STATE OF WASHINGTON February 2024

Periodic Status Review for the Gray Wolf

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Washington Department of
FISH AND WILDLIFE
Wildlife Program

The Washington Department of Fish and Wildlife (WDFW) maintains a list of endangered species and a list of threatened and sensitive species (Washington Administrative Codes 220-610-010 and 220-200-100, respectively). In 1990, the Washington Wildlife Commission adopted listing procedures developed by a group of citizens, interest groups, and state and federal agencies (Washington Administrative Code 220-610-110). The procedures include how species listings will be initiated, criteria for listing and delisting, a requirement for public review, the development of recovery or management plans, and the periodic review of listed species.

WDFW's procedures anticipate reviews of each endangered, threatened, or sensitive wildlife species at least every five years after the date of its listing by the Washington Fish and Wildlife Commission. The periodic status reviews are designed to include an update of the species status report to determine whether the status of the species warrants its current listing status or deserves reclassification. The agency notifies the general public and specific parties who have expressed their interest to WDFW of the periodic status review at least one year prior to the end of the five-year period so that they may submit new scientific data to be included in the review. The agency typically notifies the public of its recommendation at least 90 days prior to presenting the findings to the Fish and Wildlife Commission. In addition, if the agency determines that new information suggests that the classification of a species should be changed from its present state, the agency prepares documents to determine the environmental consequences of adopting the recommendations pursuant to requirements of the State Environmental Policy Act. In developing this periodic status review for the gray wolf, WDFW considered WAC 220-610-110 definitions and processes as well as the 2011 Wolf Conservation and Management Plan (Wolf Plan). In the event of a conflict between WAC 220-610-110 and the Wolf Plan, the WAC takes precedence. The WAC is the product of formal rule-making process through which a legally enforceable rule is established. The Wolf Plan provides important guidance that WDFW considers but it does not constitute a rule and is not binding.

This is the Periodic Status Review for the Gray Wolf. It contains a review of information pertaining to the status of gray wolves in Washington. It was available for a 90-day public comment period from May 18, 2023 through August 16, 2023. Comments received were considered during the preparation of the final periodic status review. The Department will present the results of this periodic status review to the Fish and Wildlife Commission at a meeting in March 2024.

Request this information in an alternative format or language at wdfw.wa.gov/accessibility/requestsaccommodation, 833-855-1012, TTY (711), or CivilRightsTeam@dfw.wa.gov.

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Cover photos by WDFW (inset) and Ben Maletzke (tracks from Chewuch pack documented in 2022)

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ACKNOWLEDGING THE INDIGENOUS PEOPLE, LAND AND CULTURE OF THE PACIFIC NORTHWEST

Since time immemorial, Indigenous People have graced the Pacific Northwest with rich traditions of many diverse cultures, languages, traditional knowledge expressed artistically and practically with intricate principles passed down throughout generations. As the first stewards of this land, Indigenous People from this part of the world are ancestrally engrained in the very fabric of this region that is known today as Washington State.

Washington Department of Fish and Wildlife (WDFW) acknowledges the American Indian Tribes as the original occupants of this land enjoyed today by all Washingtonians. Their historic reliance to hunt, fish, and gather traditional foods defines their inherent responsibilities to protect and steward the precious resources on the waters and landscape shared today by all Washington residents.

The very survival of the Pacific Northwest Tribes is a testament of resiliency of what they have endured and continue to endure throughout generations on this very landscape. Through scarred valor, many historical encounters of massacre, renunciation of religious freedom, systemic racism, cultural assimilation of native children through institutional residential schools, and the fight for their inherent rights and liberties, they have prevailed. Throughout this tormented history brought by colonization, abrogated treaties, infringement of civil rights, and the salmon protests of the 1960s, the Northwest Tribes and WDFW have founded a commitment of respect, unity, and alliance taught by the realities of the past.

Today tribal governments and WDFW work collaboratively to conserve and manage aquatic and terrestrial resources across the State and practice sound science to ensure successful resource management decisions. The Tribes and WDFW work together to ensure the sustainability of fish, wildlife, ecosystems, and culture for the next seven generations and beyond.

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ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

Gray wolves were formerly common throughout most of Washington, but they declined rapidly between 1850 and 1900. The primary cause of this decline was the killing of wolves by Euro-American settlers as ranching and farming activities expanded. Wolves were essentially eliminated as a breeding species from the state by the 1930s.

Gray wolves in Washington initially received federal protection in 1973, when Congress passed the Endangered Species Act (ESA). The 1987 Northern Rocky Mountain (NRM) Wolf Recovery Plan addressed gray wolf recovery in Idaho, Montana, and Wyoming, but did not include Washington. In 2008, the U.S. Fish and Wildlife Service (USFWS) published a final rule, which included wolves from the eastern third of Washington and Oregon, a small portion of north central Utah, and those from the three states in the NRM populations (known as a Distinct Population Segment [DPS]). The eastern third of Washington was included in the DPS designation to account for dispersing wolves from Idaho and Montana populations. However, federal recovery requirements applied only to the three states addressed in the 1987 recovery plan (Idaho, Montana, and Wyoming), and no federal wolf recovery requirements were, or have been, developed for any part of Washington. The federal status of wolves in Washington has changed from listed and delisted several times in different parts of Washington. As of this writing, wolves in the western two-thirds of the state are classified as endangered under the ESA and those in the eastern third are federally delisted as part of the recovered NRM wolf population.

Wolves were first listed as endangered by the Washington Department of Game in 1980 because of their historical occurrence in the state and subsequent extirpation. Since 1980, wolves have remained classified as endangered under state law (WAC 220-610-010) throughout Washington.

The first documented breeding pack in Washington was confirmed in 2008. The population has grown steadily since then; as of December 31, 2022, WDFW counted a minimum of 216 wolves in 37 packs with at least 26 successful breeding pairs. Documented mortality ranged from 0-18% annually and averaged 10% of the known population from 2008 – 2022. Legal harvest on tribal lands is the largest source of Washington's documented wolf mortality from 2008 – 2022 (36% of documented mortality), followed by agency lethal removal in response to conflicts with livestock (24%) and poaching (11%). All human-caused mortality during 2008 – 2022 constitutes 87% of known wolfmortality.

Since WDFW's first wolf population survey in 2008, the wolf population has increased for 14 consecutive years by an average of 23% per year. Although growth of the number of individual wolves documented has slowed in recent years, which is expected following initial recolonization of habitat formerly completely unoccupied by wolves, the number of documented packs and successful breeding pairs continues to increase. Northeast and southeast Washington wolf population growth has slowed due to wolf reoccupation of most of the available suitable habitat. The 2022 annual population revealed a continued increase in wolf packs and successful breeding pairs in the North and Central Cascades as well as novel presence in the South Cascades.

The Wolf Plan recognized that recovery objectives may need to be revisited as wolves recolonized Washington, stating, "The expectation is that over time, as wolves recolonize Washington, WDFW will be able to collect data from within the state to determine whether the model assumptions are appropriate. If future data reveal that the population dynamics of wolves in Washington are significantly different from those used in the model, these conclusions will need to be reevaluated. Incorporating wolf demographic data specific to Washington will allow WDFW to update predictions of population persistence during wolf recovery phases and to revise the recovery objectives, if needed" (pg. 67-68). It is worth noting that wolf population growth in Washington has largely occurred in the absence of federal protection as the majority (60-86% of packs 2011 – 2022, average 79%) of Washington wolf packs occur in the eastern third of Washington where wolves have not been federally protected since 2011.

Petracca et al. (2024) developed a model to estimate current and project future population dynamics of wolves in Washington. The previous model (Maletzke et al. 2016) used to inform the Wolf Conservation and Management Plan for Washington (Wolf Plan) was developed using data from wolves in the NRM as there was not enough empirical data available from Washington wolves for such an effort at the time. The model from Petracca et al. (2024) is the first effort of its kind developed using data from Washington's wolf population rather than data from wolves in other states. They used data from 74 collared wolves and yearly pup and pack counts to parameterize the model, and then projected statewide dynamics over 50 years. Model projections from Petracca et al. (2024) show mean population growth of 1.29 (95% CRI 1.26-1.33) during initial recolonization from 2009-2020 decreasing to 1.02 (95% PI 0.98-1.04) in the projection period (2021-2070). Their projections suggest that wolves have a ~100% probability of colonizing the Southern Cascades and Northwest Coast recovery region by 2030, regardless of alternative assumptions about how dispersing wolves select new territories. In the model (Petracca et al. 2023), only scenarios that included harvest mortality (removal of 5% of the population every six months), increased lethal removals (removal of 30% of the population every four years), and cessation of immigration from out of state resulted in low probabilities (i.e., probabilities <0.30) of meeting recovery goals in the next 50 years. However, although the probability of meeting recovery goals was predicted to be low in those scenarios, all management scenarios that were analyzed resulted in a predicted geometric mean of population growth that was at or above 1, indicating long- term population stability or growth of Washington's wolf population, depending on the scenario.

Washington's wolf population has far exceeded the Wolf Plan objectives for delisting in terms of the number and persistence of successful breeding pairs. However, the Wolf Plan objectives also consider wolf presence in each of the state's three recovery regions (Figure 8); furthermore, all listed classifications (e.g., endangered, threatened, sensitive) consider a significant portion of the species' range within the state. WAC 220-610-110 (section 2.9) defines a "significant portion of its range" as "that portion of a species' range likely to be essential to the long term survival of the population in Washington."

Model projections from Petracca et al. (2024) indicate Washington's wolf population currently occupies an area essential to their long-term survival and is not in danger of extinction or becoming

endangered with their current distribution and population trend. However, the geographic distribution standards of the Wolf Plan have not yet been met for the Southern Cascades and Northwest Coast recovery region. No successful breeding pairs have been documented yet in the Southern Cascades and Northwest Coast recovery region, although the first known pack was documented in this region as of 2022. Although individual wolves have been detected in western Washington (i.e., west of the Cascades [where models indicate most unoccupied, suitable wolf habitat in the state remains; Maletzke et al. 2016, Petracca et al. 2024]), no known packs or reproductive individuals have been documented as of 2022.

Based on 14 consecutive years of population growth, population modeling predictions that indicate Washington's wolf population is robust and will continue to grow and expand its range (including in the Southern Cascades and Northwest Coast recovery region), and ongoing state and federal protections, we conclude that the wolf does not meet the definition of State Endangered, which requires that the species is "seriously threatened with extinction" (WAC 220-610-110).

Similarly, we believe that the wolf does not best fit the definition of State Threatened, which requires that a species is "...likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats" (WAC 220-610-110). Current information does not indicate that wolves are threatened with extinction or likely to be threatened with extinction in the foreseeable future in Washington State.

Our recommendation is to reclassify the wolf to State Sensitive, "vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats" (WAC 220-610-110). This status reflects the significant progress toward recovery that Washington's wolf population has made since the original state listing in 1980 but recognizes that wolves remain vulnerable in western Washington and should continue to be managed for recovery within the state as a protected species. Continued population growth and range expansion will depend on the robustness of source populations in eastern Washington (as well as neighboring states and provinces) and cooperative management to ensure sources of human-caused mortality do not impede recovery.

We recommend observing the Wolf Plan recovery targets for delisting of at least four successful breeding pairs in each recovery region, with at least 15 breeding pairs statewide for at least three years or at least 18 breeding pairs statewide for at least one year. As stated in the Wolf Plan, it should be emphasized that these numbers represent only minimum criteria for delisting, and not a population cap or ceiling at which wolves would or should ultimately be managed. We believe that these targets are attainable through natural recolonization and ensure adequate distribution of reproducing wolves throughout the state. We do not recommend delisting wolves at this time.

Under State Sensitive status, wolves would be protected from unlawful take under RCW 77.15.130 and protections precluding hunting would remain in place. Wolves would continue to be protected from

malicious and intentional harassment. RCW 77.15.130 outlines that Sensitive wildlife shall not be hunted, taken, or harassed. In addition, Sensitive status is a sub-category of protected wildlife, which "shall not be hunted or fished." RCW 77.08.010(52); 77.12.020(5). Wolves would also remain on the list of Priority Habitats and Species (PHS). Under state law (RCW 77.12.395), proactive nonlethal deterrents must be included in development of conflict mitigation guidelines regardless of listing status.

The definitions of State Threatened and State Sensitive under WAC 220-610-110 are very similar and both fall under the designation of protected wildlife under RCW 77.15.130. **Appendix A** shows differences in conservation/management provisions for wolves under endangered and protected state species classifications and can assist policy makers in weighing the implications of future management actions. WDFW received comments through the Draft Periodic Status Review public process discussed in **Appendix B**.

WDFW remains committed to the recovery and long-term sustainability of Washington's wolf population. WDFW will continue to work closely with partners, stakeholders, and communities, just as we have over the past decade, on the recovery, conservation, and management of wolves in Washington, with a focus on reducing conflict between wolves and livestock, emphasizing proactive nonlethal conflict deterrence, achieving statewide recovery objectives, and supporting wolf expansion into all suitable habitat statewide.

INTRODUCTION

This periodic status review summarizes the biology, population status, factors affecting continued existence, and recent management actions for gray wolves (*Canis lupus*) in Washington. This review also assesses whether this species should retain its current endangered status under state law or be reclassified. The Washington Department of Fish and Wildlife (WDFW) has not previously published a status report for gray wolves since their initial state listing in 1980.

DESCRIPTION

The gray wolf (Figure 1) was once the most widely distributed land mammal, and broadly acknowledged as one of the most adaptable and resilient, inhabiting all vegetation types in the Northern Hemisphere (Mech and Boitani 2003a). Gray wolves are the largest wild member of the canid family. Typical weights of adult gray wolves in Washington are 80-105 pounds for males (average 92 pounds) and 65-80 pounds for females (average 75 pounds). Pelage color varies in wolves from white to grizzled gray to brown to coal black (Mech 1970). Wolves in Washington may be gray or black; both black and gray color phases can be found in a pack or in one litter of pups. Animals with dark pelage sometimes progressively change to white over time, perhaps due to old age, physiological stress, or genetic factors (Gipson et al. 2002).

Figure 1. Gray wolf (*Canis lupus*) (*Photo by Craig M. Monette*).

Observers sometimes mistake coyotes for wolves, but a number of physical features separate the two (Figure 2). Wolf tracks are typically 4.0-4.5 to 5.0-5.5 inches long and are noticeably larger than those of coyotes (2.0-2.5 inches long).

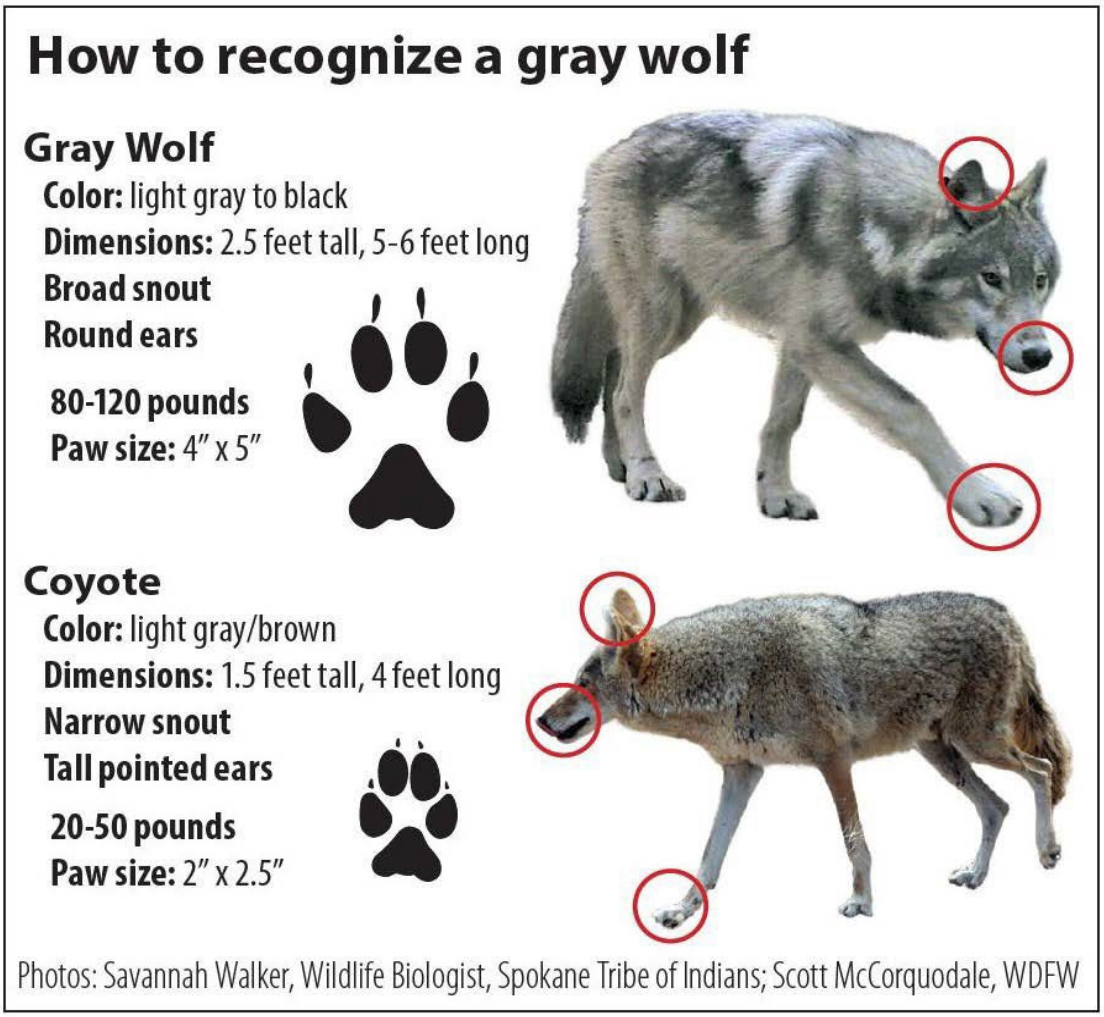

Figure 2. Characteristics of gray wolves compared with coyotes.

