

Oregon Department of Fish and Wildlife
November 9, 2015

Updated biological status review for the Gray Wolf (*Canis lupus*) in Oregon and evaluation of criteria to remove the Gray Wolf from the List of Endangered Species under the Oregon Endangered Species Act

Executive Summary

Oregon wolves are listed as an endangered species under the Oregon Endangered Species Act (OESA). The Oregon Wolf Conservation and Management Plan (hereafter Wolf Plan; ODFW 2010) contains a conservation population objective which was predicted to support the requirements for delisting the species under OESA. The conservation objective was achieved in January 2015 and this draft document is prepared to present information to the Oregon Fish and Wildlife Commission (Commission) on the biological status of gray wolves in Oregon.

Through natural dispersal from neighboring Idaho, wolves became established in Oregon in 2008 and have increased in both distribution and abundance during all years since that time. At the end of 2014 there were 9 successful breeding pairs of wolves in Oregon (Table 2). By July 2015, the known population (not including pups of the year) was 85 wolves, with reproduction having been documented in 13 packs or groups. Our analysis as part of this biological review predicts that Oregon's wolf population will continue to increase.

Delisting a species from OESA (ORS 496.176) requires public rulemaking and determinations by the Commission. These determinations are to be made upon a review of the best available scientific information and other biological data, which means that the scientific information must be documented and verifiable information. Specifically, the Commission must evaluate the biological status of the species and determine if:

1. The species is not now (and is not likely in the foreseeable future to be) in danger of extinction in any significant portion of its range in Oregon or in danger of becoming endangered; and
2. The species' natural reproductive potential is not in danger of failure due to limited population numbers, disease, predation, or other natural or human-related factors affecting its continued existence; and
3. Most populations are not undergoing imminent or active deterioration of range or primary habitat; and
4. Over-utilization of the species or its habitat for commercial, recreational, scientific, or educational purposes is not occurring or likely to occur; and
5. Existing state or federal programs or regulations are adequate to protect the species and its habitat.

The department reviewed the best available scientific and other data and prepared this biological status review document in which we evaluated the status of wolves as related to each of these criteria for the entire state (Option 1), and also for the eastern Wolf Management Zone (WMZ) only (Option 2). Our evaluation resulted in the conclusions that: 1) wolves were once extirpated as a result of historical efforts to eradicate them, and now in absence of those efforts and under

current management frameworks, are increasing in abundance and distribution; 2) there are no known conditions which prevent wolves from inhabiting currently unoccupied portions of range in Oregon or within the eastern WMZ; 3) observed movement and dispersal patterns indicate connectivity from source populations and 4) the probability of population failure is very low. We also included analysis and discussion (Option 3) regarding the biological implications of wolves remaining listed as endangered in Oregon.

Introduction

Historical accounts show that prior to extirpation from Oregon and other western states gray wolves (*Canis lupus*) were widely distributed and efforts by early Euro-American immigrants were largely directed at eliminating the predator (Oregon Department of Fish and Wildlife 2010). As a result, wolves were extirpated from most of the western United States by the mid-twentieth century. Modern recovery efforts in the Northern Rocky Mountains and subsequent conservation actions in the western United States has since led to restored gray wolf populations throughout a portion of its historical range.

In 1995 and 1996, the United States Fish and Wildlife Service (USFWS) reintroduced 66 gray wolves into the Rocky Mountains of Idaho and Wyoming. The reintroductions and associated conservation measures were part of the 1987 Northern Rocky Mountain (NRM) Wolf Recovery Plan and were responsible for the successful reestablishment of wolves in Wyoming, Idaho, Montana, and later in parts of Oregon and Washington. In 2014, the NRM wolf population (including Oregon and Washington) was estimated at 1,802 (U.S. Fish and Wildlife Service, 2015).

Though gray wolves were not reintroduced into Oregon, wolf experts predicted that wolves from a successful NRM population – especially Idaho – would eventually travel to and colonize Oregon. This prediction was soon realized and between 1999 and 2007, at least 4 individual wolves were documented to have dispersed into Oregon from Idaho. In July 2008, Oregon Department of Fish and Wildlife (ODFW) biologists discovered a wolf pack with pups in the Wenaha River area of northeastern Oregon and this was the first modern documented reproduction of wolves within the state. The Oregon wolf population has steadily increased and in 2014 ODFW documented a minimum known population of 81 wolves in 15 pairs or packs. By July of 2015 the minimum known Oregon population (not including young-of-the-year) was 85.

State and Federal Regulatory Status and Actions in Oregon

Wolves were classified as endangered in Oregon in 1987 when the Oregon Endangered Species Act (OESA) was enacted. The OESA requires the conservation of listed species and generally defines conservation as the use of methods and procedures necessary to bring a species to the point at which the measures provided are no longer necessary. To achieve this mandate, the Oregon Fish and Wildlife Commission (Commission) exercised its authority under the OESA by adopting and implementing the Oregon Wolf Conservation and Management Plan (Wolf Plan) in 2005. The Wolf Plan requires reevaluation every five years. The Plan was last updated in 2010 and the Division 110 implementing rules were last evaluated and amended in 2014.

In the early stages of implementation, the Wolf Plan focused on methods and procedures to conserve wolves so that the species was self-sustaining and could be delisted. The Wolf Plan defined a population objective of four breeding pairs of wolves for three consecutive years in eastern Oregon as the guideline for when wolves may be considered for statewide delisting from OESA. Accordingly, the Wolf Plan was drafted to meet the five delisting criteria identified in Oregon Revised Statute (ORS) 496.176 and Oregon Administrative Rule (OAR) 635-100-0112.

In 1987, the USFWS completed the NRM Wolf Recovery Plan. Four years later Congress initiated an administrative process to reintroduce wolves into Yellowstone National Park and central Idaho. Extensive public input showed general support for wolf recovery, and the U.S. Secretary of Interior approved reintroduction. In 1995 and 1996, 66 wolves were captured in Alberta and British Columbia, Canada. Of those, 35 were released in central Idaho and 31 were released into Yellowstone National Park.

At the time Oregon's Wolf Plan was first adopted in 2005, wolves were listed as endangered under the federal Endangered Species Act (ESA). To emphasize close coordination between the U.S. Fish and Wildlife Service (USFWS) and ODFW, the *2007 Federal/State Coordination Strategy for Implementation of Oregon's Wolf Plan* was developed which outlined procedures for managing wolves while federally listed. In 2007, the USFWS proposed to designate the NRM gray wolf population as a Distinct Population Segment and remove their status as endangered under federal ESA. The resulting decision to delist (and subsequent delisting decisions) was met with litigation and between 2008 and 2011 the status of NRM wolves varied between listed and delisted. In May 2011, NRM wolves, which included areas east of Highways 395-78-95 in Oregon, were delisted as a result of congressional action. Wolves in the remainder of Oregon remained listed as endangered under federal ESA (Figure 1).

