136:1923S-1926S.
- Snyder, S. A. 1991. *Canis lupus*. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. <http://www.fs.fed.us/database/feis/> [2013, March 13].
- Thompson, C. B., J. B. Holter, H. H. Hayes, H. Silver, and W. E. Urban Jr. 1973. Nutrition of white-tailed deer. 1. Energy requirements of fawns. *Journal of Wildlife Management* 37:301-311.
- Thompson, I. D., and R. O. Peterson. 1988. Does wolf predation alone limit the moose population in Pukaska park: a comment. *Journal of Wildlife Management* 52:556-559.
- Tompa, F. S. 1983. Status and management of wolves in British Columbia. Pages 20-24 in L. N. Carbyn, ed. *Wolves in Canada and Alaska: their status, biology, and management*. Canadian Wildlife Service Report Series 45:1-135.
- Toweill, D. E. 2002. North American elk: ecology and management. Smithsonian Books. 1128 pp.
- USFWS. 1987. Northern Rocky Mountain wolf recovery plan. Prepared by the USFWS in cooperation with the Northern Rocky Mountain Wolf Recovery Team. Denver, Co. 119pp.
- USFWS. 2007. Wolf Management Plan for the Wind Reservation. Eastern Shoshone and Northern Arapaho Tribes. Eastern Shoshone and Northern Arapaho Tribal Fish and Game Department. Ethete, WY.
- USFWS. 2011. Endangered and threatened wildlife and plants; proposed rule to revise the list of endangered and threatened wildlife for the gray wolf (*Canis lupus*) in the eastern United States, initiation of status reviews for the gray wolf and for the eastern wolf (*Canis lycaon*). *Federal Register* 76(87):26086-26145.
- Wallmo, O. C. 1981. Mule and Black-tailed deer of North America. University of Nebraska Press. 605 pp.

Weiss A.E., T. Kroeger, J.C. Haney, and N. Fascione. 2005. Social and ecological benefits of restored wolf populations. Transactions of the North American Wildlife and Natural Resources Conference.

Wiles, G. J., H. L. Allen, and G. E. Hayes. 2011. Wolf conservation and management plan for Washington. Washington Department of Fish and Wildlife, Olympia, Washington. 297 pp.

Wind River Reservation. 2007. Wolf Management Plan for the Wind River Reservation, Eastern Shoshone and Northern Arapaho Tribes. Ft. Washakie and Ethete, WY. Page 3.

Young, S.P., and E.A. Goldman. 1944. The Wolves of North America. American Wildlife Institute, Washington, D.C.

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Appendix A. Response Guidelines for Reported Gray Wolf Activity

Insert Final Wolf Response Guidelines – once approved

Appendix B. Tips to remember in Wolf Country

Wolves are a wild predator and should be treated and respected as such. A few tips and recommendations to avoid habituating wolves include, but are certainly not limited to:

- 1) do not approach, entice, or allow wolves to come near you, your camp, or your home;
- 2) leave suspected wolf kills, dens, and rendezvous sites alone - report these to the CCTFWD;
- 3) do not feed wolves or other wildlife, or leave food (including pet food) outside in areas where wolves are suspected to be;
- 4) discourage wolves from becoming comfortable near human-inhabited areas;
- 5) keep garbage secured.

Following these simple guidelines will help if a wolf is encountered in the wild:

- 1) make yourself appear larger/taller by waving arms;
- 2) when in a group, act in unison;
- 3) act aggressively towards the animal (make noise, throw objects);
- 4) calmly but slowly back away and maintain eye contact;
- 5) if the wolf does not back down, continue to make yourself large, keep eye contact and back away;
- 6) do not in any circumstance turn your back on the wolf and run away
- 7) report any wolf encounters/concerns to the CCTFWD.