Some large domestic dog breeds and wolf-dog hybrids may also be misidentified as wolves. Wolves can be distinguished from dogs by their longer legs, larger feet, wider head and snout, narrow body, and straight tail. Other identifying characteristics require closer examination than is possible in field settings with live animals. Some wolf-dog hybrids are indistinguishable in appearance from wild wolves, but characteristics that can be used to distinguish them from wolves include a curled tail, broader chest, shorter legs, and a distinct husky mask. In many instances, behavior distinguishes wild wolves from hybrids and dogs (Boyd et al. 2001, Duman 2001).

LEGAL STATUS

Federal Status

The status of gray wolves under federal law has been litigated for many years and their federal status has changed several times. Since 2011, wolves in the eastern third of Washington have not been listed under the federal Endangered Species Act (ESA) but are currently classified as endangered under state law. Currently, wolves are federally delisted in Washington east of Highway 97 from the British Columbia border south to Monse, Highway 17 from Monse south to Mesa, and Highway 395 from Mesa south to the Oregon border. Wolves are federally listed west of these highways (Figure 3).

Gray wolves in Washington initially received federal protection in 1973 under the predecessor of the ESA; they were protected under the ESA in 1974. The 1987 Northern Rocky Mountain (NRM) Wolf Recovery Plan addressed gray wolf recovery in Idaho, Montana, and Wyoming, but did not include Washington. In 2008, the U.S. Fish and Wildlife Service (USFWS) published a final rule, which included wolves from the eastern third of Washington and Oregon, a small portion of northcentral Utah, and those from the three states in the NRM populations (known as a Distinct Population Segment [DPS]). The eastern third of Washington was included in the DPS designation to account for dispersing wolves from Idaho and Montana populations. However, federal recovery requirements applied only to the three states addressed in the 1987 recovery plan (Idaho, Montana, and Wyoming), and no federal wolf recovery requirements were, or have been, developed for any part of Washington.

In 2009, the USFWS published a final rule to remove the NRM wolf population, excluding Wyoming, from protection under the ESA (74 FR 15123, April 2, 2009). However, the rule was vacated the following year by a federal judge whose action restored federal protection. The situation changed again in 2011, when federal lawmakers (in a section of the Department of Defense and Full-Year Appropriations Act) directed the Secretary of the Interior to reissue the 2009 delisting rule. As a result, wolves in the NRM DPS, except Wyoming and including the eastern third of Washington, were once again removed from ESA protection. Throughout this time, wolves in the western two-thirds of Washington remained classified as endangered under the ESA (Figure 3).

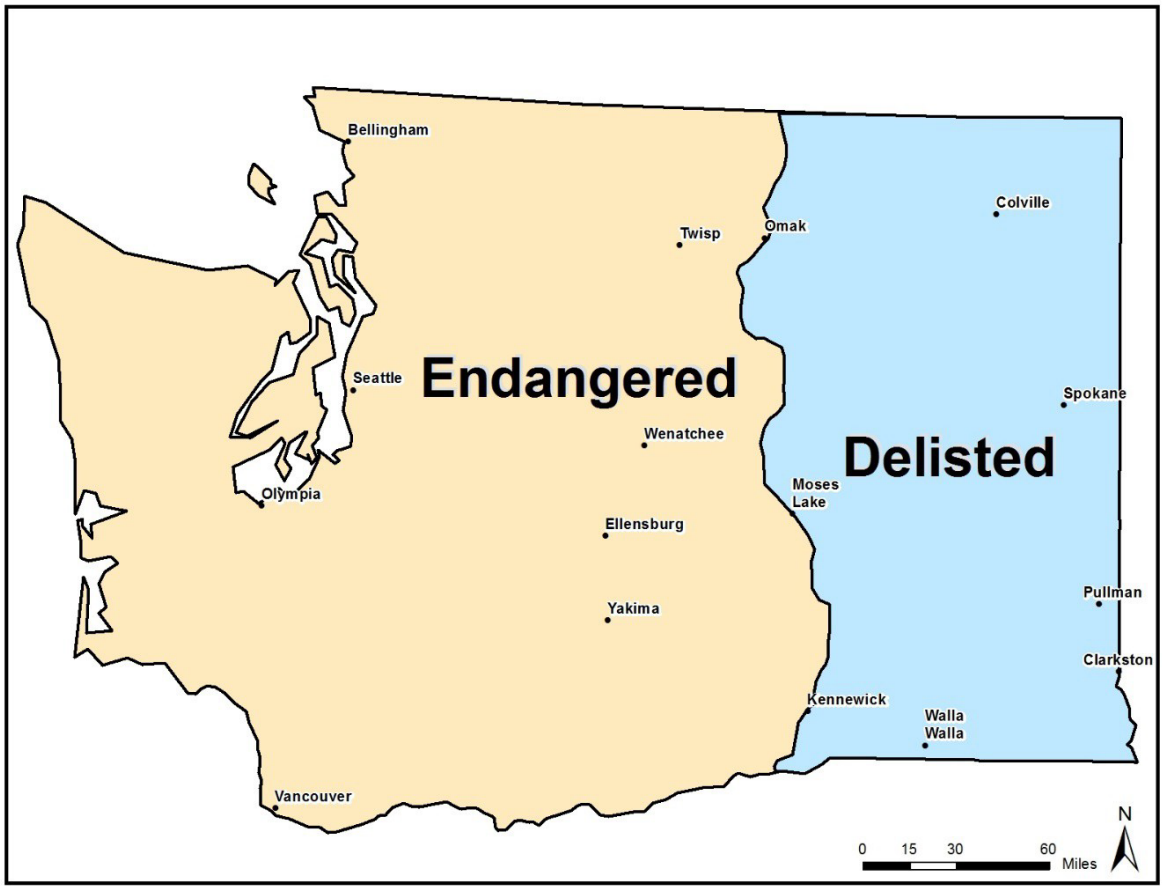

Figure 3. Federal classification of wolves in Washington.

In 2013, the USFWS issued a proposed rule (78 FR 35664, June 13, 2013) to end ESA protection for gray wolves in the contiguous United States (U.S.), including those in the western two-thirds of Washington, by removing them from the list of endangered and threatened wildlife. Further, the proposed rule would maintain endangered status for the Mexican wolf (*Canis lupus baileyi*) and would reclassify the Eastern wolf (*Canis lupus lycaon)* from a subspecies of the gray wolf to a separate species (*Canis lycaon*). The rule also served as the final status review for wolves in the Pacific Northwest, determining that listing was not warranted.

On November 3, 2020, the USFWS published a final rule (85 FR 69778, November 3, 2020) to remove the gray wolf (in the lower-48 U.S. excluding the delisted NRM and Mexican gray wolf) from the List of Endangered and Threatened Wildlife because they found that the best available scientific information indicated that the listed gray wolves no longer met the definitions of a threatened species or endangered species under the Endangered Species Act due to recovery. The final rule went into effect on January 4, 2021 and wolves in the western two-thirds of Washington were federally delisted, until February 10, 2022, when a U.S. District Judge's order vacated the delisting rule. As a result of this

vacatur, wolves in the western two-thirds of Washington were once again listed as a federally endangered species. Wolves had been (since 2011) and remained federally delisted in the eastern third of Washington.

Multiple parties appealed the district court's February 10, 2022 order to the U.S. Court of Appeals for the Ninth Circuit. In January 2023, an abeyance in the appeals process was ordered by the court. As part of the abeyance, the USFWS committed to conduct a status review of wolves in the lower-48 states and commence a stakeholder engagement effort.

To address the concern about nationwide recovery for gray wolves, the USFWS announced on February 2, 2024 that the agency would undertake a process to develop a first-ever nationwide gray wolf recovery plan by December 12, 2025. The USFWS also announced a new effort to create and foster a national dialogue led by a third-party neutral facilitator around how communities can live with gray wolves to include conflict prevention, long-term stability, and community security.

WDFW is the primary agency responsible for managing wolves in the eastern third of Washington and cooperates with the USFWS under Section 6 of the ESA in the western two-thirds of the state. Tribal governments manage wolves that inhabit their tribal lands and the National Park Service manages wolves that inhabit national parks. One tribe, the Confederated Tribes of the Colville Reservation, also have off-reservation hunting rights in an area referred to as the former "North Half" and adopt wolf hunting regulations in that area.

Federal status review of the gray wolf in the western U.S. Following legislation that became state law in Idaho and Montana to increase wolf harvest and reduce wolf populations, the USFWS received a petition (on June 1, 2021, dated May 26, 2021) to list the gray wolf NRM DPS or a new western U.S. DPS as a threatened or endangered species under the ESA. The USFWS received a second, similar petition on July 29, 2021. The first petition proposed listing a NRM DPS consisting of Montana, Idaho, Wyoming, the eastern one-third of Washington and Oregon, and a small portion of north-central Utah. Both petitions also proposed some alternative western U.S. DPS to include all, or part, of the NRM states with the addition of California, Colorado, Nevada, Utah, and in one petition, northern Arizona. This initiated a 90-day finding to determine if petitioners presented information that the requested action may be warranted. As a result of the 90-day finding, the USFWS found that the petitions presented substantial, credible information indicating that a listing action may be warranted and initiated a comprehensive status review of the gray wolf in the western U.S. The USFWS found the petitioners presented substantial information that potential increases in human-caused mortality may pose a threat to the gray wolf in the western U.S. The USFWS also found that new regulatory mechanisms in Idaho and Montana may be inadequate to address this threat. Therefore, the USFWS found that gray wolves in the western U.S. may warrant listing.

On February 2, 2024, the USFWS announced a not warranted finding for the two petitions described above to list gray wolves under the ESA in the Northern Rocky Mountains and the western U.S. The

USFWS conducted a comprehensive analysis using robust modeling that incorporated the best available data from federal, state and Tribal sources, academic institutions, and the public. The model assessed various threats, including human-caused mortality, existing regulatory mechanisms, and disease. The analysis indicates that wolves are not at risk of extinction in the western U.S. now or in the foreseeable future (USFWS 2023).

State Status

Wolves were first listed as endangered by the Washington Department of Game in 1980 because of their historical occurrence in the state and subsequent extirpation. Since 1980, wolves have remained classified as endangered under state law (WAC 220-610-010) throughout Washington. State law RCW 77.15.120 protects endangered species from hunting, possession, malicious harassment, and killing; penalties for illegally killing a state endangered species range up to $5,000 and/or one year in jail. Other statutory provisions apply to protected wildlife: RCW 77.15.130(1)(c) prohibits the hunting, possession or malicious harassment of threatened or sensitive wildlife unless authorized by rule of the commission, a WDFW permit, or a federal permit; the maximum penalty for violations is 90 days in jail and/or a $1,000 fine.

DISTRIBUTION

Globally, wild gray wolf populations are circumpolar, found in North America, Europe, and Asia (Boitani et al. 2018). In North America, gray wolves are robust and widespread throughout Alaska and Canada, and currently occupy ~90% of their historical range there (Boitani 2003). Wolves occupy a fraction of their historical range in the lower 48 U.S. and Mexico but exist in two biologically recovered populations in the Northern Rocky Mountains (Idaho, Montana, Wyoming, and parts of Oregon and Washington) and Western Great Lakes (Michigan, Minnesota, and Wisconsin) (USFWS 2020, Figure 4). Small numbers of gray wolves inhabit California and Colorado and a growing population of Mexican gray wolves occurs in Arizona, New Mexico, and Mexico (Figure 4). In Washington, wolves historically occurred throughout most of the state before 1800 (Young and Goldman 1944). Currently, in Washington, wolves occur in the northeast portion of the state, the Blue Mountains in the southeast, the North and Central Cascades range, with one pack in the South Cascades (WDFW et al. 2023, Figure 5).

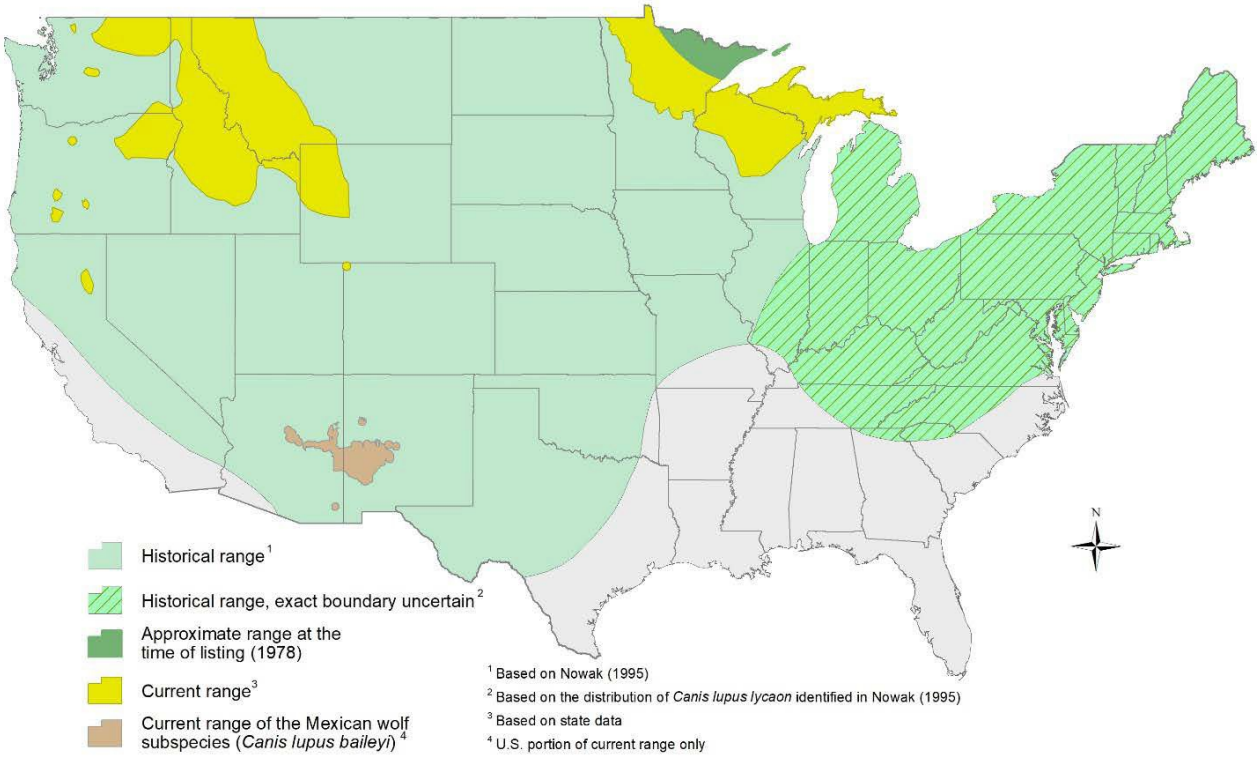

Figure 4. Historical range and current range of the gray wolf (*Canis lupus*) in the lower 48 United States (USFWS 2020b). The range of wolves in Washington state has expanded since 2020 as shown in Figure 5.

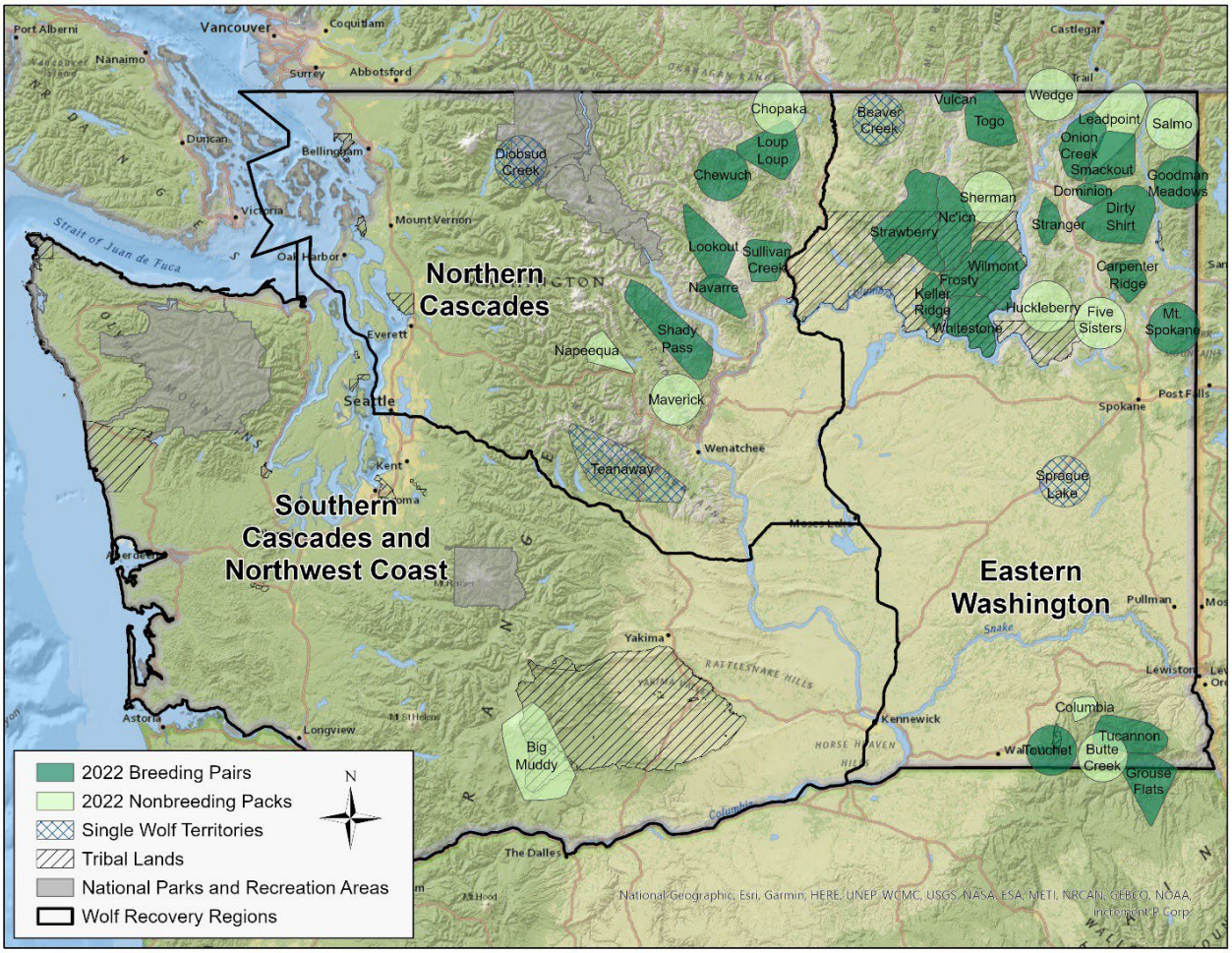

Figure 5. Known wolf packs, breeding pairs, and single wolf territories in Washington, 2022, not including unconfirmed or suspected packs or border packs from other states and provinces (WDFW et al. 2023).