Figure 1. Current Federal ESA Status of Wolves in Oregon

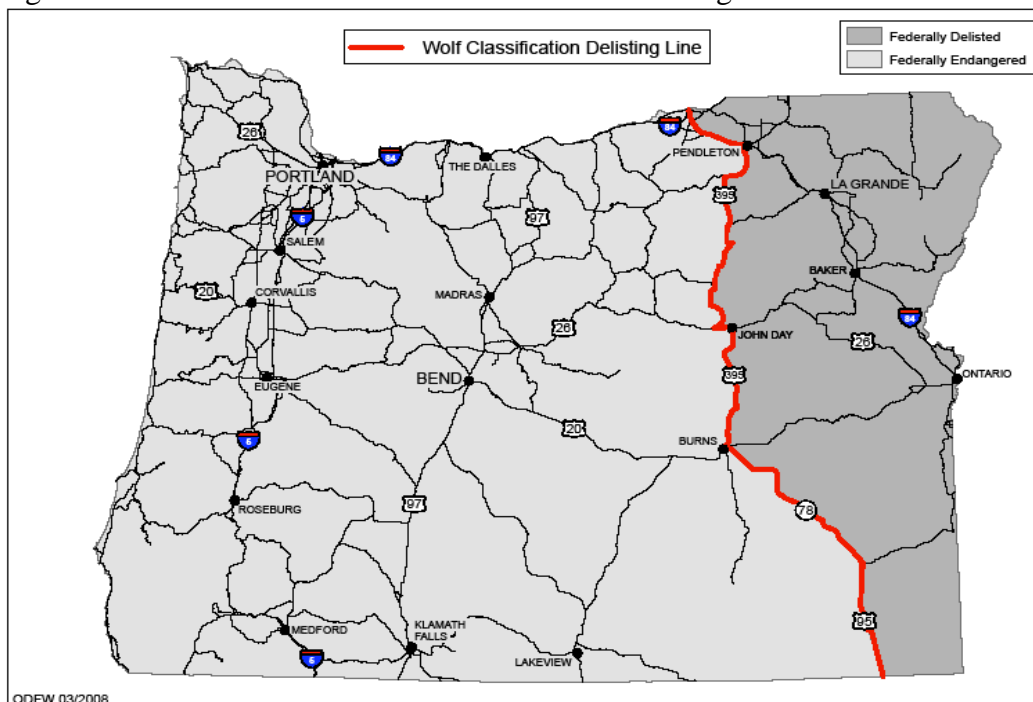


Table 1. Timeline of significant events in Oregon’s wolf history.

Year	Event
1843	Wolf bounty established in Oregon at the Oregon Wolf Association meeting.
1913	Oregon State Game Commission authorized a wolf bounty.
1946	Last recorded wolf submitted for bounty in Oregon from the Umpqua National Forest.
1974	Wolves listed as endangered in the lower 48 states under federal Endangered Species Act (ESA).
1987	Wolves classified as endangered in Oregon under the newly enacted Oregon ESA.
1995	Reintroduction of wolves by US Fish and Wildlife Service into Idaho and Yellowstone National Park. 66 wolves released over a two year period.
1999	First documented dispersing wolf (B45) arrived in Oregon from newly established Idaho population. Wolf was captured and returned to Idaho.
2005	Oregon Fish and Wildlife Commission adopts Oregon Wolf Conservation and Management Plan.
2008	First Oregon-born wolf pups documented – Wenaha Pack, NE Oregon.
2009	First confirmed ‘modern’ livestock depredation (Keating wolves).
2009	First Oregon-collared wolf (OR1) – Keating.
2009	Wolves removed from federal ESA in the eastern third of Oregon as part of the Northern Rocky Mtn. Distinct Population Segment. Decision is challenged resulting in several years of relisting/delisting decisions.
2009	Oregon legislature reclassified wolves as a “special status game mammal”.
2009	First ‘modern’ lethal control action in response to chronic livestock depredation – two Keating wolves killed.
2010	Oregon Wolf Conservation and Management Plan evaluation and update.
2011	Northern Rocky Mountain Wolves federally delisted in eastern third of Oregon as a result of congressional action.
2014	First wolf reproduction documented in Cascade Mountains (western Wolf Management Zone) – Rogue Pack.
2014	Phase I conservation population objective (4 breeding pairs for 3 consecutive years in eastern Oregon) is achieved.

Wolf Biology and Ecology

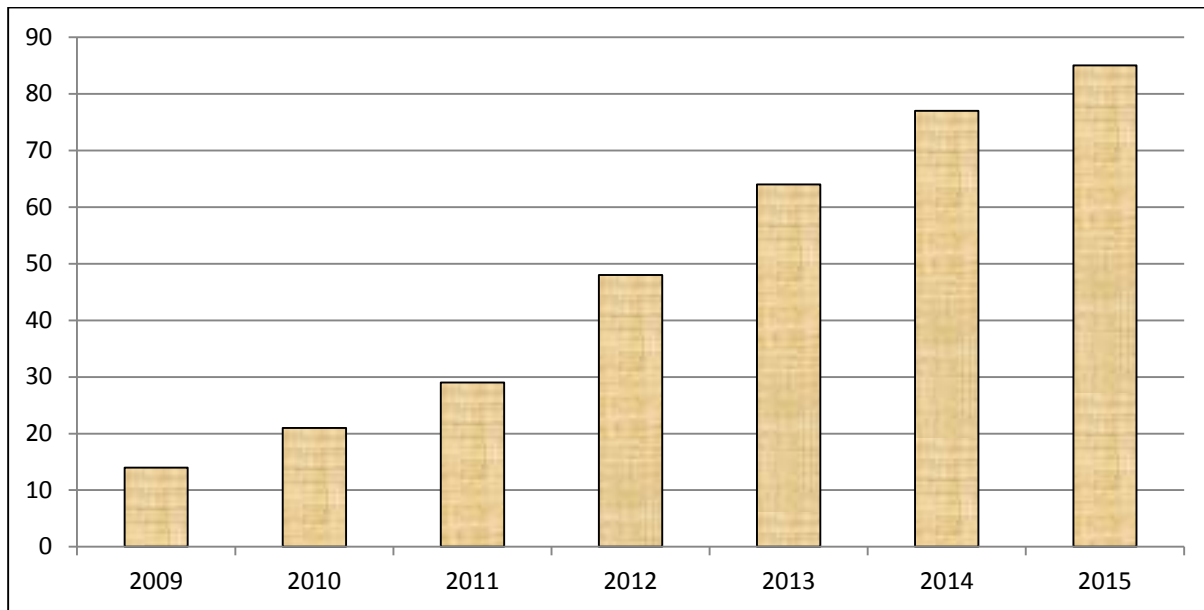
For detailed information regarding the biology and ecology of gray wolves see the Wolf Plan (Oregon Department of Fish and Wildlife 2010), or other comprehensive reviews (Verts and Carraway 1998, Mech and Boitani 2003).

Biological Status of Wolves in Oregon

Population

Successful wolf reproduction was first documented in 2008 in the northeastern portion of the state. Annual winter counts of wolves were initiated by ODFW in 2009 and Oregon's wolf population increased in all years since (Figure 2) with a mean population growth rate of 1.43 (\pm 0.15 SD). Updated information in 2015 shows that there were a minimum of 81 wolves in Oregon in 2014 (Table 2). This included 10 packs, defined as four or more wolves travelling together in winter (Oregon Department of Fish and Wildlife 2010). As of July 2015, there were 16 known groups or packs of wolves containing a male-female pair (Table 2), and the mid-year minimum population (non-pup) was 85 wolves. Oregon uses a minimum-observed count method for surveying wolves which underestimates the actual population because, 1) it does not account for all individual or non-territorial wolves which are known to occur in all wolf populations, and 2) it is unrealistic to assume complete detection of all wolves.