Individuals that take their dogs within wolf occupied areas while recreating should:

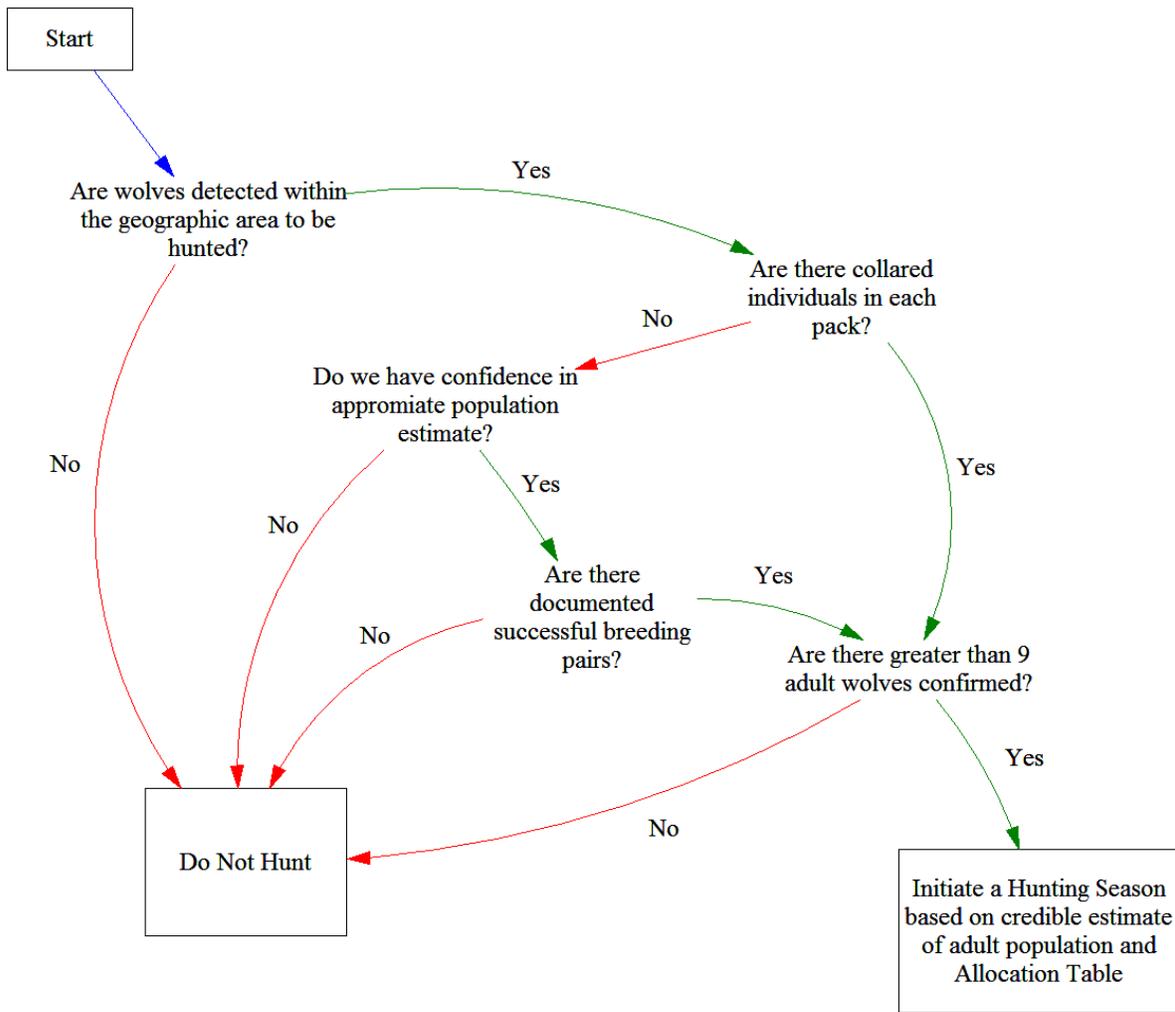
- 1) be able to identify wolf sign;
- 2) bring a leash to restrain dogs in the case a wolf or wolf sign is encountered;
- 3) immediately bring the dog to heel or put on a leash if a wolf is encountered;
- 4) stand in between the dog and the wolf;
- 5) do not in any circumstances attempt to break up a physical fight between the wolf and dog.