NATURAL HISTORY

(Text adapted and updated from 2011 Wolf Conservation and Management Plan, Wiles et al. 2011)

Habitat Requirements

As with other aspects of their ecology, wolves are generalists in their habitat use. Within their historical geographic distribution, wolves occurred in every habitat with large ungulates, including forests, deserts, prairies, swamps, tundra, and coasts (Fuller et al. 2003). Elevations ranging from sea level to mountains were occupied. Wolves are adaptable enough that they will also enter and forage in towns and farms, cross highways and open environments, and den near sites heavily disturbed by people such as logging sites and military firing ranges (Fuller et al. 2003). Surviving wolf populations in much of western North America, including the northern Rocky Mountain states and British Columbia,

predominantly inhabit forests and nearby open habitats, with prey availability and extent of human tolerance strongly influencing occupancy.

Petracca et al. (2024) used a resource selection function to determine the relative suitability of wolf territories for wolf colonization in Washington using daily locations of Washington wolves within 99% minimum convex polygons of annual pack territories. Wolves were more likely to select home ranges with greater relative deer abundance, forest cover, shrubland cover, distance from state highways, and where public grazing allotments were present. Wolves were also more likely to select home ranges in areas with lower human population density, agricultural cover, road density, grassland cover, and terrain ruggedness. Wolves also selected for areas at intermediate elevation. Areas of greatest relative selection for wolf territories largely followed forested, undeveloped areas, including the national forests in the Northeast, the Northern and Southern Cascades, and the Olympic Peninsula (Figure 6, Petracca et al. 2024).

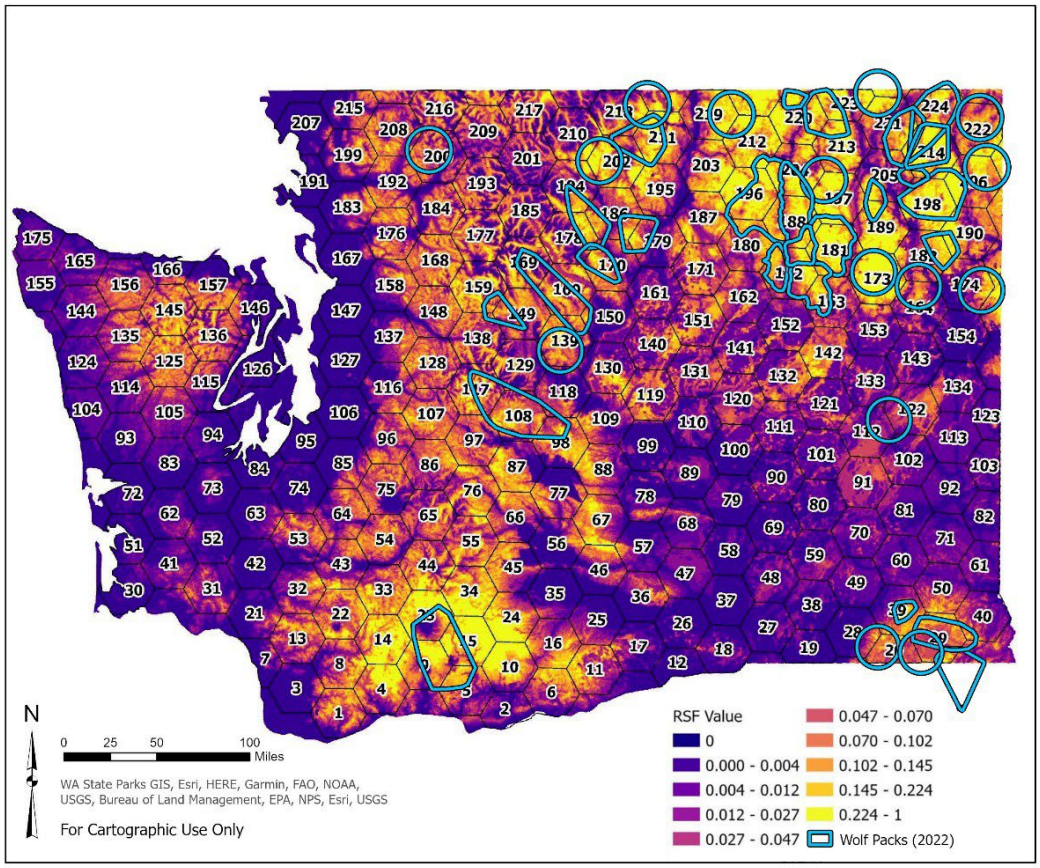

Figure 6. Predicted estimate of second-order resource selection function for wolves in Washington State, USA, based on daily GPS collar data from 74 individuals (with 2022 known wolf pack territories superimposed). Figure reproduced from Petracca et al. 2024.

Diet and Foraging

Gray wolves are opportunistic carnivores that are keenly adapted to hunt medium to large prey species, such as deer, elk, and moose. Ungulate species comprise different proportions of wolf diets, depending on their relative abundance and distribution within territories (Peterson and Ciucci 2003). In the central and northern Rocky Mountains of the U.S. and Canada, elk are often the primary prey of wolves, but deer and moose are more important in some areas (Peterson and Ciucci 2003). In Washington, primary prey species for wolves include white-tailed deer, mule deer, moose, and elk (Spence 2017, Satterfield et al. 2022). In northeast Washington, white-tailed deer and moose are the primary prey items for wolves (Spence 2017, Satterfield et al. 2022). In central Washington, wolves feed primarily on mule deer (Spence 2017, Satterfield et al. 2022).

Wolves also prey on smaller animals, scavenge carrion, and even eat fish and vegetation. In addition to deer, moose, and elk, fecal DNA metabarcoding technology detected six smaller prey species in wolf fecal samples from northeast Washington, including small mammals (snowshoe hare, red squirrel, meadow vole, and deer mouse) and birds (ruffed grouse and European starling; Shi et al. 2021). Research in northwestern Montana has also documented non-ungulate prey such as tree squirrels, other small mammals, ruffed grouse, ravens, striped skunks, beavers, coyotes, porcupines, and golden eagles (Boyd et al. 1994, Arjo et al. 2002). In coastal Alaska and British Columbia, wolves include salmon, sea otters, and marine mammals in their diet (Person et al. 1996, Darimont et al. 2003, 2008, Watts et al. 2010, Roffler et al. 2021, Roffler et al. 2023), with greater use of these prey groups on islands compared to mainland sites (Darimont et al. 2009).

Wolves scavenge opportunistically on vehicle- and train-killed ungulates, winterkills, and on kills made by other carnivores, particularly cougars. Wolves scavenge the remains of domestic livestock and game at carcass disposal sites. Wolves also kill and feed on domestic livestock such as cattle, sheep, llamas, horses, and goats.

Home Range and Movements

A pack establishes an annual home range or territory and defends it from trespassing wolves. From mid-April to early May until September or early October, pack activity is centered at or near the den or rendezvous sites, as adults hunt and bring food back to the pups. Rendezvous sites are specific resting and gathering areas that are used by wolf packs after pups emerge from the den. These sites are often in wet meadows (Ausband et al. 2010) or forest openings near the den, but sometimes are several miles away within the pack territory. By late summer/early fall, pups are large enough to travel, feed on kills, and possibly hunt with the pack. The pack hunts throughout its territory until the following spring. Wolves use different areas of their territory daily, which suggests rotational use that may improve hunting success (Demma and Mech 2009), and territory boundaries and sizes may vary from year to year. Similarly, a wolf pack may travel in its territory differently from one year to the next because of

changes in prey availability or distribution, conflicts with neighboring packs, or the establishment of a new neighboring pack. Other attributes such as elevation, land use, land ownership patterns, prey species presence, and relative prey abundance make each pack's territory unique. Rich (2010) reported that territory size in general increases with greater terrain ruggedness (which tends to reduce prey availability and vulnerability), higher human densities, and higher levels of lethal control, but decreases with larger numbers of neighboring packs. Mean territory size of wolves in Washington (2009 – 2020) was 760.03 (SE = 57.12) km^2 (Petracca et al. 2024).

Gray wolves rarely disperse before 10 months of age, and most commonly disperse between one to three years of age (Mech and Boitani 2003b, Jimenez et al. 2017). Generally, by the age of three years, most wolves will have dispersed from their natal pack to locate social openings in existing packs or find a mate and form a new pack (Mech and Boitani 2003b, Jimenez et al. 2017). Dispersers may become nomadic and cover large areas as lone animals, or they may locate unoccupied habitats and members of the opposite sex to establish their own territorial pack (Mech and Boitani 2003b). Wolves appear to disperse preferentially to areas occupied by other wolves, using scent marking and howling to locate other animals (Ray et al. 1991, Mech and Boitani 2003b). Boyd and Pletscher (1999) indicated that dispersers in their study moved toward areas with higher wolf densities than found in their natal areas. Dispersal distances in North America typically range from 65 to 154 km (40 to 96 miles) (Boyd and Pletscher 1999, Jimenez et al. 2017), although dispersal distances of several hundred kilometers are occasionally reported. The ability to disperse long distances allows wolf populations to quickly expand to recolonize vacant habitats as long as rates of human-caused mortality are sustainable.

Reproduction and Survival

Wolves are highly social and live in packs (Mech and Boitani 2003b). The fundamental unit of wolf social structure is the male and female breeding pair (Mech 1970, Mech and Boitani 2003b). Packs are formed when male and female wolves develop a pair bond, breed, and produce pups. The pack typically consists of a socially dominant breeding pair, their offspring from the previous year, and new pups. Other breeding-aged adults may be present, but they may or may not be related to the breeding pair (Mech and Boitani 2003b). The pack hunts, feeds, travels, and rests together. Maintaining the pack social unit is important for acquiring food (Stahler et al. 2006, Sand et al. 2008) and enhancing pup survival (Brainerd et al. 2008, Stahler et al. 2020). The pack also shares pup-rearing responsibilities, including hunting and tending pups at the den or at a series of rendezvous sites. The average pack size in Washington (2009-2020) was 4.67 (SE = 2.54; Petracca et al. 2024).

Several studies show numerous advantages of living in packs and maintaining larger pack sizes, such as better success hunting elk (MacNulty et al. 2012), ability to adapt to prey size (Barber-Meyer et al. 2016), higher pup production (Stahler et al. 2013, Stahler et al. 2020), better success in defending against territorial attacks from other wolves (Cassidy et al. 2015), greater ability to compete with scavengers (Wilmers et al. 2003, Vucetich et al. 2004), more successful recovery from mange infestation

(Almberg et al. 2015), and moderating the impacts of human-caused mortality (Cassidy et al. 2023).

Wolves normally do not breed until at least two years of age (Fuller et al. 2003). Breeding usually occurs only between the dominant male and female in a pack. In the northern Rockies, mating peaks in mid- to late February (Boyd et al. 1993). Wolves localize their movements around a den site and give birth in late March to early May (typically about April 15) after a 63-day gestation period. Pups are moved to a series of rendezvous sites after reaching about eight weeks of age, which is about the time that weaning occurs.

Litters usually average four to six pups (Fuller et al. 2003). Most packs produce only one litter annually, but on some occasions more than one female in a pack may breed, resulting in multiple litters (Fuller et al. 2003, Stahler et al. 2020). In Washington, from 2009-2020, the mean size of 6-month-old litters (i.e., integrating both litter size at birth and survival to 6 months of age) was 1.5 (SE = 1.73; Petracca et al. 2024). VonHoldt et al. (2008) documented an average generation time (i.e., average age at which females give birth to their offspring) of 4.16 years among wolves at Yellowstone National Park.

Pup survival is highly variable and is largely influenced by disease, predation, and nutrition (Johnson et al. 1994, Fuller et al. 2003, Mech et al. 2008). In the northern Rocky Mountain states from 1982 to 2004, annual pup survival was lower in northwestern Montana (40%) than in central Idaho (89%) and the greater Yellowstone area (76%; Smith et al. 2010). In Yellowstone National Park, pup survival varied between 73 and 81% from 1996 to 1998, declined to 45% in 1999 because of a likely outbreak of canine distemper, and rebounded to 77% the following year (Smith et al. 2000, Smith and Almberg 2007). Pup survival again dipped to low levels in 2005 (32%) and 2008 (29%) due to canine distemper (Smith et al. 2006, Smith et al. 2009). Wolf pup survival from birth to midwinter averaged 29% (range 14 to 58%) in Wisconsin over a 28-year period (Wydeven et al. 2009a). In this population, the lowest pup survival occurred in years coincident with an outbreak of parvovirus (Wydeven et al. 1995).

Pack size and breeder presence and turnover have been shown to be important factors in pup survival and recruitment as well as maintenance of the pack social unit. Mitchell et al. (2008) showed that larger packs of 10 or more wolves in Idaho, Montana, and Wyoming have a 90% or greater chance of successfully rearing two or more pups through December of a given year, whereas smaller packs are much less likely to do so. For example, depending on location within these states, packs of four to five animals had only a 20-73% chance of successfully raising at least two pups to year's end. The unexploited wolf packs in Yellowstone National Park have maintained a long-term average of 10 individuals per pack and sometimes support larger numbers (Stahler et al. 2020), providing additional evidence that this pack size may be advantageous. Ausband and Mitchell (2021) found that reproductive rates were generally lower for wolves in small groups (1–4 adults) compared to those in large groups (≥8 adult wolves). Pup survival, however, was slightly higher for wolves in small groups compared to large groups except at very high densities. Large pack size resulted in less birthing failure, more female breeders per group, larger litter sizes, and ultimately more pups recruited per group.

In Brainerd et al.'s (2008) study of the impacts of the loss of breeding wolves from a pack, they found that at least one pup survived in 84% of cases regardless of the sex of the remaining breeder. In packs of

six or more, pups survived more frequently compared with smaller groups; non-breeding wolves in the pack benefited pup survival. The number of adult-sized wolves remaining after breeder loss, along with pup age, had the greatest influence on pup survival. Wolves holding the territory reproduced the following season about half the time, and a greater proportion reproduced where one breeder was replaced versus cases where both breeders needed to be replaced. Wolf packs dissolved and abandoned their territories following breeder loss in 38% of cases. Where groups dissolved, wolves reestablished territories in over half of cases, with neighboring wolves taking over territories in a few cases. Fewer groups dissolved where breeders remained versus cases where all breeders were lost. Pack size following breeder loss was smaller where packs dissolved compared with cases where packs did not dissolve. Similarly, Borg et al. (2015) found that the loss of a breeder preceded about three quarters of cases of pack dissolution; packs were more likely to dissolve if a female or both breeders were lost and pack size was small. Packs that lost breeders exhibited lower denning and recruitment rates. Cassidy et al. (2023) found that the human-caused mortality of any wolf in a pack decreased odds of pack persistence by 27% and reproduction the following year by 22%; the human-caused mortality of a pack leader decreased the odds of pack persistence by 73% and the odds of reproduction by 49%. Although these studies show the importance of breeders in maintaining pack cohesion, breeder loss and pack dissolution had no significant effects on short- or long-term population dynamics (similar to findings of Brainerd et al. [2008]), indicating the wolf's ability compensate for such losses through mechanisms such as reduced natural mortality, increased reproductive output/recruitment, and immigration via dispersal.

Ausband et al. (2017a) also illustrated the importance of breeders to pup survival—in their study of harvest and group effects on wolf pup survival, the number of breeders present when pups reached 15 months of age was a strong predictor of pup survival. Large pack sizes and breeder stability increased pup survival in harvested wolf populations, but turnover of breeding males and the presence of older, non-breeding males decreased pup survival. In years where harvest occurred, the average effect of one additional adult in a pack was associated with a 1.14 times increase in pups reaching 15 months old. At 15 months of age, increasing the number of breeders present by one was associated with a nearly four times increase in the probability of survival during years with harvest. Turnover of breeding males was associated with more than three times decrease in the probability of pup survival. Although increasing pack size generally had a positive effect on pup survival, each additional two-year-old or older non-breeding male present when pups reached 15 months of age was associated with a nearly three times decrease in the probability of pup survival. Ausband et al. (2017b) further elucidated how breeder turnover affects breeding opportunities of subordinates and the number and sex ratios of subsequent litters of pups. Breeder turnover led to shifts in the reproductive hierarchies within groups and the resulting changes to group composition were highly variable and depended on the sex of the breeder lost. Harvest had no effect on the frequency of breeder turnover, suggesting that even in unexploited wolf populations, breeder turnover may be common.

Few wolves in the wild live more than 4-5 years (Fuller et al. 2003), although maximum age can reach 15 years (Ausband et al. 2009). Wolves die from a variety of causes, which are usually classified as either natural or human-caused. Natural deaths result from territorial conflicts between packs, injuries while

hunting, old age, disease, starvation, or accidents. In protected populations where human-caused mortality may be lower, most wolves die from being killed by wolves from neighboring packs, disease, or starvation (Fuller et al. 2003, USFWS 2020). Because most wolves live in human-dominated landscapes, mortality probably does not regulate most wolf populations. Humans are the largest cause of wolf mortality as a whole and are the only cause that has the potential to significantly affect population recovery; effects of human-caused mortality are more pronounced in smaller populations (Mitchell et al. 2008, Smith et al. 2010, USFWS 2020). Mitchell et al. (2008) reported that humans were responsible for 71-87% of wolf deaths in five of six regions of Idaho, Montana, and Wyoming from 1979 through 2005, whereas only 23% of mortalities in Yellowstone National Park were human-related. Cassidy et al. (2023) reported high levels of human-caused mortality (22-58% of mortalities of collared wolves) even in national parks. Human-caused mortality includes control actions to resolve conflicts, illegal killings, legal harvest, and vehicle collisions.