Figure 2. Oregon minimum wolf population 2009 - 7/2015 (2015 population does not include pups of the year)



Reproduction and pup survival

The minimum number of breeding pairs in Oregon increased since 2009 but varies annually (Table 2). Breeding pairs are considered successful if at least 2 pups survive and are documented at the end of the calendar year. In 2014, 8 of 9 Oregon breeding pairs occurred within the eastern Wolf Management Zone (WMZ) and this marks the third consecutive year in which at least 4 breeding pairs occurred in eastern Oregon; prompting entry into Phase II of the Wolf Plan. As of July 2015, we were aware of reproduction occurring in 13 packs or groups of wolves in Oregon, (the other 3 groups had not been surveyed at that time). Although these will not be considered successful breeding pairs until December 31st, they do signify a likely increase in breeding pairs for the year and this increase is consistent with past and predicted trends.

Oregon’s minimum pup counts across all years indicate a pup survival rate of 0.61 (95% CI = 0.53 - 0.69) assuming 5 pups were born per litter. This is slightly lower survival, but within the range of values reported in literature (Appendix B). Oregon’s minimum-observed count method is likely to underestimate pup survival because pups are not always together, nor are they always detected during winter surveys. See Appendix B for additional discussion of reproduction and survival rates of Oregon’s wolves.

Table 2. Oregon wolf population summary. Shaded cells denote successful breeding pairs.

Pack/Area	2009	2010	2011	2012	2013	2014	July 2015*
Imnaha Pack	10	15	5	8	6	5	4
Wenaha Pack	4	6	5	11	9	11	10
Walla Walla Pack			8	6	9	9	9
Snake River Pack			5	7	9	6	6
Umatilla River Pack			2	4	6	8	6
Minam Pack				7	12	9	9
Mt Emily Pack					4	7	8
Meacham Pack						5	5
Rogue Pack						5	5
Catherine Cr / Keating Units Pack					5	0	0
Desolation Pair						2	2
Chesnimnus Pair						2	2
Catherine Pair						2	2
Sled Springs Pair				2		2	2
South Snake Wolves						6**	6
OR13 wolves							3
Keno Pair						2	3
Individual wolves			4	3	4	0	3
Minimum Total	14	21	29	48	64	81	85

* Does not include pups born in 2015

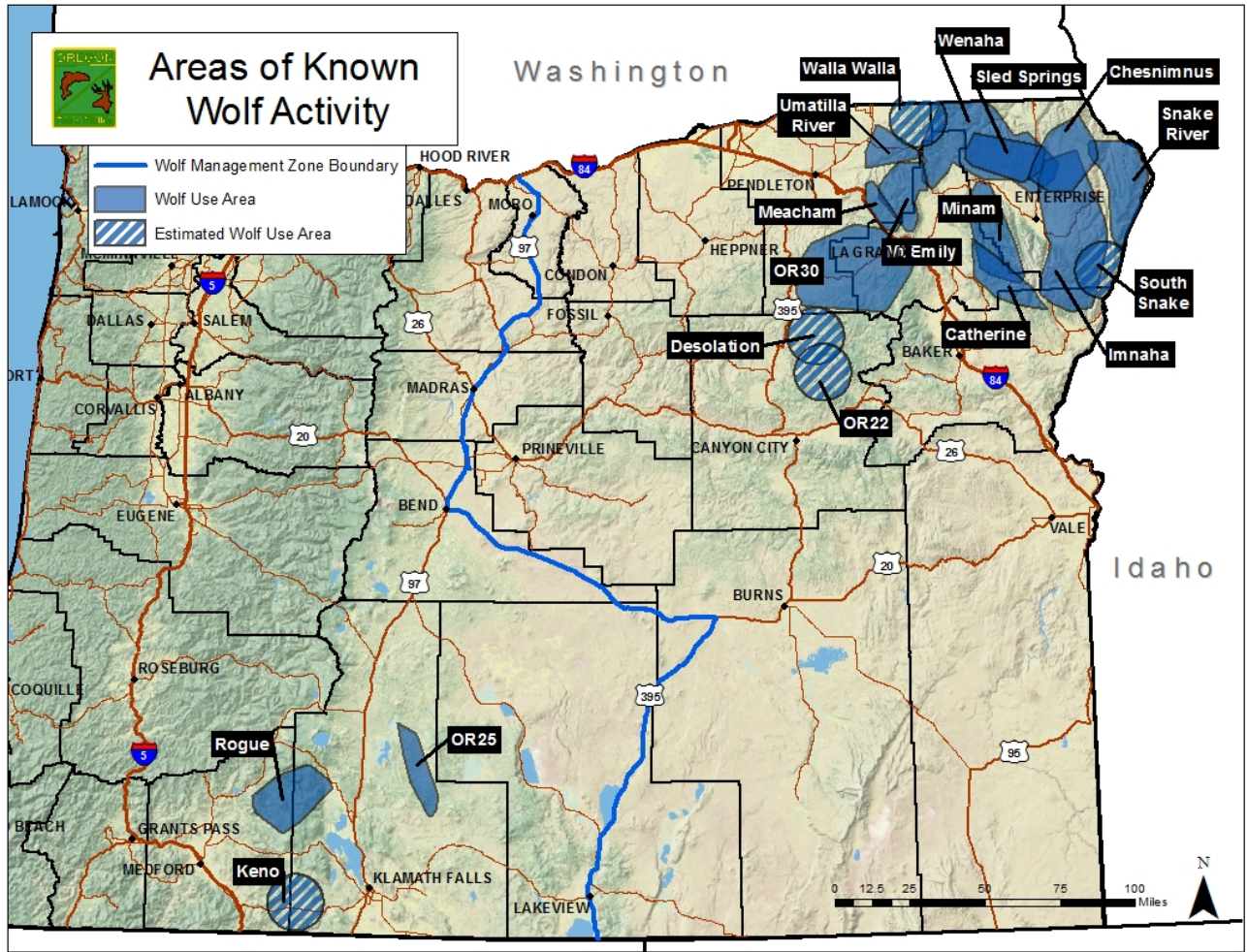
** Pack and breeding pair status changed retroactively with evidence of 2014 pup production documented on March 31, 2015. The 2014 population total was also updated to reflect the new wolves.

ODFW does not routinely conduct den or rendezvous surveys in all packs/years, and relies on winter pup recruitment data to assess reproductive success. Factors affecting early pup survival in Oregon are undetermined, though canine parvovirus was responsible for the loss of pups in the Wenaha Pack in 2013 and illegal take was responsible for the loss of one pup of the Umatilla River Pack in 2013.

Distribution

Since establishment in 2008, Oregon’s wolves have expanded rapidly and wolves currently occupy 13,222 km². In July 2015, 3 new areas of known wolf activity were documented (Figure 4); 1 in south-central Oregon (OR25) and 2 in northeastern Oregon (OR22 and OR30). Currently most wolves occur within the northeastern portion of the state, and three areas of known wolf activity now occur within the southern Oregon Cascade Mountains (Figure 4).