Hunters need to be informed and aware of wolf territories and follow guidelines to ensure the safety of themselves and their hunting dogs. Hunters, as well as any individual in the outdoors, need to have an increased awareness of their surroundings when within wolf occupied areas. This can and will help maintain human and pet safety. Guidelines include but are not limited to:

- 1) avoid releasing dogs in areas with fresh wolf sign;
- 2) only release dogs on fresh sign of the target species to avoid long chases;
- 3) regularly make sure all dogs are accounted for;
- 4) leash the dogs once the hunt is over; and
- 5) place a bell or tracking collar on dogs and yell or make noise when releasing dogs and when following the dogs.

Appendix C. Wolf Harvest Decision Tree

The diagram is designed to be a simple, but practical, method in determining if an annual allocation of harvest should be approved and utilized. This diagram, along with the Wolf Harvest Allocation Table (Appendix D), should guide annual harvest allocation management and decision making.



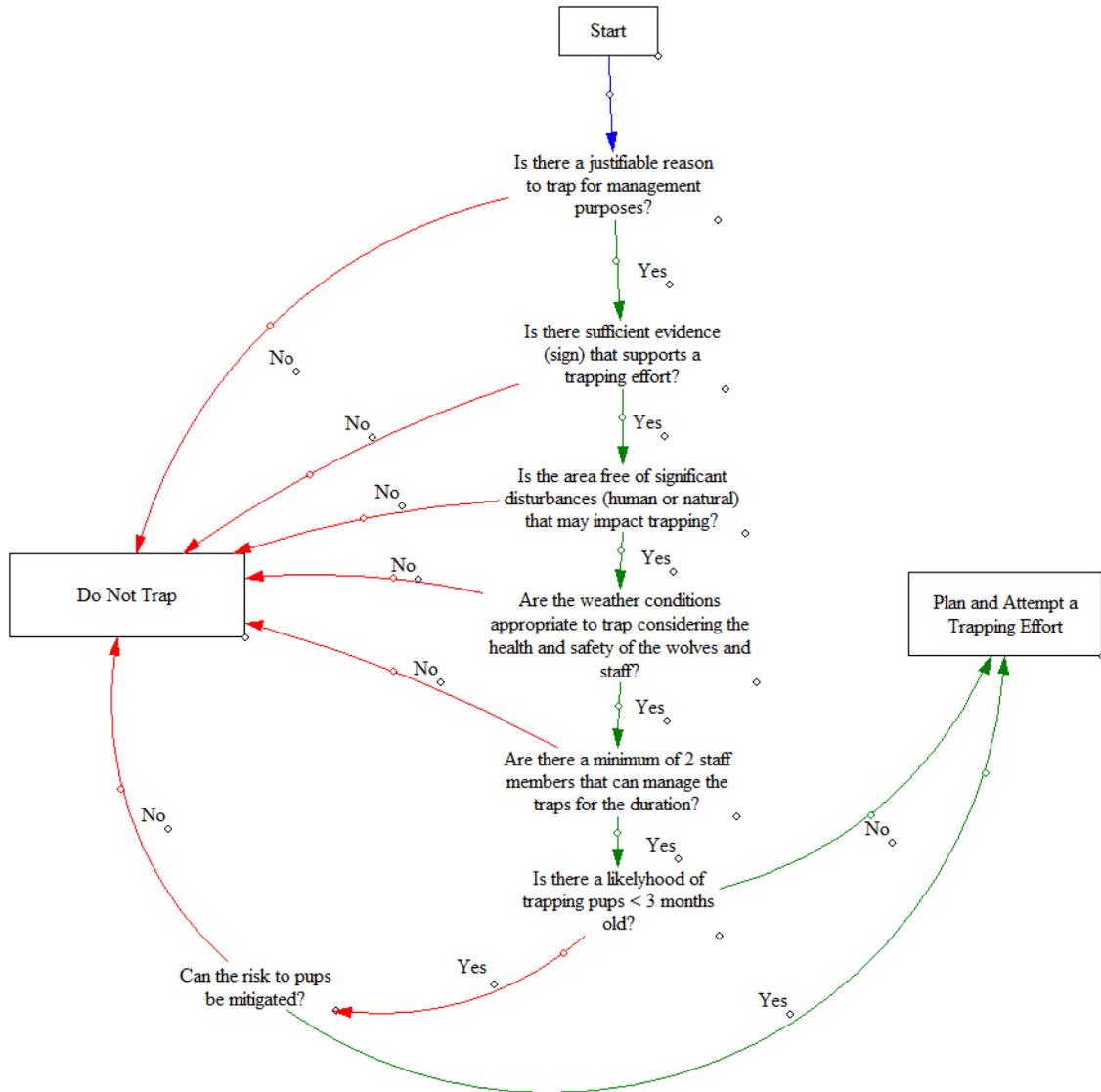
Appendix D. Wolf Harvest Allocation Table