Human-caused mortality may fracture packs and affect pup survival and recruitment depending on which pack members are removed (Mech and Boitani 2003b, Cassidy et al. 2023). However, pack social structure is adaptable and resilient. Typically, the loss of offspring (young of the year, yearlings, or older offspring) does not result in the disruption of the pack because the breeding pair continues to hold the territory (Mech and Boitani 2003b). A wolf pack will generally maintain its territory if both members of the breeding pair survive, and even if one member of the breeding pair is killed, the pack may hold its territory until a new breeder arrives (Mech and Boitani 2003b). If both members of the breeding pair are killed, the remaining members of the pack may disperse, starve, or remain in the territory until an unrelated dispersing wolf arrives and mates with one of the remaining pack members (Mech and Boitani 2003b, Brainerd et al. 2008). If breeders are killed, they can typically be quickly replaced from either within or outside the pack, and pups can be reared by another pack member if their parents die (Packard 2003, Mech 2006, Brainerd et al. 2008, Borg et al. 2015).

Documented mortality ranged from 0-18% annually and averaged 10% of the known population from 2008 – 2022 (Table 1). With this level of documented mortality, Washington's wolf population has grown at an average rate of 23% annually since breeding wolves were first documented in the state (Table 2). Legal harvest on tribal lands is the largest source of Washington's documented wolf mortality from 2008 – 2022 (36% of documented mortality), followed by agency lethal removal in response to conflicts with livestock (24%) and poaching (11%; Table 1, Figure 6). All human-caused mortality (including all sources of mortality in Table 1 except "Natural" and "Unknown") during 2008 – 2022 constitutes 87% of known wolf mortality.

Table 1. Causes of documented wolf mortality in Washington, 2008–2022.

Year	Minimum wolf count	Natural	Under investigation and/or illegal killing	Killed by people feeling threatened	Legal killing under WAC 220-440-080	Vehicle collision	Unknown	Legal harvest	Agency removal	Total known mortalities
2008	5	0	0	0	0	0	0	0	0	0
2009	14	0	0	0	0	0	0	0	0	0
2010	19	0	0	0	0	0	2	0	0	2
2011	35	0	0	0	0	0	0	0	0	0
2012	51	0	0	1	0	0	1	0	7	9
2013	52	1	0	3	0	0	0	1	0	5
2014	68	3	0	4	0	0	2	0	1	10
2015	90	0	0	3	0	0	1	3	0	7
2016	115	0	2	2	0	0	0	3	7	14
2017	122	0	4	0	2	2	0	3	3	14
2018	126	0	2	0	0	0	0	6	4	12
2019	145	1	1	1	2	0	1	6	9	21
2020	178	2	0	1	0	1	1	8	3	16
2021	206	0	2	0	0	4	0	22	2	30
2022	216	7	9	0	3	0	1	11	6	37
Total	-	14	20	15	7	7	9	63	42	177
% overall known mortality	-	8	11	8	4	4	5	36	24	

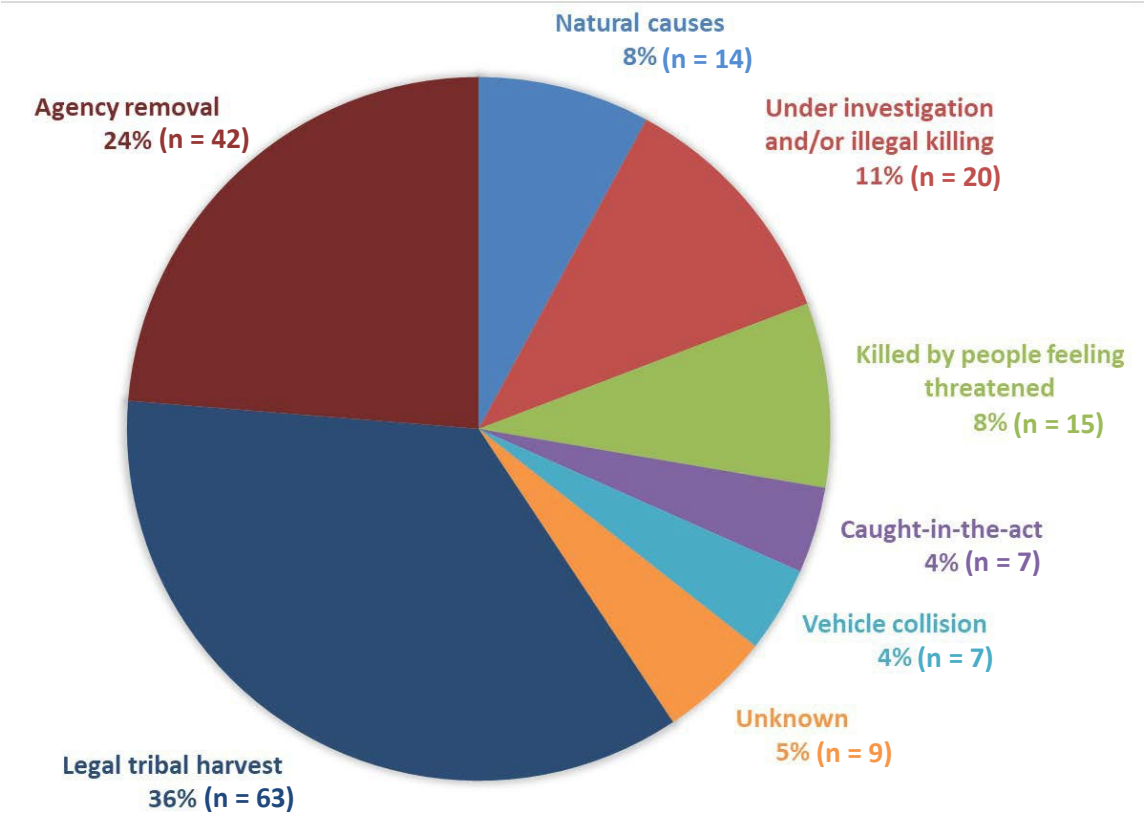

Figure 7. Causes of documented wolf mortality in Washington, 2008-2022. The extent of undocumented mortality is not known or represented.

POPULATION AND HABITAT STATUS

North American Population

Historically, wolves ranged over nearly all North America north of Mexico City, except possibly parts of California (Boitani 2003). Alaska and Canada historically and currently support a large, widespread, and contiguous population of wolves (Boitani 2003), which has been estimated at approximately 8,000-11,000 individuals in Alaska, about 15,000 wolves in western Canada, and about 12,000-14,000 wolves in eastern Canada (USFWS 2020b). Extirpation of wolf populations began shortly after European settlers arrived, and gray wolves were eliminated from the lower 48 U.S. by the 1930s to 1940s save for remnant populations of wolves on Isle Royale, Michigan (~40 individuals) and ~700 animals primarily within the Superior National Forest in northeastern Minnesota (Mech 2009). In the U.S., following protection of gray wolves under the Endangered Species Act of 1973 and earlier listings under the ESA's legislative predecessors, gray wolf populations have rebounded in two regions: the northern Rocky Mountains (due to both natural recolonization and reintroduction), including Idaho, Montana, Wyoming, and parts of Oregon and Washington (as well as California and Colorado though not considered part of the NRM); and the western Great Lakes (solely due to natural recolonization),

including Michigan, Minnesota, and Wisconsin (USFWS 2020b). In addition to these two robust metapopulations, there are ongoing recovery efforts for a subspecies of the gray wolf, the Mexican wolf, in the Southwest (USFWS 2020b). Gray wolves in the lower 48 U.S. currently number over 6,000 individuals (USFWS 2020b).

A federal Species Status Assessment (SSA; USFWS 2023) found that there were approximately 2,797 wolves distributed across at least 286 packs in seven states in the western U.S. as of 2022. Despite regulated harvest, lethal control, and episodic disease outbreaks, wolf abundance in the western U.S. has generally continued to increase and occupied range has continued to expand since reintroduction in the 1990s. This population size and widespread distribution contribute to the resiliency and redundancy of wolves in the region. The population maintains high genetic diversity and connectivity and is projected to withstand environmental and demographic stochasticity, increased human-caused mortality, potential disease events, and changing environmental conditions. The analysis in the SSA determined that the wolf population in the western U.S. is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range (USFWS 2023).

Washington Population

Gray wolves were formerly common throughout most of Washington, but they declined rapidly between 1850 and 1900. The primary cause of this decline was the killing of wolves by Euro-American settlers as ranching and farming activities expanded. Wolves were essentially eliminated as a breeding species from the state by the 1930s. Reports of wolves in Washington increased as wolf abundance and distribution increased in the NRM; following the recovery of wolves in Idaho, Montana, and Wyoming, the first documented breeding pack in Washington was confirmed in western Okanogan County and adjacent northern Chelan County in 2008. As of July 2011, there were five confirmed packs in the state: two in Pend Oreille County, one in Pend Oreille/Stevens counties, one in Kittitas County, and one in Okanogan/Chelan counties. As of December 31, 2022, WDFW counted a minimum of 216 wolves in 37 packs with at least 26 successful breeding pairs (WDFW et al. 2023, Table 2). Human-caused mortality— particularly tribal-regulated harvest, lethal control actions to resolve conflicts, and illegal killing—is the largest source of mortality for the species (Table 1).

Table 2. Wolf population growth trends in Washington, 2008–2022.

Year	Minimum count	Packs	Breeding pairs	Annual growth rate (%)	Documented mortality
2008	5	1	1	-	0
2009	14	2	2	-	0
2010	19	3	1	36	2
2011	35	7	5	84	0
2012	51	9	5	46	9
2013	52	13	5	2	5
2014	68	16	5	31	10
2015	90	18	8	32	7
2016	115	20	10	28	14
2017	122	22	14	6	14
2018	126	27	15	3	12
2019	145	26	10	14	21
2020	178	29	16	24	16
2021	206	33	19	16	30
2022	216	37	26	5	37

Petracca et al. (2024) developed a model to estimate current and project future population dynamics of wolves in Washington. The previous model (Maletzke et al. 2016) used to inform the Wolf Conservation and Management Plan for Washington (Wolf Plan) was developed using data from wolves in the NRM as there was not enough empirical data available from Washington wolves for such an effort at the time. The model from Petracca et al. (2024) is the first effort of its kind developed using data from Washington's wolf population rather than data from wolves in other states. Petracca et al. (2024) used data from 74 collared wolves in Washington and yearly pup and pack counts to parameterize the model, and then projected statewide dynamics over 50 years. In this model, wolf abundance at the state level increased from a median of 257 (95% prediction interval [PI] = 76-487) in 2030 to 470 (51-1259) in 2070, with λ growth of 1.02 (0.98-1.04) over the projection period (2021-2070). Probability of recovery (i.e., four breeding pairs in each recovery region, with three additional breeding pairs anywhere in the state) across all years (2021-2070) was 0.64 (95% PI = 0.00-1.00). This probability of recovery increased over time, from 0.00 (0.00-0.00) in 2020 to 0.91 (0.02-1.00) in 2070. Median probability of quasi-extinction across all years (i.e., <92 adult wolves in the state and <24 adult wolves in each recovery region from 2021-2070), as well as median probability of extinction (i.e., zero wolves in 2070), were close to 0 ([0.00, 95% PI = 0.00-0.37] and [0.00, 0.00-0.01], respectively).

Petracca et al. (2023) predicted the effects of 12 scenarios relating to management actions (e.g., lethal removals, translocation, harvest) and system uncertainties (e.g., immigration from out of state, disease)

on the probability of meeting Washington's wolf recovery goals, along with other metrics related to population status. Most scenarios indicated a high probability of wolf recovery in Washington over the next 50 years, but scenarios related to harvest mortality (removal of 5% of the population every six months), increased lethal removals (removal of 30% of the population every four years), and cessation of immigration from out of state resulted in low probabilities (0.11, 0.18, and 0.27, respectively) of meeting recovery goals across all years (2021-2070). However, while recovery goals were not predicted to be met in those scenarios, all 12 management scenarios exhibited a geometric mean of population growth that was at or above 1, indicating long-term population stability or growth, depending on the scenario. These results suggest that long-term survival of Washington's wolf population is highly probable, wolves will continue to recolonize unoccupied, suitable habitat in Washington, and that recovery goals will be met if harvest and lethal removals occur at or near modeled levels (see section "Lethal control and harvest" below for discussion of sustainable levels of wolf mortality) and wolves continue to immigrate to Washington from surrounding states and provinces (see section "Management in other states" below for discussion of immigration).

The federal SSA (USFWS 2023) also specifically evaluated western Washington and found that due to the current and projected demographic health of the wolf population and existing regulatory mechanisms, this portion of the western U.S. population is not in danger of extinction or likely to become so in the foreseeable future.

2011 Wolf Conservation and Management Plan Recovery Objectives for Washington

The Wolf Plan, finalized in 2011, guides wolf recovery in Washington. The Wolf Plan designates three recovery regions: Eastern Washington, the Northern Cascades, and the Southern Cascades and Northwest Coast (Figure 8).

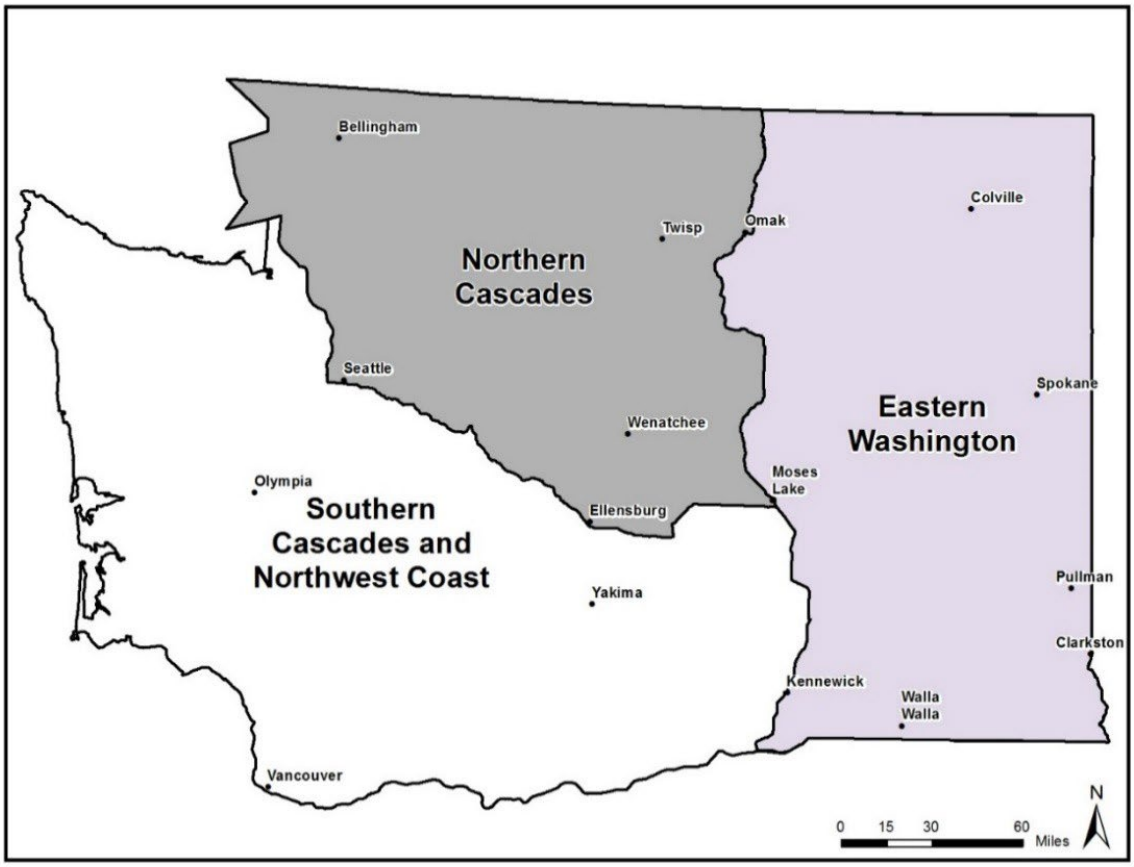

Figure 8. Washington wolf recovery regions as defined in the 2011 Wolf Conservation and Management Plan (Wiles et al. 2011).

The Wolf Plan designated target numbers and distribution for downlisting and delisting within the three recovery regions as follows:

- To reclassify from state endangered to state threatened status: six successful breeding pairs present for three consecutive years, with two successful breeding pairs in each of the three recovery regions.
- To reclassify from state threatened to state sensitive status: 12 successful breeding pairs present for three consecutive years, with four successful breeding pairs in each of the three recovery regions.
- To delist from state sensitive status: 15 successful breeding pairs present for three consecutive years, with four successful breeding pairs in each of the three recovery regions and three successful breeding pairs anywhere in the state.

In addition to the delisting objective of 15 successful breeding pairs distributed in the three geographic regions for three consecutive years, an alternative delisting objective was also established whereby the

gray wolf will be considered for delisting when 18 successful breeding pairs are present for one year, with four successful breeding pairs in the Eastern Washington region, four successful breeding pairs in the Northern Cascades region, four successful breeding pairs distributed in the Southern Cascades and Northwest Coast region, and six anywhere in the state.

As of 2022, in terms of the **number and duration** of successful breeding pairs, both minimum objectives for delisting have been exceeded (15 successful breeding pairs for three consecutive years, and 18 successful breeding pairs for a year; Table 3). The objective of maintaining at least four successful breeding pairs has been met in two of three recovery regions (the Eastern Washington region and Northern Cascades region). No successful breeding pairs have been documented in the Southern Cascades and Northwest Coast region, thus the **geographic distribution** objective has not been met in this recovery region (however, although not a successful breeding pair, the first known pack was documented in this region as of 2022).