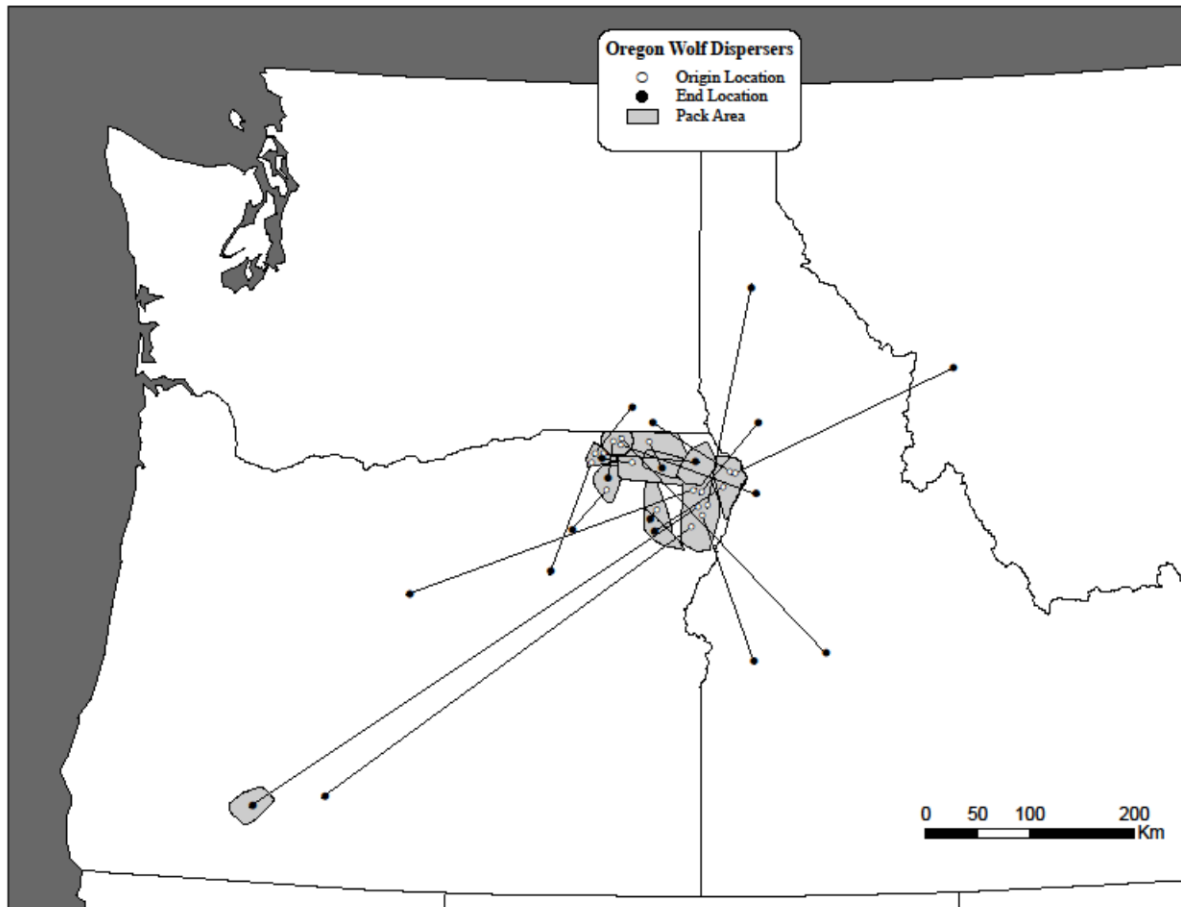
Figure 4. Current distribution of known wolves in Oregon



Dispersal

ODFW has documented dispersal of 19 collared wolves from their natal territories. To date, 58% (n=11) of the dispersals terminated within Oregon and 42% (n=8) emigrated from Oregon. This observed rate of emigration was expected given proximity of wolves in northeastern Oregon to Idaho and Washington. As Oregon's wolf population becomes more 'interior' the proportion of dispersers that emigrate is expected to decline. See Appendix B for more discussion on dispersal and emigration. Some dispersals are ongoing, but of completed dispersals analyzed (n=14), mean dispersal distance was 161 km.

Figure 5. Map of Oregon-collared wolf dispersers 2009 - 7/2015



Habitat Use and Land Ownership.

Wolves can occupy a variety of land cover types provided adequate prey exists (Keith 1983, Fuller 1989, Haight et al. 1998) and human activity is minimal (Oakleaf et al. 2006, Belongie 2008). GPS location data indicated wolves in Oregon primarily use forested habitat with seasonal shifts to more open habitats that reflect seasonal distributions of prey (e.g., lower elevation elk wintering areas). Location data from wolves collared in Oregon from 2006 to 2014 showed that 62% of all locations occurred on public and 38% on private lands (ODFW unpublished data). Denning also occurs on both public and private land in Oregon and all known den sites occurred within forested habitat. In 2015, 8 (62%) den sites were on National Forest land and 5 (38%) 8 (62%) den sites were on National Forest land and 5 (38%) were on private land.

Wolf Prey

Across their range in North America, wolves depend on native large ungulates as a primary prey source (Haight et al. 1998, Fuller et al. 2003). Oregon is a multi-prey system with abundant elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), black-tailed deer (*O.h. columbianus*) and white-tailed deer (*Odocoileus virginianus*). Though prey selection may vary in multi-prey systems, diets of wolves in the NRM are dominated by elk wherever the two species co-occur (Smith et al. 2004, Oakleaf et al. 2006).

Analysis of prey selection and kill rates by wolves in Oregon has not been completed, but observations in northeastern Oregon indicate that elk are common prey species of wolves. Oregon maintains a robust and widely distributed elk population numbering an estimated 128,000 elk across 151,500 km² (ODFW data). Between 2009 and 2014, all Wildlife Management Units (WMU's) of northeastern Oregon with established wolf packs for at least four years (Imnaha, Snake River, Walla Walla, Wenaha) had increasing elk populations, and two of the four (Imnaha and Snake River) were above the established management objectives for elk since wolves became established (ODFW data).

Other important wolf prey species include mule deer – estimated at 229,000 in eastern Oregon (ODFW data), black-tailed deer (western Oregon) and white-tailed deer (esp. northeastern Oregon). ODFW does not maintain specific population estimates of black-tailed and white-tailed deer. However, hunter harvest data shows that both species are abundant within their respective habitats. Deer distribution overlaps with all elk range in Oregon.

Diseases and Mortality of Wolves

As with most North American wildlife populations, a variety of diseases and parasites may affect wild wolf populations (Brand et al. 1995, Wobeser 2002). A thorough discussion of diseases potentially affecting wolves in Oregon is contained in the Wolf Plan (Oregon Department of Fish and Wildlife 2010).

To better understand potential exposure to several common canine diseases such as leptospirosis, canine adenovirus, canine distemper virus, and canine parvovirus, ODFW analyzed blood serum samples collected from captured wolves (n=19) between 2010 and 2013 within the Imnaha, Minam, Snake River, Umatilla River, Walla Walla and Wenaha packs (Oregon Department of Fish and Wildlife 2014). Positive parvovirus titers were found in all but 2 samples (both 4 month-old pups) and in all 6 of the packs tested. Parvovirus caused 2 instances of mortality in the Wenaha pack in 2013 and was assigned as primary cause of the reproductive failure for that pack during that year. However, the Wenaha pack is still extant and was classified as a breeding pair in 2014 indicating transient effects of parvovirus.

Distemper virus has not been detected in the Oregon wolf population but is present throughout the state in both domestic dogs and wild canids (i.e., coyotes [*Canis latrans*] and foxes [*Vulpes vulpes* and *Urocyon cinereoargenteus*]) and raccoons (*Procyon lotor*). Though distemper outbreaks have been documented in wolves in other states, it has not been a major source of mortality (Brand et al. 1995). Leptospirosis titers were also detected in 2 samples from 2 different packs and canine adenovirus titers were detected in 68% of the samples from 5 different packs (Oregon Department of Fish and Wildlife 2014). No known mortalities of wolves have been attributable to either of these diseases in Oregon.