This table is used to determine annual harvest allocation after a wolf harvest strategy is identified as appropriate through the Wolf Harvest Decision Tree. Annual allocation will remain under the 24% maximum in order to maintain a stable population. The defined geographic hunting area considered under the current regulations include only the South Half of the Colville Indian Reservation.

| Number of confirmed wolves in the geographic hunting area | Hunt (Open/Closed) | Allowcated annual harvest goal | Percent allocation (X ≤ 24%) |
|---|--------------------|--------------------------------|------------------------------|
| 0 | Closed | 0 | 0.0 |
| 1 | Closed | 0 | 0.0 |
| 2 | Closed | 0 | 0.0 |
| 3 | Closed | 0 | 0.0 |
| 4 | Closed | 0 | 0.0 |
| 5 | Closed | 0 | 0.0 |
| 6 | Closed | 0 | 0.0 |
| 7 | Closed | 0 | 0.0 |
| 8 | Closed | 0 | 0.0 |
| 9 | Closed | 0 | 0.0 |
| 10 | Open | 1 | 10.0 |
| 11 | Open | 2 | 18.2 |
| 12 | Open | 2 | 16.7 |
| 13 | Open | 3 | 23.1 |
| 14 | Open | 3 | 21.4 |
| 15 | Open | 3 | 20.0 |
| 16 | Open | 3 | 18.8 |
| 17 | Open | 4 | 23.5 |
| 18 | Open | 4 | 22.2 |
| 19 | Open | 4 | 21.1 |
| 20 | Open | 4 | 20.0 |
| 21 | Open | 5 | 23.8 |
| 22 | Open | 5 | 22.7 |
| 23 | Open | 5 | 21.7 |
| 24 | Open | 5 | 20.8 |
| 25 | Open | 6 | 24.0 |
| 26 | Open | 6 | 23.1 |
| 27 | Open | 6 | 22.2 |
| 28 | Open | 6 | 21.4 |
| 29 | Open | 6 | 20.7 |
| 30 | Open | 7 | 23.3 |
| 31 | Open | 7 | 22.6 |
| 32 | Open | 7 | 21.9 |
| 33 | Open | 7 | 21.2 |
| 34 | Open | 7 | 20.6 |
| 35 | Open | 8 | 22.9 |
| 36 | Open | 8 | 22.2 |
| 37 | Open | 8 | 21.6 |
| 38 | Open | 8 | 21.1 |
| 39 | Open | 8 | 20.5 |
| 40 | Open | 9 | 22.5 |
| 40+ | Open | Unlimited | |

Appendix E. Wolf Management Trapping Decision Tree

This diagram illustrates the decision process that the CCTFWD utilize when considering initiating a departmental wolf trapping effort for management purposes. Management goals, staff availability, and safety of animals and humans are considered before initiating any trapping efforts.



Appendix F. Map of current Wildlife Management Zones.

Insert Map