The Wolf Plan recognized that recovery objectives may need to be revisited as wolves recolonized Washington, stating, "The expectation is that over time, as wolves recolonize Washington, WDFW will be able to collect data from within the state to determine whether the model assumptions are appropriate. If future data reveal that the population dynamics of wolves in Washington are significantly different from those used in the model, these conclusions will need to be reevaluated. Incorporating wolf demographic data specific to Washington will allow WDFW to update predictions of population persistence during wolf recovery phases and to revise the recovery objectives, if needed" (pg. 67-68). Although the Wolf Plan accurately predicted that "recovery is…likely to happen more quickly through the reoccupation of eastern Washington than waiting for wolves to reach far western Washington" (pg. 60), the Wolf Plan did not predict exceeding the recovery objective in eastern Washington by five times prior to meeting geographic distribution objectives. Wolf Plan predictions of how **numbers** of wolves would correspond to state listing status (see Table 4 in the Wolf Plan, pg. 65) show that Washington's current wolf population **numbers** align with a non-endangered population.

The Wolf Plan's recovery objectives were established to address the status of the wolf population across a significant portion of their range. WAC 220-610-110 (section 2.9) defines a "significant portion of its range" as "that portion of a species' range likely to be essential to the long term survival of the population in Washington." Down- and delisting criteria in the Wolf Plan were set to describe the population's status based on occupancy by successful breeding pairs across three recovery areas (Figure 7). The numbers of successful breeding pairs needed per recovery region were identified to describe the status of wolves given a statewide distribution. However, the area in Washington currently occupied by wolves has greatly exceeded those minimum successful breeding pair numbers. Model projections from Petracca et al. (2024) indicate Washington's wolf population currently occupies an area essential to their long-term survival and is not in danger of extinction or becoming endangered with their current distribution and population trend.

Although current wolf distribution in Washington is not yet what was predicted in the Wolf Plan, the numbers of wolves and successful breeding pairs in the areas they do occupy represent a significant portion of the range to the extent that they are no longer seriously threatened with extinction or likely to be threatened with extinction in the foreseeable future in Washington state. However, WDFW believes the Wolf Plan recovery targets of at least four successful breeding pairs in each recovery region for **delisting** are still appropriate, attainable through natural recolonization, and ensure adequate distribution of reproducing wolves throughout the state.

Table 3. Objectives for downlisting and delisting wolves in Washington by number, duration of occupancy, and geographic distribution of successful breeding pairs (Wiles et al. 2011). As of 2022, all plan recovery objectives have been met with the exception of a minimum of four breeding pairs in the Southern Cascades and Northwest Coast recovery region.

Successful breeding pair number and duration objectives	2011 WOLF PLAN DOWNLISTING AND DELISTING OBJECTIVES								
	Eastern Washington		Northern Cascades		Southern Cascades and Northwest Coast		Anywhere in state		Duration of occupancy
	Objective	*As of 2022*	*Objective*	*As of 2022*	*Objective*	*As of 2022*	*Objective*	*As of 2022*	
Threatened (6 pairs/ 3 years)	2	20	2	6	2	0	N/A	N/A	Objective met
Sensitive (12 pairs/ 3 years)	4		4		4		N/A	N/A	Objective met
Delist (15 pairs/ 3 years)	4		4		4		3	Objective met	Objective met
Delist (18 pairs)	4		4		4		6	Objective met	Objective met

FACTORS AFFECTING CONTINUED EXISTENCE

Adequacy of Regulatory Mechanisms

Federal regulatory protection. Wolves in Washington are federally protected under the ESA in most of Washington (the western two-thirds of the state [Figure 3] and in two of three state-designated recovery regions [Figure 8]). Wolves are not subject to lethal control or harvest where they are federally protected. WAC 220-440-080 ("Killing wolves attacking domestic animals"), section 1 only applies to the area of the state where the gray wolf is not listed as endangered or threatened under the ESA. It is worth noting that wolf population growth in Washington has largely occurred in the absence of federal protection as the majority (60-86% of packs 2011 – 2022, average 79%) of Washington wolf packs occur in the eastern third of Washington where wolves have not been federally protected since 2011.

State regulatory protection. The gray wolf was listed as endangered by the State of Washington in 1980 (WAC 220-610-010) and receives protection under state law (RCW 77.15.120) from hunting, possession, malicious harassment, and killing. WDFW does allow for agency lethal control, issue of depredation permits, and removal of one wolf if the wolf is attacking domestic animals (as described in WAC 220-440-080) under state endangered status as laid out in the Wolf Plan. Wolves are not designated as a game species in Washington and therefore are not subject to state hunting seasons; they are subject to tribal harvest on reservation or by tribes that have off-reservation hunting rights where not federally protected.

Under State Sensitive or Threatened status, wolves would be protected from unlawful take under RCW 77.15.130 and protections precluding hunting would remain in place. Wolves would continue to be protected from malicious and intentional harassment. RCW 77.15.130 outlines that Threatened and Sensitive wildlife shall not be hunted, taken, or harassed. In addition, Threatened and Sensitive status are sub-categories of protected wildlife, which "shall not be hunted or fished." RCW 77.08.010(52); 77.12.020(5). Wolves would also remain on the list of Priority Habitats and Species (PHS). Under state law (RCW 77.12.395), proactive nonlethal deterrents must be included in development of conflict mitigation guidelines regardless of listing status. A change in state status would not change any of the allowed management actions (in the federally delisted portion of Washington) listed above.

Appendix A shows differences in conservation/management provisions for wolves under state endangered and protected species classifications. Potential reclassification to State Threatened or Sensitive status is not anticipated to affect future wolf population projections given the protections afforded under either listing.

Other Factors

Lethal control and harvest. Wolves in Washington are subject to lethal control in response to conflicts with livestock and harvest by tribes where they are not federally listed (currently, only the Confederated Tribes of the Colville Reservation and the Spokane Tribe of Indians allow wolf hunting). WDFW only considers lethal removal of wolves if it is not expected to harm the wolf population's ability to reach recovery objectives statewide or within individual wolf recovery regions. WDFW uses empirical and predictive data to determine whether removal would harm recovery each time lethal removal of wolves is considered. WDFW only considers lethal removal of wolves in the portion of the state where the gray wolf is not listed as endangered or threatened under the federal ESA. WDFW has used lethal removal in an attempt to resolve conflicts with livestock in nine of 15 years of wolf recovery in Washington, and annually since 2016. Scenarios in Petracca et al. (2023) related to harvest mortality (removal of 5% of the population every six months) and increased lethal removals (removal of 30% of the population every four years) resulted in low probabilities (0.11 and 0.18, respectively) of meeting recovery goals in the future (2021-2070) although a lower level of harvest (removal of 2.5% of the population every six months) resulted in a substantially higher predicted probability of recovery (0.44).

Since 2020 (and overall 2008-2022; Table 1), tribal harvest has been the largest source of wolf mortality in the state. The Confederated Tribes of the Colville Reservation currently allow for a year-round hunting season for wolves on both the North Half and South Half of the Colville Reservation with the use of any legal weapon, harvest of either sex, and no daily or season limits. Trapping and snaring seasons run November 1 – February 28 and include either sex harvest using any legal trap or snare and no daily or season limit. Regulated wolf harvest is also allowed for tribal members on the Spokane Indian Reservation. Wolf seasons remain open year-round or until a maximum of 10 wolves are taken during the calendar year. Trapping and/or snaring is allowed by special permit only with a season from October 1 –February 28. Statewide, the current geographic scope of harvest is localized and limited to the areas noted above, and not permitted where wolves are federally listed in the western two-thirds of the state. Because of the limited geographic scope and scale of tribal harvest, this practice is not expected to affect the overall viability and persistence of Washington's wolf population, but harvest may affect annual and mean population growth rates and time to reach statewide recovery goals. It is unknown how tribal harvest might be affecting wolf dispersal; however, collared wolf data shows dispersing wolves successfully moving through the areas where harvest is legal.

It has been estimated that wolf populations can remain stable to slightly increasing with anthropogenic mortality rates of 22-48% if reproduction and immigration are high (Hayes and Harestad 2000, Larivière et al. 2000, Fuller et al. 2003, Adams et al. 2008, Creel and Rotella 2010, Gude et al. 2012). Wolves can rebound and recolonize territory even following intensive lethal control (e.g., following intensive aerial reduction in the Yukon, Canada, the wolf population increased 88% in six years; Hayes and Harestad 2000). In their review of human-caused mortality in North American wolves, Adams et al. (2008) found that population growth rates remained stable to slightly increasing with human-caused mortality rates of approximately 29% or less. Similarly, the wolf population in Idaho, Montana, and Wyoming

maintained an annual average of approximately one percent growth in 2009 and from 2011 to 2015 at 29% human-caused mortality (USFWS 2023). The factors most influential to the percentage of a wolf population that can be killed by humans annually without reducing the population are its productivity and the rate of immigration from source populations (Fuller et al. 2003). If productivity is low and immigration limited, human-caused mortality can have a larger impact on population growth; if

productivity is average or high, higher mortality rates can be sustained, especially if the controlled population is near a source population providing dispersers (Fuller et al. 2003).

Both the western U.S. (comprised of Idaho, Montana, Wyoming, Oregon, Washington, and California) and Great Lakes (comprised of Michigan, Minnesota, and Wisconsin) wolf metapopulations are connected to large and expansive populations of wolves in western Canada (estimated about 15,000 wolves) and eastern Canada (estimated about 12,000-14,000 wolves), respectively. The wolf populations within the states listed above are not discrete; in fact, they are extensions of the large populations in Canada and effective dispersal has been documented across state and international boundaries (USFWS 2020b).

Despite relatively high levels of mortality due to liberal harvest and lethal removal in response to livestock depredation, Idaho, Montana, and Wyoming have maintained stable wolf populations without federal protections for over a decade (Table 4, USFWS 2020a). From 2009 – 2015, Idaho removed an average of 10% of its wolf population in lethal control actions with total annual mortality from all causes averaging 45%; from 2009 – 2017, Montana removed an average of 14% of its wolf population in lethal control actions with total annual mortality from all causes averaging 47%; from 2009 – 2017, Wyoming removed an average of 15% of its wolf population in lethal control actions with total annual mortality from all causes averaging 30% (Table 4, USFWS 2020a). Recent year-end estimates indicate approximately 1,000 wolves occur in Idaho and 819 wolves occur in Montana; the most recent year-end minimum count shows at least 311 wolves in Wyoming (USFWS 2020b).

In the Great Lakes region of the U.S. (Michigan, Minnesota, and Wisconsin), 2,773 wolves were killed in response to depredations over a 33-year period during which this population was federally protected (Ruid et al. 2009). Despite lethal control actions during this recovery phase, wolves in the Great Lakes region have since increased to roughly 4,200 animals and now occupy most suitable habitat in the region (Ruid et al. 2009, USFWS 2020b). The annual percentage of each of the three states' wolf populations removed for depredation management ranged from 1-7% while their wolf populations were increasing and is currently about 5% annually with no evidence of jeopardizing population viability (Ruid et al. 2009).

Lethal removal of wolves in response to livestock depredations has not had significant effects on recovery or continued viability of wolves in the western U.S. or Great Lakes wolf metapopulations, likely due to normal or high productivity levels and genetic connectivity of these wolf populations with those in Canada (USFWS 2020b).

Table 4. Percentage and number of individuals of the minimum population lethally removed, percentage and number of individuals included in total mortality, and minimum population counts of wolves in Idaho, Montana, and Wyoming, 2009 – 2017 (USFWS 2020a).

Year	Idaho			Montana			Wyoming		
	% min. pop. Lethally removed (# individuals)[1]	% total mortality (# individuals)[1]	Min. pop. Count	% min. pop. Lethally removed (# individuals)[1]	% total mortality (# individuals)[1]	Min. pop. Count	% min. pop. Lethally removed (# individuals)[1]	% total mortality (# individuals)[1]	Min. pop. Count
2009	11 (93)	31 (272)	870	28 (145)	49 (258)	524	10 (32)	18 (57)	320
2010	10 (78)	19 (144)	777	25 (141)	32 (179)	566	12 (40)	20 (69)	343
2011	8 (63)	39 (296)	768	10 (64)	33 (216)	653	11 (37)	20 (64)	328
2012	10 (73)	59 (425)	722	17 (108)	28 (324)	625	16 (43)	49 (136)	277
2013	14 (94)	72 (473)	659	12 (75)	53 (335)	627	11 (33)	36 (109)	306
2014	9 (67)	47 (360)	770	10 (57)	55 (306)	554	11 (37)	23 (78)	333
2015	10 (75)	45 (357)	786	7 (39)	51 (276)	536	14 (54)	22 (84)	382
2016	NA	NA	NA	11 (52)	70 (334)	477	30 (113)	35 (132)	377
2017	NA	NA	NA	9 (57)	48 (305)	633	18 (62)	48 (168)	347

[1] Derived by dividing the number of individuals by the minimum population count.

Poaching. Wolf poaching (i.e., illegal killing, unauthorized take) is a major source of mortality for wolf populations around the world (Liberg et al. 2011, Suutarinen and Kojola 2017, Treves et al. 2017a). Poaching is challenging to document and measure and may be underestimated as a result (Treves et al. 2017b). Wolf poaching in Washington represents 11% of documented mortality, 2008 – 2022, but was higher in 2022 than in previous years (Table 1, Figure 6) due to a poisoning incident that killed six wolves. In addition to documented wolf poaching in the state, undoubtedly there is poaching that goes undetected as well. It is uncertain whether collared wolves are a representative sample of the population with respect to their risk of being illegally killed, or whether collared wolves are instead at disproportionately high or low risk of poaching. Although the extent of undocumented poaching in Washington is not known, Washington's wolf population has continued to increase and poaching has not yet affected its continued existence in the state. A significant increase in poaching adding to overall wolf mortality in Washington could be unsustainable in the future depending on the extent, but poaching across the western U.S. alone or in combination with all other forms of mortality has not prevented continued wolf recolonization of vacant, suitable habitat in the western U.S. (USFWS 2023).

Some research suggests that policy changes in wolf management that allow authorized take and/or reduce protections for wolves result in increased wolf poaching (Chapron and Treves 2016, Santiago-Ávila et al. 2020, Louchouarn et al. 2021). However, these conclusions have been heavily critiqued and the biological significance to wolf populations questioned (Olson et al. 2017, Pepin et al. 2017, Stien et al. 2017), there is evidence of the opposite conclusion (Liberg et al. 2020), and such views do not represent a universal interpretation among researchers and biologists (see Olson et al. 2015, von Essen et al. 2015). Illegal killing can be a major source of wolf mortality worldwide regardless of the wolf population's level of protection (Liberg et al. 2011, Suutarinen and Kojola 2017, Nowak et al. 2021), including in Washington where wolves have been state endangered since recolonization.

Other human-caused mortality. All other sources of human-caused mortality represent a much lower level (16%, Table 1, Figure 6) of all documented wolf mortality in the state. As wolves populate the Southern Cascades and Northwest Coast recovery region and western Washington, it is possible that vehicle collisions may increase along the I-5 corridor. Legal killing incidents under WAC 220-440-080 likely would not increase given the wolf's federally protected status in the western two-thirds of Washington but could increase if wolves are federally delisted statewide in the future.

Management in other states. Wolves in Washington are part of the population in the Northern Rocky Mountains (Idaho, Montana, Wyoming, and parts of Oregon and Washington, with connectivity to British Columbia, Canada). The wolf populations within this region are not discrete; they are extensions of the large populations in Canada and effective dispersal has been documented across state and international boundaries (USFWS 2020b). Some of Washington's neighboring states have management goals of significantly decreasing the wolf populations within their states (Idaho aims to decrease their wolf population by approximately 63% [IDFG 2023]; Montana passed legislation in 2021 requiring Montana Fish, Wildlife, and Parks to make efforts to reduce Montana's wolf population [Montana SB 314, 2021]). It is unknown how efforts to reduce wolf populations in neighboring states may affect

immigration and dispersal of wolves from other states into Washington because effects of harvest on dispersal, emigration, and immigration are complex. For example, Bassing et al. (2020) found that immigration rates were unchanged by various harvest regimes (e.g., Idaho before and after harvest and continual long-term harvest in southwestern Alberta) and that immigrating wolves did not join neighboring packs at higher levels in harvested populations than in unharvested populations. Ausband et al. (2020) found that harvest led to a small increase in genetic diversity in subpopulations yet also increased the relatedness of individuals between groups in subpopulations (meaning that harvest likely created opportunities for wolves to immigrate into nearby groups and breed, thereby making groups in subpopulations more related over time).

Petracca et al. (2023) modeled scenarios including reducing immigration of wolves into Washington by 50%, and by 100%. Under the 50% immigration scenario, there was a 69% probability that the population would still meet recovery criteria projected over the next 50 years. Under the scenario of no immigration, the probability was 27% (total cessation of all wolf immigration into Washington is highly unlikely given the connectivity of Washington's wolves to a much larger population in Canada and the NRM). However, both scenarios showed a geometric mean of population growth ≥1, indicating long-term population stability or growth (Petracca et al. 2023).

Disease (text adapted and updated from 2011 Wolf Conservation and Management Plan, Wiles et al. 2011). Wolves are susceptible to a number of viral and bacterial diseases, including rabies, canine parvovirus, canine distemper, canine adenovirus (canine hepatitis), canine herpesvirus, and leptospirosis (Kreeger 2003, Mech et al. 2008, Almberg et al. 2009, ODFW 2019). None of these appear to threaten the long-term population viability of wolves in the northern Rocky Mountain states, although periodic outbreaks of canine distemper have been linked to poor pup survival and population decline in some years (Almberg et al. 2009, Brandell et al. 2020). Wolves at Yellowstone National Park have shown high and relatively constant levels of exposure to canine parvovirus and canine adenovirus since their reintroduction in 1995, but each disease has produced little or no wolf mortality (Almberg et al. 2009). Canine parvovirus is suspected to have caused a decline in the wolf population at Isle Royale National Park, Michigan (Kreeger 2003), and in Wisconsin during the early 1980s when its wolf population was <30 animals (Wydeven et al. 1995). In Minnesota, canine parvovirus limited population growth and expansion of the wolf population through reductions in pup survival (Mech et al. 2008). Rabies may limit population growth in some situations (Kreeger 2003).