Two important parasites in wolves are sarcoptic mange and dog-biting lice (*Trichodectes canis*). Sarcoptic mange is a contagious skin disease caused by a mite (*Sarcoptes scabiei*) causing irritation and hair loss. It can lead to secondary infection and mortality of wolves (Kreeger 2003) and has been documented in NRM wolves (Jimenez et al. 2010). However, to date, mange has not been observed or suspected in Oregon wolves. Dog-biting lice can also cause hair loss and stress to wolves which may lead to reduced survival (Brand et al. 1995). Examination of more than 35 Oregon wolves and wolf carcasses between 2009 and 2015 resulted in few ectoparasites

documented. Dog-biting lice were observed in one instance in 2015 on a captured wolf of the Imnaha pack, and though some hair loss was observed body condition was generally good.

Wolves are highly susceptible to human-caused mortality – evidenced by the widely accepted view that human-caused eradication efforts were responsible for the wolf’s disappearance throughout most of the contiguous United States. In Oregon, human-caused mortality including illegal take (n=5), ODFW control action (n=4), vehicle collisions (n=1), and ODFW capture-related complications (n=1) accounted for 85% of the documented wolf deaths between 2000 and present. Wolves are especially vulnerable to human-caused mortality in open habitats (Bangs et al. 2004) and since 2000, 82% (n=9) of the documented human-caused mortalities in Oregon occurred within or were associated with, open habitats. This does not imply that mortality occurred as a result of wolves utilizing open areas, but rather asserts that wolves in open habitats are likely more susceptible to control actions, management activities which may result in death, and illegal take. See Appendix B for additional discussion of the effects of anthropogenic (human-caused) mortality on wolves in Oregon.

OESA Delisting Requirements and Analysis of Oregon Delisting Criteria

The Wolf Plan directed wolf management activities in Oregon to achieve the conservation population objective of four breeding pairs of wolves for three consecutive years, and that once this objective was reached the process to consider removing the species from the list of endangered species under the OESA would be initiated. The conservation population objective was based on the prediction that, if the protections of the OESA cease when the objective is met, a naturally self-sustaining population of wolves would continue to exist in Oregon and this population level would support the necessary findings to justify a Commission decision to delist the species.

Oregon Revised Statute (ORS) 496.004 and Oregon Administrative Rules (OAR) 635-100-0100 defines an endangered species as “*any native wildlife species determined by the Commission to be in danger of extinction throughout any significant portion of its range within this state*”. OAR 635-100-0100 to 635-100-0112 guide the Commission’s procedures and criteria for listing, delisting, and reclassifying from the list of Oregon endangered species. Furthermore, delisting a species from OESA (ORS 496.176) requires a public rulemaking decision by the Commission and this decision is to be made upon a review of the best available scientific information and biological data. The scientific information must be documented and verifiable information related to the species’ biological status.

To delist wolves in Oregon, the Commission must evaluate the biological status of the species and determine if:

1. The species is not now (and is not likely in the foreseeable future to be) in danger of extinction in any significant portion of its range in Oregon or in danger of becoming endangered; and
2. The species’ natural reproductive potential is not in danger of failure due to limited population numbers, disease, predation, or other natural or human-related factors affecting its continued existence; and
3. Most populations are not undergoing imminent or active deterioration of range or primary habitat; and

4. Over-utilization of the species or its habitat for commercial, recreational, scientific, or educational purposes is not occurring or likely to occur; and
5. Existing state or federal programs or regulations are adequate to protect the species and its habitat.

For any determination of Criterion 1 above regarding the range of a species, OAR 635-100-0105 specifies three evaluation factors to be used by the Commission:

1. The total geographic area in this state used by the species for breeding, resting, or foraging and the portion thereof in which the species is or is likely within the foreseeable future to become in danger of extinction; and
2. The nature of the species' habitat, including any unique or distinctive characteristics of the habitat the species uses for breeding, resting, or foraging; and
3. The extent to which the species habitually uses the geographic area

Option 1

Evaluation of delisting criteria for wolves within the entire state of Oregon

Criterion 1: The species is not now (and is not likely in the foreseeable future to be) in danger of extinction throughout any significant portion of its range in Oregon or is not at risk of becoming endangered throughout any significant portion of its range in Oregon.

Within broadly defined habitat requirements described in this document, wolves are not generally known to require specific or niche habitat features within areas of use. We define and use 'potential range' as geographic areas of Oregon with sufficient habitat features to allow breeding, resting, and foraging requirements of wolves per OAR 635-100-0105. It does not include areas of contracted historical range (described below), nor does it provide a qualitative assessment of future wolf numbers or carrying capacity based on available habitat. A report describing methods used for evaluating contracted historical and potential range is available in Appendix A of this document.

Historical range

Assessment of the baseline historical range of wolves in Oregon is difficult because: 1) historical accounts are inconsistent and often anecdotal; and 2) human-caused effects which resulted in the wolf's extirpation pre-dated accurate surveys of the species. Historical accounts generally describe a wide distribution and variable abundance within the state (Oregon Department of Fish and Wildlife 2010), but no comprehensive surveys of wolf distribution and abundance were conducted during this period. Scientists described wolves as historically occurring in both eastern (Young 1946) and western Oregon (Bailey 1936). Bounty records up to 1946 corroborated presence of wolves from both sides of the Oregon Cascade Mountains (Olterman and Verts 1972). For this criterion, and to facilitate our analysis, we conclude that prior to European settlement most of the land area within Oregon was historical wolf range.

Historical range, however, does not mean that all geographic areas of Oregon supported sustainable sub-populations of wolves or that densities were uniformly distributed across the state. Based on preferred cover types and our current understanding of wolf ecology, some

portions of Oregon historically contained areas of marginal or less suitable habitat. By example, arid and non-forested areas with low prey densities would have been expected to support few wolves (Young and Goldman 1944). In Oregon, these areas likely included much of the Columbia Basin and Great Basin rangeland habitats.

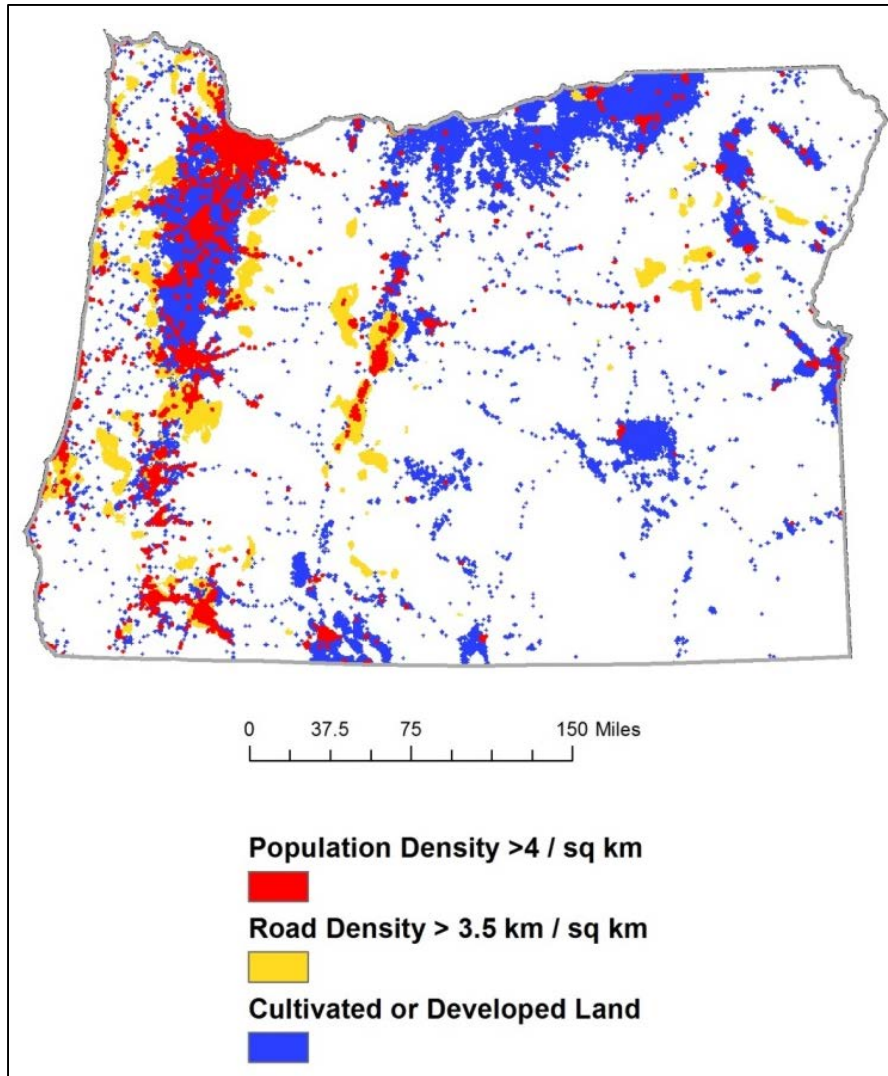
Contraction of historical range in Oregon

Human activities affect wolf distribution (Mladenoff et al. 1995) and the absence of wolves in human-dominated areas may reflect high anthropogenic mortality, avoidance, or both (Mech and Boitani 2003). We used human density, road density, and cultivated agriculture areas to identify geographic areas that are unsuitable for wolf establishment. We estimated permanent contraction of historical range of at least 57,889 km² (23.1%) of Oregon has occurred to date (Figure 6). A large proportion of which occurs in the Willamette Valley, where dense human population, cultivated landscape, lack of forest cover and high road density is expected to preclude significant reestablishment of resident wolves under any protection level or management policy.

Potential range

Several studies have assessed habitat features as related to occupancy and persistence of wolves, and though the resulting model outputs have varied, some generalizations among studies were observed. First, wolves will likely occupy areas with adequate prey populations and where conflict with humans is low (Keith 1983, Fuller 1989, Fritts et al. 2003, Carroll et al. 2006, Oakleaf et al. 2006). Second, habitat features associated with occupancy and persistence of wolves include: human density (Oakleaf et al. 2006, Belongie 2008), forest cover (Mladenoff et al. 1995, Larsen and Ripple 2004, Oakleaf et al. 2006), prey availability (Mech and Boitani 2003, Peterson and Ciucci 2003, Larsen and Ripple 2006, Oakleaf et al. 2006), public land ownership (Mladenoff et al. 1995, Carroll 2003, Mech and Boitani 2003, Larsen and Ripple 2006), and road density (Thiel 1985, Mech 1989, Carroll 2003, Carroll et al. 2006, Larsen and Ripple 2006). We are not aware of any published model which included data collected from wolves in Oregon because wolves did not occur in Oregon at the time the models were developed. We used the above factors, (sans public land ownership) and estimated the potential range for wolves in Oregon to be approximately 106,853km², or 42.6% of the total area of the state (Figure 7). See Appendix A for a description of methods used in this analysis.

Figure 6. Estimated areas of contracted wolf range in Oregon.



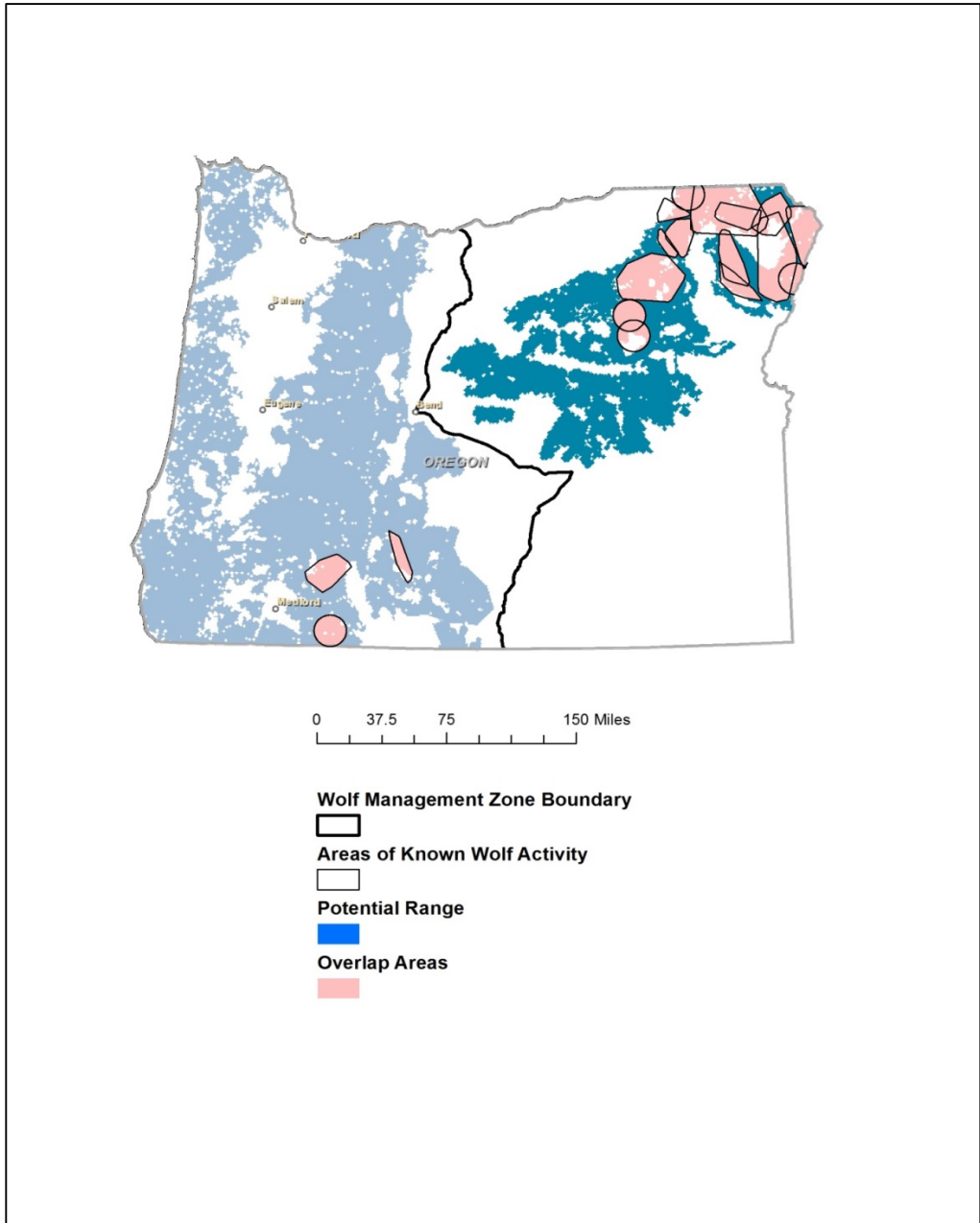
Current occupied range

Wolves currently occupy 13,222 km² (12.4%) of the estimated potential wolf range in Oregon (Figure 7). Within the eastern WMZ, occupied wolf range is 31.6% of the total available area (Table 3), and in the western WMZ, occupied wolf range is 2.7% of the total available.