Wolves host various parasites, but most produce little pathology and do not regulate populations (ODFW 2019). Sarcoptic mange has been documented in wolves in Montana and Wyoming, but not Idaho (Jimenez et al. 2010). Occurrence of this disease increased noticeably among wolves at Yellowstone National Park in 2008 and 2009 (Brandell et al. 2020). Mange outbreaks can be locally severe and persistent in wolves, and commonly can result in mortalities, but are not considered a serious threat to population persistence (Jimenez et al. 2010, Brandell et al. 2020) and mange is now considered enzootic in Yellowstone National Park (Brandell et al. 2020). Minor cases of parasite infestation have been documented in Washington wolves, but no known significant or population-

regulating effects of disease or parasites have been observed in Washington's wolf population.

Climatic impacts. Because wolves are adaptive generalists, climate change likely will not affect them directly. However, climate change may have significant effects on their prey which could indirectly impact the survival, density, and distribution of wolves. Unprecedented climate change is altering habitat conditions. Investigations of ungulate range conditions across the west suggest most populations are experiencing some level of nutritional limitation and additional stress due to climate change that may have negative effects on population performance (Cook et al. 2013, Johnson et al. 2019). Climate-induced changes with increased temperature and altered precipitation patterns may create difficulties for ungulates. For example, resource availability during critical times such as parturition and while females are lactating could become mismatched with peak spring green-up (Post and Forchhammer 2007). Snow accumulation, snow melt, green-up magnitude and duration are changing but not consistently across all western herds. In some cases, elk can match their need with the available resources by interpreting environmental cues (Rickbeil et al. 2019), and by altering their site fidelity based on experience with resource tracking the previous spring (Morrison et al 2020). However, examples of additional stress from climate change resulting in poor population performance have been documented. Investigations of a migratory elk herd in the Greater Yellowstone Ecosystem revealed a shift of green-up duration by 27 days over the last two decades (Middleton et al. 2013). The shift was linked to increases in April-August temperature concurring with April-May precipitation declines. These climatic changes facilitate a rapid but short green-up period and reduced forage availability for migrating elk, which was a contributing factor to poor annual reproductive success. Snow accumulations and available forage influenced by climate change can also have a strong influence on the age class and gender of elk that are killed by wolves (Wilmers et al. 2020).

MANAGEMENT ACTIVITIES

In 2007, anticipating dispersal of wolves into Washington from surrounding states and provinces, and the likely formation of resident packs, WDFW initiated development of a state Wolf Conservation and Management Plan for Washington (Wolf Plan). Assisted by an 18-member working group comprised of stakeholders, the Wolf Plan was adopted in December 2011 by the state Fish and Wildlife Commission. The purpose of the plan is to ensure the reestablishment of a self-sustaining population of gray wolves in Washington and to encourage social tolerance for the species by addressing and reducing conflicts.

Goals of the plan are to:

- Restore the wolf population in Washington to a self-sustaining size and geographic distribution that will result in wolves having a high probability of persisting in the state through the foreseeable future (>50-100 years).
- Manage wolf-livestock conflicts in a way that minimizes livestock losses, while at the same time not negatively impacting the recovery or long-term perpetuation of a sustainable wolf

population.

- Maintain healthy and robust ungulate populations in the state that provide abundant prey for wolves and other predators as well as ample harvest opportunities for hunters.
- Develop public understanding of the conservation and management needs of wolves in Washington, thereby promoting the public's coexistence with the species.

Management and research activities related to each of these plan goals are described in depth in Washington Gray Wolf Conservation and Management Annual Reports, provided annually from 2011 to 2022 (all reports available here). These reports describe annual population monitoring efforts (including techniques, status and distribution, captures and monitoring, dispersal information, harvest information, and documented mortality), management efforts (including wolf-livestock conflict management, conflict deterrence, cost-sharing for conflict deterrence, compensation for livestock losses, and wolf interactions with ungulates), ongoing research, and outreach initiatives.

CONCLUSIONS AND RECOMMENDATIONS

Washington's wolf population is robust. Since WDFW's first wolf population survey in 2008, the wolf population has increased for 14 consecutive years by an average of 23% per year. Although growth of the minimum population has slowed in recent years, which is expected following initial recolonization of habitat formerly completely unoccupied by wolves, the number of documented packs and successful breeding pairs continues to increase. Northeast and southeast Washington wolf population growth has slowed due to wolf reoccupation of most of the available suitable habitat. The 2022 annual population revealed a continued increase in wolf packs and successful breeding pairs in the North and Central Cascades as well as novel presence in the South Cascades.

Model projections from Petracca et al. (2024) show mean population growth of 1.29 (95% CRI 1.26-1.33) during initial recolonization from 2009-2020 decreasing to 1.02 (95% PI 0.98-1.04) in the projection period (2021-2070). Their projections suggest that wolves have a ~100% probability of colonizing the Southern Cascades and Northwest Coast recovery region by 2030, regardless of alternative assumptions about how dispersing wolves select new territories. In the model (Petracca et al. 2023), only scenarios that included harvest mortality (removal of 5% of the population every six months), increased lethal removals (removal of 30% of the population every four years), and cessation of immigration from out of state resulted in low probabilities (i.e., probabilities <0.30) of meeting recovery goals in the next 50 years. However, although recovery goals were not predicted to be met in those scenarios, all management scenarios analyzed exhibited a geometric mean of population growth that was at or above 1, indicating long-term population stability or growth of Washington's wolf population, depending on the scenario.

Washington's wolf population has far exceeded the Wolf Plan objectives for delisting in terms of the number and persistence of successful breeding pairs. However, the Wolf Plan objectives also consider wolf presence in each of the state's three recovery regions (Figure 8); furthermore, all listed

classifications (e.g., endangered, threatened, sensitive) consider a significant portion of the species' range within the state. WAC 220-610-110 (section 2.9) defines a "significant portion of its range" as "that portion of a species' range likely to be essential to the long term survival of the population in Washington." Model projections from Petracca et al. (2024) indicate Washington's wolf population currently occupies an area essential to their long-term survival and is not in danger of extinction or becoming endangered with their current distribution and population trend. However, the geographic distribution standards of the Wolf Plan have not yet been met for the Southern Cascades and Northwest Coast recovery region.

As discussed in the "Population and Habitat Status" section in this document above, no successful breeding pairs have been documented yet in the Southern Cascades and Northwest Coast recovery region, although the first known pack was documented in this region as of 2022. Although individual wolves have been detected in western Washington (i.e., west of the Cascades [where models indicate most unoccupied, suitable wolf habitat in the state remains; Figure 6]), no known packs or reproductive individuals have been documented as of 2022. The Wolf Plan specifically indicates the importance of the recovery region that has not yet met plan recovery objectives: "In particular, the southern Cascade Mountains contain a large amount of high quality habitat. This area contains abundant natural prey for wolves, including nearly half of Washington's elk population, and large contiguous blocks of forested public and private lands, where low levels of conflict with livestock are expected. As a result, the southern Cascades have the potential to support a source population of wolves, a factor of importance with regard to the long-term survival of the wolf population in Washington" (pg. 60).

We recommend observing the Wolf Plan recovery targets for delisting of at least four successful breeding pairs in each recovery region, with at least 15 breeding pairs statewide for at least three years or at least 18 breeding pairs statewide for at least one year. As stated in the Wolf Plan, it should be emphasized that these numbers represent only minimum criteria for delisting, and not a population cap or ceiling at which wolves would or should ultimately be managed. We believe that these targets are attainable through natural recolonization and ensure adequate distribution of reproducing wolves throughout the state. We do not recommend delisting wolves at this time.

Based on 14 consecutive years of population growth, population modeling predictions that indicate Washington's wolf population is robust and will continue to grow and expand its range (including in the Southern Cascades and Northwest Coast recovery region), and ongoing state and federal protections, we conclude that the wolf does not meet the definition of State Endangered, which requires that the species is "seriously threatened with extinction" (WAC 220-610-110).

Similarly, we believe that the wolf does not best fit the definition of State Threatened, which requires that a species is "...likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats" (WAC 220-610-110). Current information does not indicate that wolves are

threatened with extinction or likely to be threatened with extinction in the foreseeable future in Washington State.

Our recommendation is to reclassify the wolf to State Sensitive, "vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats" (WAC 220-610-110). This status reflects the significant progress toward recovery that Washington's wolf population has made since the original state listing in 1980 but recognizes that wolves remain vulnerable in western Washington and should continue to be managed for recovery within the state as a protected species. Continued population growth and range expansion will depend on the robustness of source populations in eastern Washington (as well as neighboring states and provinces) and cooperative management to ensure sources of human-caused mortality do not impede recovery.

Under State Sensitive status, wolves would be protected from unlawful take under RCW 77.15.130 and protections precluding hunting would remain in place. Wolves would continue to be protected from malicious and intentional harassment. RCW 77.15.130 outlines that Sensitive wildlife shall not be hunted, taken, or harassed. In addition, Sensitive status is a sub-category of protected wildlife, which "shall not be hunted or fished." RCW 77.08.010(52); 77.12.020(5). Wolves would also remain on the list of Priority Habitats and Species (PHS). Under state law (RCW 77.12.395), proactive nonlethal deterrents must be included in development of conflict mitigation guidelines regardless of listing status.

The definitions of State Threatened and State Sensitive under WAC 220-610-110 are very similar and both fall under the designation of protected wildlife under RCW 77.15.130. **Appendix A** shows differences in conservation/management provisions for wolves under endangered and protected state species classifications and can assist policy makers in weighing the implications of future management actions. WDFW received comments through the Draft Periodic Status Review public process discussed in **Appendix B**.

WDFW remains committed to the recovery and long-term sustainability of Washington's wolf population. WDFW will continue to work closely with partners, stakeholders, and communities, just as we have over the past decade, on the recovery, conservation, and management of wolves in Washington, with a focus on reducing conflict between wolves and livestock, emphasizing proactive nonlethal conflict deterrence, achieving statewide recovery objectives, and supporting wolf expansion into all suitable habitat statewide.

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References are organized alphabetically, by first author. The "code" column indicates the appropriate source category (level of peer review) for the reference, pursuant to RCW 34.05.271, which is the codification of Substitute House Bill 2661 that passed the Washington Legislature in 2014. These codes are as follows:

Table 5. Key to 34.05.271 RCW categories.

34.05.271(1)(c) RCW	**Category code**
(i) Independent peer review: review is overseen by an independent third party.	i
(ii) Internal peer review: review by staff internal to the department of fish and wildlife.	ii
(iii) External peer review: review by persons that are external to and selected by the department of fish and wildlife.	iii
(iv) Open review: documented open public review process that is not limited to invited organizations or individuals.	iv
(v) Legal and policy document: documents related to the legal framework for the significant agency action including but not limited to: (A) federal and state statutes; (B) court and hearings board decisions; (C) federal and state administrative rules and regulations; and (D) policy and regulatory documents adopted by local governments.	v
(vi) Data from primary research, monitoring activities, or other sources, but that has not been incorporated as part of documents reviewed under the processes described in (c)(i), (ii), (iii), and (iv) of this subsection.	vi
(vii) Records of the best professional judgment of department of fish and wildlife employees or other individuals.	vii
(viii) Other: Sources of information that do not fit into one of the categories identified in this subsection (1)(c).	viii

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Appendix A. Differences in conservation/management provisions for gray wolves under endangered and protected state species classifications

Note: Most items in this table do not differ among the endangered and protected state species classifications. Those items that do differ are highlighted in yellow. Wolves are federally listed in the western two-thirds of Washington (as of February 2024) and most of these actions (including lethal take) do not apply where wolves are federally protected. All proposed state conservation/management actions in areas of Washington where the species is federally listed are contingent on consistency with federal law and consultation and approval by the U.S. Fish and Wildlife Service.

Conservation/management action (source)	**Endangered and protected state species classification**		
	Endangered Any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state (WAC 220-610-110). (See WAC 220-610-010 for currently listed species.)	**Protected wildlife**	
		Threatened Any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats (WAC 220-610-110). (See WAC 220-200-100 for currently listed species.)	**Sensitive** Any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats (WAC 220-610-110). (See WAC 220-200-100 for currently listed species.)
Criminal enforcement penalty for illegal take (RCW 77.15.120, RCW 77.15.130)	RCW 77.15.120 protects endangered species from hunting, possession, malicious harassment, and killing; penalties for illegally killing a state endangered species range up to $5,000 and/or one year in jail.	RCW 77.15.130(1)(c) prohibits the hunting, possession or malicious harassment of threatened or sensitive wildlife unless authorized by rule of the commission, a WDFW permit, or a federal permit; the maximum penalty for violations is 90 days in jail and/or a $1,000 fine.	

"Killing wolves attacking domestic animals" lethal take (WAC 220-440-080)	An owner of domestic animals, the owner's immediate family member, the agent of an owner, or the owner's documented employee may kill one wolf without a permit issued by the director, regardless of its state classification, if the wolf is attacking their domestic animals.	
Wolf location information to livestock owners (2011 Wolf Plan)	Provided under each status	
Non-injurious harassment (2011 Wolf Plan)	Allowed under each status	
WDFW authorization for livestock owners and grazing allotment holders (and their agents) to use non-lethal injurious harassment (2011 Wolf Plan)	May grant authorization to strike wolves with non-lethal projectiles if WDFW required training is completed. Under the endangered classification, an authorization would be reconsidered if used inappropriately or a mortality occurs.	Allowed with a permit and training from WDFW.
Move individual wolves to resolve conflicts (2011 Wolf Plan)	May be used by state/federal agents to resolve conflicts on a case-by-case basis under each status.	
Lethal control by state/federal agents of wolves involved in repeated livestock depredations (2011 Wolf Plan)	Allowed during all listed statuses and after delisting, consistent with federal law.	

WDFW permits for lethal control by livestock owners (including family members and authorized employees) of wolves to resolve repeated wolf-livestock conflicts (2011 Wolf Plan)	Typically not issued, except WDFW may consider issuing a permit to a livestock owner (including family members and authorized employees) to conduct lethal control if WDFW does not have the resources to address control.	May be issued to livestock owners (including family members and authorized employees) with an issued permit on private lands and public grazing allotments they own or lease.
WDFW permits for lethal take of wolves in the act of attacking (biting, wounding, or killing) livestock, including guarding/herding animals (2011 Wolf Plan)	May be issued to livestock owners (including family members and authorized employees) on private land they own or lease and public grazing allotments after documented depredation (injury or killing) in the area. Would trigger a review by WDFW if used inappropriately or if 2 wolf mortalities occur under this provision in a year. WDFW would evaluate the circumstances of the mortalities and determine if it would continue issuing permits.	
Compensation for livestock loss (2011 Wolf Plan)	Yes under each status	
Assistance to livestock owners with the use of proactive non-lethal management tools (2011 Wolf Plan)	Yes under each status	
Title 222 WAC (Forest Practices Board): Critical habitats (state) of threatened and endangered species (WAC 222-16-080)	Harvesting, road construction, or site preparation within 1 mile of a known active den site, documented by the department of fish and wildlife, between the dates of March 15 and July 30 or 0.25 mile from the den site at other times of the year.	Does not apply

Appendix B. WDFW response to comments on the Draft Periodic Status Review for the Gray Wolf

Public comments on the Draft PSR can be viewed at https://publicinput.com/psr-gray-wolf.

1.0. Introduction. The Washington Department of Fish and Wildlife (WDFW) Wildlife Program released the Draft Periodic Status Review for the Gray Wolf (Draft PSR) and invited the public to comment on the draft from May 18, 2023 to August 16, 2023. The public was invited to provide comments on the Draft PSR via a web portal (https://publicinput.com/psr-gray-wolf), email (psr-gray-wolf@PublicInput.com) or via voicemail message. Written/mailed comments were also accepted. Although there is no regulatory requirement for WDFW to respond to comments on the Draft PSR, in light of the high level of interest and controversy around the subject of this PSR, we are choosing to provide a general overview and general response to major comment themes.

We will respond separately to public comments received in response to a proposed rule change (CR-102) and about the substance of the APA proposed rule change/new rule via a "Concise Explanatory Statement" in the event that the FWC votes to approve the proposed WAC amendment. The present document (hereinafter the "Response") contains an overview, classification, summary, and set of responses to these comments on the Draft PSR.

2.0. General overview of comments. WDFW received over 12,000 written submissions on the draft PSR. Few respondents directly commented on the biological and scientific information provided in the PSR in their comments, and instead provided general statements of support and opposition.

Approximately 9,500 of these submissions were copies of or slight variations of four different form letters. All four form letters were very similar in terms of content and stated that Washington's wolf population is fragile, recovery is in its infancy, wolves are not recovered by state standards, and that endangered status should be retained. The remaining submissions in the comment process were unique. These submissions came from private individuals, non-governmental organizations (NGOs) or advocacy groups, the U.S. Forest Service, county commissions, county conservation districts, and elected officials.

3.0. Classification of comments. In light of the voluminous comments related to the Draft PSR, we summarized and grouped comments. We strived to represent comments accurately, but generalizations are inherent in these summaries and each comment is not addressed individually. We note additional comment detail in some of its responses, but some of the nuance present in original comments has been simplified for brevity.