Table 3. Potential and Occupied Wolf Range in Oregon.

Wolf Management Zone	Potential range (km ²)	Currently occupied range (km ²)
West	71,011	1,909
East	35,842	11,313
Total	106,853	13,222

Figure 7. Potential wolf range by wolf management zone and currently occupied potential range in Oregon.



Extinction risk

We assessed risk of population failure or extinction of Oregon’s wolves using an individual-based population model. Specific methods and results of this analysis are presented in detail in Appendix B. The results are also summarized in Criterion 2 below.

Oregon’s wolf population is currently increasing at an annual mean rate of 1.43 (\pm 0.15 SD) and is projected to continue this trend in the near term. Using vital rates observed in Oregon from 2009-2014 our model had no simulations in which either the biological-extinction or

conservation-failure levels were reached in the next 50 years. However, Oregon's wolf population will transition from a rapidly increasing population to a population with lower growth rates. The timing of this transition is unknown and to account for this we modeled the wolf population using conservative inputs, and the resulting analysis indicated a low (5%) probability of wolves dropping below 4 breeding pairs or fewer within the next 50 years and the risk of the population becoming biologically extinct (i.e., < 5 wolves) was about 1% over the same time period. The modeled risk of extinction was reduced even further in our analysis when using an initial population (100 or more) larger than the current minimum wolf population (n = 85). However, as discussed elsewhere in this document, initial population size used in our model was based on observed minimum counts and the actual population is likely larger. Even using conservative biological inputs over the long term, our modeled wolf population is projected to continue to increase at a mean growth rate of 1.07 (\pm .17 SD).

Summary conclusions for Criterion 1

We evaluated a combination of historical, potential, and currently occupied wolf range in Oregon to evaluate Criterion 1. In addition, we identified portions of the state which have been altered by humans in a manner that preclude current and future use by wolves. These contracted range areas are not likely to affect the threat of extinction of the species in Oregon because 1) they represent a relatively small portion of Oregon's available wolf habitat, and 2) the biological requirements of wolves indicate that some of these now unsuitable areas were likely marginal or unsuitable year-round habitats anyway.

Wolves continue to increase in both distribution and abundance, and do not yet occupy all of their potential range in Oregon. They currently occupy 12.4% of the estimated potential wolf range in Oregon. In the western WMZ in which approximately 3% of the potential range is currently occupied by wolves. However, representation in two distinct and separate geographical portions of the state (Figure 7) is an indication that conditions exist (e.g., habitat capability, connectivity, and prey availability) to support wolves in both the east and west WMZ's. Successful range expansion of a species is often used as a measure of population fitness, and there are no known conditions which prevent wolves from occupying currently unoccupied areas of potential wolf range.

The eventuality that wolves would become established in the eastern WMZ before the western WMZ was accurately predicted by the Commission when the 2005 Oregon Wolf Plan was adopted. The decision to divide the state into two WMZ's was an intentional effort to provide the flexibility needed to manage increasing numbers of wolves in eastern Oregon while maintaining conservation measures for colonizing sub-populations in western Oregon. When evaluating the threat of extinction in Oregon's potential and current wolf range we considered that: 1) wolves were once extirpated as a result of historical efforts to eradicate them, and now in absence of those efforts and under current management frameworks, are increasing in abundance and distribution; 2) there are no known conditions which prevent wolves from inhabiting currently unoccupied portions of range in Oregon; 3) observed movement and dispersal patterns indicate connectivity from source populations; and 4) the probability of extinction in Oregon is low (see Criterion 2 below).

Criterion 2: The species' natural reproductive potential is not in danger of failure due to limited population numbers, disease, predation, or other natural or human-related factors affecting its continued existence.

To assess the risk of population failure in Oregon wolves, we conducted a population viability analysis (PVA) using a peer-reviewed published individual-based model which incorporated 6 demographic processes (in order): 1) survival between age classes; 2) emigration from Oregon; 3) territory establishment by dispersing wolves; 4) immigration into Oregon; 5) anthropogenic mortality; and 6) reproduction. Initial model inputs using conservative vital rate estimates allowed us to err on the side of caution and prevent overly optimistic conclusions regarding viability. In our model, any simulated population which drops below the Wolf Plan's conservation objective of four breeding pairs was considered a conservation-failure. Any simulated population that dropped below 5 wolves was considered biologically extinct. The full analysis is described in Appendix B of this report, and the results are summarized as follows:

1. The current population growth rate for Oregon wolves is 1.43 (\pm 0.15 SD), and this growth is projected to continue in the near term.
2. Based on conservative model inputs, Oregon's modeled wolf population over time is projected to increase at a minimum mean annual population growth rate of 1.07 (\pm .17 SD).
3. Using conservative input parameters, we estimated a 5% probability of the population reaching the conservation-failure threshold (< 4 breeding pairs), and 1% probability of biological extinction over the next 50 years. Most of the simulated conservation-failures occurred within the first 10 years of simulation.
4. Our model used a starting population of 85 wolves. Increasing the starting population to 100 reduced the risk of conservation-failure to 1%.
5. Using vital rates required to match population growth rates of wolves in Oregon from 2009-2014 resulted in no simulations reaching the conservation-failure threshold; an indication of conservative model inputs.
6. Factors which had the most influence on model outputs were related to survival (of pups and adults), human-caused mortality, litter size, frequency of catastrophic reductions in survival and reproduction, and starting population size.
7. Human-caused mortality was treated as additive to natural survival (i.e., 1-natural mortality rate \times human-caused mortality) in our model and the probability of conservation-failure was low (0.05) when applying human-caused mortality rates of 0.1 or less. These findings are based on the current starting population of 85 wolves, and larger populations will likely be able to sustain higher human-caused mortality rates.

Disease

Disease-related mortality of young wolves can affect the population in two ways: 1) direct population reduction; and 2) reduced ability of the population to expand or re-colonize new areas. Canine parvovirus and distemper are two diseases commonly observed in wolf populations that typically cause temporary and local effects on wolf populations and are not expected to affect long term viability (Bailey et al. 1995, Brand et al. 1995, Kreeger 2003). However, high pup mortality to parvovirus may slow colonization of new areas (Mech et al. 2008). Though wolves in Oregon are commonly seropositive for parvovirus, only two mortalities to parvovirus (1 adult and 1 yearling, 2013) have been documented in a single pack (Wenaha), and this pack remains extant and productive (Oregon Department of Fish and Wildlife 2015). These observations suggest presence of disease is having minimal effects on

wolf survival or reproductive success in Oregon. Furthermore Oregon's wolf population continues to colonize new areas despite the presence of disease, and we contend disease has not been a significant factor in Oregon's wolf population to date.

The population effect of sarcoptic mange and dog-biting lice (*Trichodectes canis*) is not affecting viability of wolves in Oregon. Mange can affect pup survival, and its occurrence may be positively correlated with higher wolf densities (Brand et al. 1995). Though it has been detected in the NRM wolves east of the Continental Divide (Jimenez et al. 2010), it has not been observed in Oregon and likely will have little effect on wolf populations in the near term. The single instance of dog-biting lice observed in 2015 indicates a low occurrence that may be related to increased densities of wolves in northeast Oregon; however, no mortality has been documented as a result.