4.0. General comment themes in support/opposition of the PSR recommendation.

Commenters who agreed with the PSR recommendation to list wolves as Sensitive generally stated the following:

- Washington wolves have demonstrated 14 consecutive years of growth – wolves are not in decline
- The wolf population continues to grow and expand geographically
- Two recovery regions alone have exceeded the recovery objective for total number of wolf breeding pairs in the state

- The Eastern recovery region has exceeded the recovery objective by 5 times
- Wolf populations remain stable in all states where lethal control or harvest is implemented
- Wolves have shown remarkable recovery in a short period of time
- Current wolf biological status fits the Sensitive definition in WAC 220-610-110
- If wolves are endangered when there are zero packs as when listed, or 5 packs in 2011, and still when they are well established in two of the three recovery zones with a total of 37 packs, 26 breeding pairs, and a growing population trend, the term "endangered" is meaningless
- It is important to recognize the progress that has been made toward full recovery
- Reclassifying wolves to Sensitive does not put the wolf population at risk of decline and does not bring them closer to an eventual hunt or other management practices that increase deliberate human-caused mortality
- The Governor's office attempting to influence the recommendation or the final decision of the Fish and Wildlife Commission on the draft is inappropriate and unethical

Commenters who disagreed with the PSR recommendation and believed wolves should be maintained as Endangered generally stated the following:

- Washington's wolf population is fragile and recovery is in its infancy
- Wolves are not recovered by state standards
- WDFW is not following the Wolf Plan
- Wolves are not present in a significant portion of their range
- Wolf management in neighboring states and provinces jeopardizes wolves in Washington
- The PSR relies too much on the population model (Petracca et al. 2024) and/or the population model is flawed/has too much uncertainty
- Downlisting wolves is counter to public opinion
- Downlisting wolves will result in increased wolf poaching
- Downlisting wolves would bring Washington closer to delisting wolves and opening wolf trophy hunting and trapping seasons

Commenters who disagreed with the PSR recommendation and believed wolves should be delisted generally stated the following:

- The data and analysis in the PSR support delisting
- Wolves are neither vulnerable nor declining in Washington nor are they likely to become endangered or threatened in a significant portion of their range
- Gray wolves should be delisted and managed as protected wildlife
- The recovery of the species in eastern Washington occurred without the protections of the federal Endangered Species Act
- Even with tribal hunting, lethal removal, poaching, and natural mortality the wolf population continues to grow
- There is no data or analysis that indicates vulnerability

5.0. Summarized comments and responses.

Comment: Some commenters state that Washingtonians overwhelmingly support wolf recovery and that downlisting wolves is counter to public opinion.

Response: Our recommendation is based solely on the biological status of the species being considered based on the preponderance of scientific data available, not public opinion.

Furthermore, our public process is informed by public opinion, but we do not believe that public opinion of all Washingtonians is accurately represented solely by those from the public who choose to testify at public hearings, send form letters, or reach out to elected officials, or that these actions necessarily represent an unbiased sample. Statements about what the public supports or does not support should be qualified with unbiased social science research to specify exactly who in the population is being considered and how.

Comment: Some commenters stated that wolves are just starting to recover, the population remains "fragile," and that they experience over five percent annual mortality in Washington.

Response: Although we agree that wolves are still in the recovery phase in Washington, we respectfully disagree that wolves are just starting to recover in Washington and that their population is fragile. Since WDFW's first wolf population survey in 2008, the wolf population has increased for 14 consecutive years by an average of 23% per year. When the 2011 Wolf Conservation and Management Plan (Wolf Plan) was adopted in 2011, there were only five wolf packs in the state—there are now 37. The Wolf Plan objective for delisting of maintaining at least 4 successful breeding pairs in each of three recovery regions has been exceeded in two of three recovery regions. The 2022 annual population revealed a continued increase in wolf packs and successful breeding pairs in the North and Central Cascades as well as novel presence in the South Cascades.

All wildlife populations experience mortality and five percent mortality is a very low level of mortality for a wolf population and easily supports population growth, as has been documented over 14 years of monitoring in the state. In their review of human-caused mortality in North American wolves, Adams et al. (2008)[1] found that population growth rates in North American wolves remained stable to slightly increasing with human-caused mortality rates of approximately 29% or less.

Comment: Some commenters believe wolves should be completely delisted and state there is no data or analysis that indicates vulnerability.

Response: As discussed in the "Population and Habitat Status" of the PSR, no successful breeding pairs have been documented yet in the Southern Cascades and Northwest Coast recovery region. Although individual wolves have been detected in western Washington (i.e., west of the Cascades [where models indicate most unoccupied, suitable wolf habitat in the state remains]), no known packs or reproductive individuals have been documented as of 2022. The Wolf Plan specifically indicates the importance of the recovery region that has not yet met plan recovery objectives: "In particular, the southern Cascade Mountains contain a large amount of high quality habitat. This area contains abundant natural prey for wolves, including nearly half of Washington's elk population, and

[1] Adams, L. G., R. O. Stephenson, B. W. Dale, R. T. Ahgook, and D. J. Demma. 2008. Population dynamics and harvest characteristics of wolves in the Central Brooks Range, Alaska. Wildlife Monographs 170:1-25.

large contiguous blocks of forested public and private lands, where low levels of conflict with livestock are expected. As a result, the southern Cascades have the potential to support a source population of wolves, a factor of importance with regard to the long-term survival of the wolf population in Washington" (pg. 60). We recommend observing the Wolf Plan recovery targets for delisting of at least four successful breeding pairs in each recovery region. We believe that these targets are attainable through natural recolonization and ensure adequate distribution of reproducing wolves throughout the state. We do not recommend delisting wolves at this time.

Wolves remain vulnerable in western Washington and should continue to be managed for recovery within the state as a protected species. Continued population growth and range expansion will depend on the robustness of source populations in eastern Washington (as well as neighboring states and provinces) and cooperative management to ensure sources of human-caused mortality do not impede recovery.

Comment: Some commenters express concern that WDFW is following definitions set forth in WAC 220-610-110 and/or perceive a conflict between definitions set forth in the WAC and the downlisting/delisting guidance in the Wolf Plan.

Response: In developing the Draft PSR, we considered WAC 220-610-110 definitions and processes as well as the Wolf Plan. In the event of a conflict between WAC 220-610-110 and the Wolf Plan, the WAC takes precedence. The WAC is the product of formal rulemaking process through which a legally enforceable rule is established. The Wolf Plan provides important guidance that WDFW considers but it does not constitute a rule and is not binding.

The PSR does not disregard the Wolf Plan. The guidance of the Wolf Plan is thoroughly discussed and considered in the Draft PSR (pg. 18-21). It has been 13 years since the Wolf Plan was finalized. The trajectory of wolf recovery has progressed significantly during that time and differed somewhat from the predictions of how recovery *might* occur described in the Wolf Plan. The Wolf Plan *predicted* a recovery trajectory; we now have 15 years of data on the *actual/realized* trajectory of wolf recovery. The *current* recovery status of wolves best aligns with the definition of a Sensitive species as described in WAC 220-610-110.

Although current wolf distribution in Washington is not yet what was predicted in the Wolf Plan, the numbers of wolves and successful breeding pairs in the areas they do occupy represent a significant portion of the range to the extent that they are no longer seriously threatened with extinction or likely to be threatened with extinction in the foreseeable future in Washington state.

Notably, it is stated in the PSR that the Wolf Plan recovery targets of at least four successful breeding pairs in each recovery region for *delisting* are still appropriate, attainable through natural recolonization, and ensure adequate distribution of reproducing wolves throughout the state.

Comment: Some commenters believe that WDFW's recommendation to downlist gray wolves to sensitive does not adhere to WAC 220-610-110 section 3.2, which states, "If a species is listed as endangered or threatened under the federal Endangered Species Act, the agency will recommend to the commission that it be listed as endangered or threatened as specified in section 9.1."

Response: We interpret WAC 220-610-110 section 3.2 to mean that when a species is *newly* listed as endangered or threatened under the federal Endangered Species Act (ESA), the agency will recommend to the commission that it be listed as endangered or threatened—it does not mean that a species should then maintain that status forever regardless of the current biological and recovery status of the species in Washington, or that the agency should not complete the PSR process. WDFW has followed section 3.2 by listing wolves as an endangered species in 1980 (following the ESA classification) and are now following the PSR process. Since the original state listing, Washington has significantly advanced wolf recovery in the absence of any federal recovery objectives and well ahead of the federal listing/delisting process. A PSR is different from an initial listing process in that it requires WDFW to consider status at the state level, and is not beholden to maintain the status designated at initial listing—a PSR is intended to keep the status of the species current. WDFW staff believe that Sensitive status currently best describes Washington's wolf population based solely on the biological status of the species.

In April 2021, WDFW's Fish and Wildlife Commission (FWC) voted to maintain state Sensitive status for another species with some individuals listed as federally endangered in Washington, the gray whale (*Eschrichtius robustus*). Similar to the gray wolf, some gray whales that occur in Washington waters are federally listed and others are federally delisted. The Eastern North Pacific gray whale population was federally delisted in 1994. The Western North Pacific gray whale population is federally listed as endangered, and individuals have been seen in Washington waters.[2] Similarly, the majority of wolves that occur in Washington (>70%) are federally delisted and the remainder are federally listed.[3]

We recognize an alternative interpretation of WAC 220-610-110 section 3.2 that could indicate if any segment of a population is listed federally, a state listing recommendation of threatened or endangered is required (although that is not the interpretation the FWC followed in 2021 for the gray whale). The FWC can choose to follow that interpretation and they have a broad scope of decision-making authority and responses available.

Comment: Commenters provide various interpretations of "significant portion of its range" (SPR) as defined in WAC 220-610-110 and included in definitions of endangered, threatened, and sensitive, providing various reasons why their interpretation does or does not support downlisting or does or does not match the guidance and predictions of the Wolf Plan.

Response: In Washington state law, WAC 220-610-110 establishes both the context for using the SPR phrase and definition, and neither have changed since first adopted in 1990 (RCW 77.12.020 does not use the phrase). This makes the legal interpretation of this phrase in Washington state law much simpler than a similar phrase used in the federal ESA. The U.S. Congress used the phrase in the federal ESA statute and the phrase has been given different, fluctuating interpretations by different federal administrations through varying regulations. From the perspective of WDFW staff, it is clear the Washington's SPR language is separate and distinct from the federal ESA.

[2] Sato, C. and G. J. Wiles. 2021. Periodic status review for the gray whale in Washington. Washington Department of Fish and Wildlife, Olympia, Washington. 32+ iii pp.

[3] Washington Department of Fish and Wildlife, Confederated Tribes of the Colville Reservation, Spokane Tribe of Indians, Yakama Nation, Swinomish Tribe, and U.S. Fish and Wildlife Service. 2023. Washington Gray Wolf Conservation and Management 2022 Annual Report. Washington Department of Fish and Wildlife, Ellensburg, WA, USA.

The status of a population as it relates to SPR is to ask if an unoccupied area, or an area occupied but lacking sufficient protection or mitigation of significant threats, is essential to the long-term survival of the population in Washington. This could be incredibly important for disjunct populations. Another way is to ask if the species occurs in a significant enough portion of their range to ensure the long-term survival of the population in Washington. Both approaches should reach the same conclusion. Although it is true that gray wolves do not currently occupy a substantial portion of their *potential* range, WDFW staff believe they occupy a significant portion of their range to ensure long-term survival in Washington. WAC 220-610-110 defines SPR as the latter. This does not mean that continued management for recovery and range expansion is not needed, only that the status of the species is adjusted to reflect their current state of recovery.

Some may interpret certain definitions and sections of WAC 220-610-110 differently. The FWC can choose to follow an interpretation that differs from that of WDFW staff and they have a broad scope of decision-making authority and responses available.

Comment: Some commenters state that wolf management policies in Idaho and Montana threaten recovery of Washington's wolves, that a 50% or higher reduction in immigration is likely, and that Washington wolves may emigrate to Idaho, Montana, and British Columbia to fill territories vacated by wolves that were killed.

Response: We respectfully disagree that a reduction in immigration of wolves into Washington by 50% is likely and is not sure on what data commenters are basing their conclusions. It is unknown how efforts to reduce wolf populations in neighboring states may affect immigration and dispersal of wolves from other states into Washington because effects of harvest on dispersal, emigration, and immigration are complex. For example, Bassing et al. (2020)[4] found that immigration rates were unchanged by various harvest regimes (e.g., Idaho before and after harvest and continual long-term harvest in southwestern Alberta) and that immigrating wolves did not join neighboring packs at higher levels in harvested populations than in unharvested populations. Ausband et al. (2020)[5] found that harvest led to a small increase in genetic diversity in subpopulations yet also increased the relatedness of individuals between groups in subpopulations (meaning that harvest likely created opportunities for wolves to immigrate into nearby groups and breed, thereby making groups in subpopulations more related over time).

In addition, simply because other jurisdictions have stated intent to reduce their wolf populations does not mean they will be successful in doing so to the extent they desire, or that reductions will result in wolf populations so small that there is no longer interchange with Washington's population. For example, Idaho aims to decrease their wolf population by approximately 63% (IDFG 2023a[6]).

[4] Bassing, S. B., D. E. Ausband, M. S. Mitchell, M. K. Schwartz, J. J. Nowak, G. C. Hale, and L. P. Waits. 2020. Immigration does not offset harvest mortality in groups of a cooperatively breeding carnivore. Animal Conservation 23:750-761. https://doi.org/10.1111/acv.12593.

[5] Ausband, D. E., and L. P. Waits. 2020. Does harvest affect genetic diversity in grey wolves? Molecular Ecology 29:3187-3195. https://doi.org/10.1111/mec.15552

[6] IDFG (Idaho Department of Fish and Game). 2023a. Draft Idaho Gray Wolf Management Plan, 2023-2028. Available at https://idfg.idaho.gov/sites/default/files/02012023%20DRAFT%202023%20IDFG%20Wolf%20Management%20Plan.pdf.

However, Idaho's 2022 population estimate of 1,337 wolves indicates wolves declined by about only 13% since 2021.[7] Between 2019 and 2021, summer population estimates averaged 1,548 animals, and 516 of those died on average each year, or about 33% of the annual population.[4] Even with mortality of about 33% of the population annually, Idaho still maintains a robust wolf population of over 1,300 wolves[4] connected geographically to Washington's wolf population. As stated in the Draft PSR (pg. 26), "total cessation of all wolf immigration into Washington is highly unlikely given the connectivity of Washington's wolves to a much larger population in Canada and the Northern Rocky Mountains."

Wolves in Washington are expected to continue to expand their range into unoccupied habitat building from the existing population. Maletzke et al. (2016)[8] suggest that even with no immigration from other states, the risk of not reaching recovery goals is about 2%, and if the state reaches the recovery goal of 15 breeding pairs, then that risk continues to decline toward zero. Washington has almost doubled the number of breeding pairs needed for recovery with 26 pairs in 2022, so the risk of not reaching recovery goals is greatly reduced. As the population that currently exists in Washington becomes more robust, immigration from other jurisdictions becomes less critical for statewide recovery. Petracca et al. (2024)[9] found that wolves are almost certain to occupy the last of the three recovery regions by 2030, and that Wolf Plan recovery goals are likely (median >75%) to be met by 2040. These modeling exercises included empirical data on demographics of Washington's wolf population as neighboring jurisdictions have attempted to reducing their wolf populations.

Washington's wolf emigration data in these models is derived from a period in which wolves were most abundant in northeast Washington where populations in Idaho and British Columbia were the closest neighboring populations. Wolves are now expanding in the Cascades in Washington, which we expect to influence emigration in the future (i.e., more wolves may stay within Washington as they encounter other wolves in new areas during dispersal that in the past were unoccupied).

Lastly, the mere identification of any potential threat(s) does not necessarily mean that the species meets the definition of an endangered or threatened species.

Comment: Some commenters state that the population model referenced in the PSR has not yet completed the independent peer-review process, only peer-reviewed (independent peer-review preferred) studies should be considered as a foundational component of any species' listing status change, and forecasting models should not be relied upon to dictate WDFW's listing recommendation.

Response: The population model referenced in the PSR has completed the independent scientific peer-review process and has been published in the journal Biological Conservation.[8]

[7] IDFG (Idaho Department of Fish and Game). 2023b. "Idaho's wolf population has dropped by about 13 percent." Available at https://idfg.idaho.gov/article/idahos-wolf-population-has-dropped-about-13-percent.

[8] Maletzke, B. T., R. B. Wielgus, D. J. Pierce, D. A. Martorello, and D. W. Stinson. 2016. A meta-population model to predict occurrence and recovery of wolves. The Journal of Wildlife Management 80:368-376. https://doi.org/10.1002/jwmg.1008

[9] Petracca, L. S., B. Gardner, B. T. Maletzke, and S. J. Converse. 2024. Merging integrated population models and individual-based models to project population dynamics of recolonizing species. Biological Conservation 289:110340. https://doi.org/10.1016/j.biocon.2023.110340

Regardless, the model did not dictate the listing recommendation; it along with 14 years of population monitoring and range expansion informed the recommendation. The model provided a prediction of wolf population trajectory over the next 50 years that provides the best available scientific prediction of what the population trend will be under current management and other scenarios. Maletzke et al. 2016[8] is another independently, peer-reviewed publication that demonstrates the same trend and supports the same conclusion.

It should be noted that many status reviews do not include independent peer-review studies as foundational components of status reviews due to lack of resources available for studying species that are less high-profile, lack of data availability, and the difficulty of monitoring trends of rare and at-risk populations. Fortunately, wolves in Washington have been well-resourced, well-studied, and closely monitored since returning to Washington and do not face the same challenges for funding and monitoring that many other imperiled species do.

Comment: Commenters express concern regarding uncertainty (i.e., large credible intervals, high variance) in the population model and predictions in Petracca et al. 2024.[9]

Response: It is correct that there is uncertainty and in some cases large credible and/or predictive intervals in some of the model results and predictions. However, uncertainty is inherent in the data and questions for which the model provides some elucidation. There are multiple types of "uncertainty," some of which are reducible and some of which are not. Uncertainty in knowledge of parameters (parametric stochasticity) can be reduced through more information gathering and research (e.g., having more exact information about survival of younger age classes of wolves, litter sizes, and dispersal). Collecting such information is invasive and comes at a cost. Our knowledge about the parameters used in the wolf model is better than we have for most, if not all, other species in Washington. The model accounts for known demographic stochasticity, which cannot be reduced. The model also includes uncertainty about factors in the environment (i.e., random effects of different years), known as environmental stochasticity. The fact that modelers worked specifically to account for different kinds of stochasticity make the predictions more robust in an uncertain future, which is what a model is intended to do.

Both the Maletzke et al. 2016[8] and Petracca et al. 2024[9] models demonstrate degrees of uncertainty and it is important for managers to understand which components of the model may influence population growth or decline. However, both models suggest the wolf population will continue to grow until recovery goals are met or exceeded based on current the status of wolves even with this uncertainty. This trend has also been demonstrated by the empirical data collected on wolves in Washington showing an increasing trend for the past 14 years. Wolves in neighboring jurisdictions including Idaho and Montana also have empirical data to demonstrate recovery of wolves even with increased mortality levels and similar uncertainties, demonstrating the robust nature of wolf populations.

In response to inquiries about how WDFW intends to address uncertainty while recommending downlisting, the model predicted *favorable* results for wolf recovery and persistence over many thousands of iterations 50 years into the future, *despite* inherent uncertainty. This best available science does not provide any indication that wolves are in danger of extinction and in fact indicates their current population is robust and expected to spread to all suitable habitat in Washington. These results support that wolves no longer meet the definition of endangered.

The status recommendation in a PSR is based on the *current* biological status of the species being considered, based on the preponderance of scientific data available at a point in time. It is well understood that a species' status may change and require uplisting, downlisting, delisting, or relisting in the future—that is why the PSR process is intended to be conducted every five years. If population declines are observed in the future, wolves can be uplisted through the same process. If fully delisted in the future, in the event of a decline approaching the minimum population objectives for delisting (including numbers and distribution), WDFW may immediately initiate a status review to determine whether relisting is appropriate. WDFW's listing procedures (WAC 220-610-110, section 5.1.3) also provide for emergency listing.

Comment: Commenters point out that Petracca et al. 2023[10] examines threats from disease, reduced immigration, hunting, and increased killing of wolves in response to livestock depredation, but does not examine any of these factors working together.

Response: It is correct that although Petracca et al. 2023[10] examines dynamics of the wolf population under different scenarios, it does not analyze the effects of all the scenarios simultaneously (although it does examine the current baseline under which wolves *currently* experience mortality from these sources). Doing so was not the intention of the exercise. These are not scenarios intended to predict the future; rather, this exercise was a sensitivity analysis to examine sensitivity to particular kinds of threats or management to better understand which may or may not significantly affect the wolf population.

The status recommendation in a PSR is based on the *current* biological status of the species being considered, based on the preponderance of scientific data available at a point in time. It is well understood that a species' status may change and require uplisting, downlisting, delisting, or relisting in the future—that is why the PSR process is intended to be conducted every five years. If population declines are observed in the future, wolves can be uplisted through the same process. If fully delisted in the future, in the event of a decline approaching the minimum population objectives for delisting (including numbers and distribution), WDFW may immediately initiate a status review to determine whether relisting is appropriate. WDFW's listing procedures (WAC 220-610-110, section 5.1.3) also provide for emergency listing.

Comment: Some commenters state that downlisting wolves and reducing penalties for illegal take will result in increased wolf poaching. Some state that downlisting will increase attempts at legislation that aims to remove protections for wolves.

Response: As discussed in the "Poaching" section of the PSR, we agree that wolf poaching is a threat to wolves in Washington, could result in population decline, and has the potential to impede recovery. However, in 14 years of population monitoring, both documented and undocumented poaching has not resulted in population decline and Washington's wolf population continues to meet recovery milestones annually. Regardless, we acknowledge that poaching could reduce potential

[10] Petracca L. S., B. Gardner, B. T. Maletzke, and S. J. Converse. 2023. Forecasting dynamics of a recolonizing wolf population under different management strategies. bioRxiv doi: 10.1101/2023.03.23.534018.

population growth rates of wolves in Washington and the possible impacts of illegal killing are an important factor to consider in wolf conservation and recovery.

Some research suggests that policy changes in wolf management that allow authorized take and/or reduce protections for wolves result in increased wolf poaching (Chapron and Treves 2016,[11] Santiago-Ávila et al. 2020,[12] Louchouarn et al. 2021[13]). However, these conclusions have been heavily critiqued and the biological significance to wolf populations questioned (Olson et al. 2017,[14] Pepin et al. 2017,[15] Stien et al. 2017[16]), there is evidence of the opposite conclusion (Liberg et al. 2020[17]), and such views do not represent a universal interpretation among researchers and biologists (see Olson et al. 2015[18], von Essen et al. 2015[19]).

Unfortunately, illegal take can be a major source of wolf mortality worldwide regardless of the wolf population's level of protection (Liberg et al. 2011,[20] Suutarinen and Kojola 2017,[21] Nowak et al. 2021[22]), including in Washington where wolves have been state endangered since recolonization.

[11] Chapron, G., and A. Treves. 2016. Blood does not buy goodwill: allowing culling increases poaching of a large carnivore. Proceedings of the Royal Society B 283:20152939. http://dx.doi.org/10.1098/rspb.2015.2939

[12] Santiago-Ávila, F.J., R. J. Chappell, and A. Treves. 2020. Liberalizing the killing of endangered wolves was associated with more disappearances of collared individuals in Wisconsin, USA. Scientific Reports 10:13881. https://doi.org/10.1038/s41598-020-70837-x

[13] Louchouarn, N. X., F. J. Santiago-Ávila, D. R. Parsons, and A. Treves. 2021 Evaluating how lethal management affects poaching of Mexican wolves. Royal Society Open Science 8:200330. https://doi.org/10.1098/rsos.200330

[14] Oslon, E.R., S.M. Crimms, D.E. Beyer, D.R. MacNulty, B.R. Patterson, B.A. Rudolph, A.P. Wydeven, and T.R. Van Deelen. 2017. Flawed analysis and unconvincing interpretation: a comment on Chapron and Treves. Proceedings of the Royal Society B 284: 20170273. http://dx.doi.org/10.1098/rspb.2017.0273

[15] Pepin, K., S. Kay, and A. Davis. 2017. Comment on: 'Blood does not buy goodwill: allowing culling increases poaching of a large carnivore.' Proceedings of the Royal Society B 284:20161459. https://doi.org/10.1098/rspb.2016.1459

[16] Stien, A. 2017. Blood may buy goodwill: no evidence for a positive relationship between legal culling and poaching in Wisconsin. Proceedings of the Royal Society B 284:20170267. http://dx.doi.org/10.1098/rspb.2017.0267

[17] Liberg, O., J. Suutarinena, M. Åkessona, H. Andréna, P. Wabakkenb, Camilla Wikenrosa, and H. Sanda. 2020. Poaching-related disappearance rate of wolves in Sweden was positively related to population size and negatively to legal culling. Biological Conservation 243:108456. https://doi.org/10.1016/j.biocon.2020.108456

[18] Olson, E. R., J. L. Stenglein, V. Shelley, A. R. Rissman, C. Browne-Nuñez, Z. Voyles, A. P. Wydeven, and T. Van Deelen. 2015. Pendulum swings in wolf management led to conflict, illegal kills, and a legislated wolf hunt. Conservation Letters 8:351-360. https://doi.org/10.1111/conl.12141

[19] von Essen, E., H. P. Hansen, H. Nordström Källström, M. N. Peterson, and T. R. Peterson. 2015. The radicalisation of rural resistance: How hunting counterpublics in the Nordic countries contribute to illegal hunting. Journal of Rural Studies 39:199-209. https://doi.org/10.1016/j.jrurstud.2014.11.001

[20] Liberg, O., G. Chapron, P. Wabakken, H. C. Pedersen, N. T. Hobbs, and H. Sand. 2011. Shoot, shovel and shut up: cryptic poaching slows restoration of a large carnivore in Europe. Proceedings of the Royal Society B 279:910-915. https://doi.org/10.1098/rspb.2011.1275

[21] Suutarinen, J., and I. Kojola. 2017. Poaching regulates the legally hunted wolf population in Finland. Biological Conservation 215:11-18. https://doi.org/10.1016/j.biocon.2017.08.031

[22] Nowak, S., M. Z˙mihorski, M. Figura, P. Stachyra, and R. W. Mysłajek. 2021. The illegal shooting and snaring of legally protected wolves in Poland. Biological Conservation 264:109367. https://doi.org/10.1016/j.biocon.2021.109367

Frequent pendulum swings in policy caused by lawsuits, reactions to lawsuits, and legislation have also been found to cause more poaching (Olson et al. 2015[18]). At the federal level with now almost two decades of wolf listing decisions and reversals, several attempts to weaken the Endangered Species Act have followed as a result of not being able to downlist wolves due to lawsuits (Smith 2019[23]). This mirrors our experience in Washington where wolf conservation has been afflicted by pendulum swings in policy fueled by lawsuits attempting to prevent WDFW from removing any wolves followed by reactive legislation aimed at local wolf control and reducing wolf protections.

We share concerns about reducing penalties for illegally killing wolves. However, species listing is designated only by biological status and not by preferences for specific policies. Although it is not in scope of this PSR process, we believe stricter penalties for poaching wolves should be considered regardless of listing status, similar to species listed under RCW 77.15.130(3) or RCW 77.15.420(1) and could be pursued through the appropriate process. This PSR process has highlighted the importance of heightening penalties for illegal take for all endangered species and ensuring special penalties for poaching wolves are in place at any status.

Comment: Some commenters express concern that lethal control permits for livestock owners could increase on private property and be allowed on public grazing allotments if wolves are listed as Sensitive.

Response: We are not proposing changes to the wolf-livestock interaction protocol[24] or expectations around wolf-livestock conflict mitigation as a part of the PSR process. There is no information to indicate that lethal control permits issued to livestock producers on private land would increase if wolves were listed as Sensitive. As is, WDFW rarely issues lethal control permits to livestock producers, and when offered, livestock producers typically decline them.

As described in Appendix A, the Wolf Plan does state that permits for lethal control may be issued to livestock owners (including family members and authorized employees) for use on public grazing allotments under Sensitive status. We do not believe this provision would lead to increased mortality from lethal control given the broader system in place to minimize lethal control of wolves.

Comment: Some commenters state that downlisting wolves would bring Washington closer to delisting wolves and opening wolf trophy hunting and trapping seasons.

Response: This is not entirely correct. There is no legal requirement for species to go through each listed stage before downlisting or delisting. Wolves could go from endangered straight to delisted once they meet recovery objectives and thus are no "closer" to delisting at any one status from a process perspective. Any proposed status change requires an Administrative Procedures Act (APA) and State Environmental Policy Act (SEPA) process. However, it is accurate to say that a recommendation to downlist a species indicates that a population is trending toward recovery and eventual downlisting. If recovery continues along the current trend, delisting is possible in the future

[23] Smith, J. B. 2019. Wolf war and peace. The Wildlife Professional 13(5):46-49.

[24] WDFW (Washington Department of Fish and Wildlife). 2017. Wolf-livestock interaction protocol. Available at https://wdfw.wa.gov/sites/default/files/2020-09/20200915_wdfw_wolf_livestock_interaction_protocol.pdf.

assuming the population no longer meets the definitions and requirements to be state listed, which is the goal for all species recovery programs and the 2011 Wolf Plan.

Body gripping traps and neck snares are prohibited in Washington (RCW 77.15.194) so a future trapping season for wolves in Washington is highly unlikely under current law. Any future proposals to hunt wolves following delisting would go through a public process (an APA rulemaking process) and there is no predetermined outcome such that a wolf hunting season is a foregone conclusion.

Comment: Some commenters express concern that the provision in the current Forest Practices Rule (WAC 222-16-080 1(a)) that puts a one-mile buffer around den sites during the denning season would not apply if wolves were listed as Sensitive, and could lead to pup injury or death.

Response: We appreciate this concern. However, based on WDFW staff's professional knowledge and experience, as well as that of professionals in other states, we do not believe this change would negatively impact wolves or wolf pups. Wolves tolerating human activity in close proximity to dens and rendezvous sites with pups is well-documented among wolf biologists and managers (Thiel et al. 1998,[25] Fritts et al. 2003[26]). Although wolves may relocate pups in response to human activity and/or disturbance near homesites, data does not support reduced reproductive success at disturbed homesites (Frame et al. 2007[27]). In Frame et al.'s 2007 study, disturbed sites were reused as often as those in the control group, suggesting that homesite disturbance has minimal if any adverse effect on wolf populations. There is further evidence that human activity and/or disturbance at den sites does not have lasting effects on reproductive success or reuse of homesites through information gathered during cross-fostering events, which involve the removal of captive or wild newborn pups from one den and subsequent placement into an active wild den of pups of similar age (Gese et al. 2018,[28] J. Smith, unpublished data).

When wolves were reintroduced to Yellowstone National Park and Idaho, the U.S. Fish and Wildlife Service established an option of closing a 1.6 km buffer around active den and rendezvous sites on public land during the denning season, and the option was only implemented once (Fritts et al. 2003). Similarly, timing restriction criteria related to timber sales in Washington associated with WAC 222-16-080 have rarely needed to be implemented.

Restrictions are only possible if den sites or rendezvous sites are known or located within a particular timeframe. Wolves typically begin to den between early to mid-April to early May and may remain at a den though mid-July. Each year during the spring, snowpack, temperature, moisture, and green-up alter distribution and migration of ungulates along the gradient from lower elevation winter range to their summer range. In response, wolves may choose new locations to den and/or rendezvous each

[25] Thiel, R. P., S. Merrill, and L. D. Mech. 1998. Tolerance by denning wolves, *Canis lupus*, to human disturbance. Canadian Field-Naturalist 122:340-342.

[26] Fritts, S. H., R. O. Stephenson, R. D. Hayes, and L. Boitani. 2003. Wolves and humans. Pages 289-316 *in* L. D. Mech and L. Boitani, editors. Wolves: behavior, ecology, and conservation. The University of Chicago Press, Chicago, Illinois.

[27] Frame, P. F., H. D. Cluff, and D. S. Hik. 2007. Response of wolves to experimental disturbance at homesites. The Journal of Wildlife Management 71:316-320.

[28] Gese, E. M., W. T. Waddell, P. A. Terletzky, C. F. Lucash, S. R. McLellan, and S. K. Behrns. 2018. Cross-fostering as a conservation tool to augment endangered carnivore populations. Journal of Mammalogy 99:1033–1041. https://doi.org/10.1093/jmammal/gyy087

year in response to climate and prey distribution. Because wolves do not utilize the same locations each year to den, a database of known dens would be obsolete each year.

WDFW staff work to locate any new packs and attempt to maintain collars in each pack; however, collar failures, mortalities, dispersals, and other factors influence our ability to maintain collars in all packs. As the wolf population continues to grow, we intend to explore new techniques to monitor Washington's wolf population and collars may be less widely used in the future as it becomes more difficult to maintain collars in each pack. Even with a collar in a pack, how quickly we can determine if the pack is actually denning depends greatly on which pack member is collared. If a Global Positioning System (GPS) collar is deployed on a breeding female, then we may be able to determine quickly whether a pack is denning (if the collar is unobstructed and can transmit location data; sometimes the den structure itself can prevent a collar from sending locations). If other members of the pack are collared, it may take up to three weeks or more to determine if the pack is denning (to see the pattern of individuals returning to a suspected den location).

We keep this data as secure as possible because it has been abused in the past. We have observed den locations become attractions for work crews, had "beware of dog" signs placed at a den, and had external agency staff on a trail camera approaching a den. To avoid these disturbances, WDFW maintains a blackout period for data sharing around the timing of denning for wolves and specific GPS location data for den sites is not shared.

Our goal is to minimize disturbance around denning wolves; as such, WDFW staff believe the best course of action to minimize disturbance is not to reveal den sites. Thus, the current Forest Practices rule as it relates to wolves may not actually be in their best interest.

Regardless of listing status or rules in practice, WDFW staff are available to provide guidance on projects that might occur in areas occupied by wolves and can work with forest landowners to create voluntary buffers when den sites are established within proposed harvest areas. WDFW and the Washington Department of Natural Resources have a history of working with landowners on voluntary conservation plans and temporary operational modifications for species such as western gray squirrel and Canada lynx.

WASHINGTON STATE STATUS REPORTS, PERIODIC STATUS REVIEWS, RECOVERY PLANS, AND CONSERVATION PLANS

Periodic Status Reviews

2024	Northern Spotted Owl
2024	Mardon Skipper
2023	Western Gray Squirrel
2023	Woodland Caribou
2023	Columbian White-tailed Deer
2022	American White Pelican
2022	Brown Pelican
2022	Snowy Plover
2022	Cascade Red Fox
2021	Ferruginous Hawk
2021	Oregon Vesper Sparrow
2021	Steller Sea Lion
2021	Gray Whale
2021	Humpback Whale
2021	Greater Sage-grouse
2020	Mazama Pocket Gopher
2019	Tufted Puffin
2019	Oregon Silverspot
2018	Grizzly Bear
2018	Sea Otter
2018	Pygmy Rabbit
2017	Fisher
2017	Blue, Fin, Sei, North Pacific Right, and Sperm Whales
2017	Sandhill Crane
2017	Western Pond Turtle
2016	Canada Lynx
2016	Marbled Murrelet
2016	Peregrine Falcon

Conservation Plans

2013	Bats

Status Reports

2021	Oregon Vesper Sparrow
2019	Pinto Abalone
2017	Yellow-billed Cuckoo
2015	Tufted Puffin
2007	Bald Eagle
2005	Aleutian Canada Goose
1999	Northern Leopard Frog
1999	Mardon Skipper
1999	Olympic Mudminnow
1998	Margined Sculpin
1998	Pygmy Whitefish
1997	Aleutian Canada Goose

Recovery Plans

2020	Mazama Pocket Gopher
2019	Tufted Puffin
2012	Columbian Sharp-tailed Grouse
2011	Gray Wolf
2011	Pygmy Rabbit: Addendum
2007	Western Gray Squirrel
2006	Fisher
2004	Sea Otter
2004	Greater Sage-Grouse
2003	Pygmy Rabbit: Addendum
2002	Sandhill Crane
2001	Pygmy Rabbit: Addendum
2001	Lynx
1999	Western Pond Turtle

Status reports and plans are available on the WDFW website at: http://wdfw.wa.gov/publications/search.php