Because Oregon has recorded very little disease-caused mortality, we assessed the influence of disease on wolf viability by including two effects into our PVA: 1) range-wide reductions in survival at random intervals; and 2) pack-specific complete reproductive failure at random intervals. The latter was intended to simulate situations (such as parvovirus outbreak) in which all pups born in a single litter die in a given year. Overall this had minimal effects on our results so long as intervals between reproductive failures within a pack were greater than once every 10 litters – well below rates currently observed in Oregon (1 out of 20). Potential effects of disease as incorporated in our model had the greatest effect when wolf populations were small and the effects decreased as simulated wolf populations became larger. These model results combined with minimal observed occurrences suggest disease is not a significant threat to wolves in Oregon.

Predation:

In general, few interactions between wolves, bears and cougars have been recorded (Jimenez et al. 2008) and no predators are known which routinely prey on wolves (Ballard et al. 2003). In addition, since monitoring began in 2009, ODFW has not documented predation of wolves by other predators.

Within wolf populations, intra-specific mortality may be the largest cause of predation and this may be highest in dense wolf populations (Mech and Boitani 2003). However, in Oregon no intra-specific mortality has been observed, and though it likely has occurred at some level, we do not consider it to be a population limiting factor and account for this mortality in our analysis (via. annual survival parameter inputs).

Other natural or human-related factors

As described elsewhere in this document, data shows that dispersing wolves immigrate (how they first arrived into the state) and emigrate from Oregon, indicating that Oregon is part of a larger meta-population with Idaho. Genetic sampling of captured Oregon wolves (ODFW, unpublished data) confirms genetic relatedness to the Idaho subpopulation of wolves, further indicating a biological connection between the two subpopulations. Because of this, our population analysis includes parameters for immigration and emigration and assumes that both will continue.

At the time the Wolf Plan was first adopted, the ability of wolves to reach areas of habitat outside of northeast Oregon was assumed but undocumented. However, habitat connectivity between the eastern and western WMZ's has since been confirmed by two radio-collared wolves

(OR7 and OR25), and further indicated by at least four uncollared adult wolves in the southern Oregon Cascade Mountains. Recently breeding wolves were documented in northern California (California Department of Fish and Game News Release August 20, 2015), and though the genetic source of these wolves is unknown at the time of this report, it is expected that these wolves are likely connected to Oregon or other NRM wolves.

Data from GPS-collared dispersers shows that dispersal in Oregon occurred largely through forested habitats. However, dispersers which travelled more than 85 km generally crossed a variety of land cover types and landscape features (i.e., open prairie or shrub habitats, roads, rivers, etc.). To evaluate effects of major highways as barriers to dispersal, we examined crossings of two interstate highways by dispersing wolves fitted with GPS collars; Interstate 84 in eastern Oregon and Interstate 5 in western Oregon. Seven collared wolves in Oregon are known to have crossed Interstate 84, and one wolf (OR7) crossed Interstate 5 on two occasions. We documented fourteen instances where GPS-collared wolves crossed interstate highways in Oregon, with four wolves (OR7, OR14, OR24, and OR30) crossing more than once. Data from two GPS-collared dispersers (OR15 and OR18) indicate attempted, but unsuccessful crossings of Interstate 84 in 2014 between La Grande and Pendleton. In both cases the wolves changed dispersal course and ultimately emigrated from Oregon. It is notable that both of these emigrating dispersers were from Oregon's most remote pack (Snake River) and prior to dispersal had few encounters with busy roadways and vehicles. Oregon's only documented highway-related mortality was in May 2000 when a wolf dispersing from Idaho was struck by a vehicle on Interstate 84 south of Baker City. Combined, these observations of dispersing wolves suggest interstate highways are at least partially permeable and do not prevent dispersal of wolves.

The ability for wolves to cross large rivers is also important for maintaining connectivity between Oregon wolves and the larger NRM meta-population which includes Idaho. To date, we have no data of wolves crossing the Columbia River. Wolves in Oregon are genetically related to wolves in Idaho, and GPS-collared dispersers in Oregon have successfully crossed the Snake River 14 times. This apparent ease of large river crossing is consistent with collar data from non-dispersing wolves of the Snake River pack (a shared Oregon/Idaho pack) which in 2013 showed regular crossings of the Snake River (ODFW, unpublished data). These crossings indicate the river itself does not impede connectivity between subpopulations in Idaho and Oregon.

Genetic viability is a critical concern for any threatened or endangered population (Frankham et al. 2002, Scribner et al. 2006). Small populations of wolves are unlikely to be threatened by low genetic diversity (Boitani 2003). Although inbreeding is a potential threat to the long-term viability for small and isolated populations (Liberg 2005, Fredrickson et al. 2007), there are examples of wolf populations which are small and isolated which have persisted for decades (Fritts and Carbyn 1995, Boitani 2003, Liberg 2005). Regarding a 'required' population size, Fritts and Carbyn (1995) stated the following:

“Most theoretical analyses of population viability have assumed a single, isolated population and lack of management intervention, neither of which is likely for wolves. Data on survival of actual wolf populations suggest greater resiliency than is indicated by theory. In our view, the previous theoretical treatments of population viability have not been appropriate to wolves, have contributed little to their conservation, and have created unnecessary dilemmas for wolf recovery programs by overstating the required population size”

Genetic interchange between subpopulations is important to maintain genetic health of any wildlife population and as few as 1-2 immigrants per generation (~5 years with wolves) is

generally considered sufficient to minimize effects of inbreeding (Vila et al. 2003, Liberg 2005). This requirement is easily attained because wolves have the demonstrated ability to rapidly disperse long distances and avoid inbreeding by selecting unrelated mates (Vonholdt et al. 2008). Montana and Idaho wolf population are connected to each other and to Canada through natural dispersal (U. S. Department of the Interior 2009), and Oregon wolves are genetically related to Idaho wolves. For example, Oregon's westernmost wolf pack (Rogue) in the southern Oregon Cascade Mountains is only 1 generation removed from central Idaho wolves – the breeding male of that pack (OR7) is an offspring of an Idaho-born female (B300). We contend that high levels of genetic diversity in Oregon wolves will be maintained through connectivity to the larger NRM wolf population. Natural dispersal will allow a sufficient number of immigrants to arrive in Oregon so long as sufficient connectivity is maintained between populations in adjacent states (Hebblewhite et al. 2010).

As a source population, the genetic health of the NRM reintroduced wolves is also important to understanding the genetic health of Oregon wolves. Wolves reintroduced into Idaho in 1995 and 1996 originated from two distinct wolf populations in Canada – 15 wolves from 7 packs came from Hinton, Alberta in 1995, and 20 wolves from 9 packs came from Fort St. John, British Columbia in 1996 (M. Jimenez, USFWS, personal communication). Subsequent genetic analysis concluded that the reintroduced wolves were as diverse as their general source population (Forbes and Boyd 1996;1997) and that genetic variation within the NRM is high (Forbes and Boyd 1996;1997, Vonholdt et al. 2008). While our analysis of wolf-population viability did not explicitly incorporate genetic effects, we recognize that genetic effects could become important if the Oregon wolf population becomes isolated from the remainder of the NRM wolf population.

The challenges of wolves in areas with livestock are well documented, and wolves prey on domestic animals in all parts of the world where the two coexist (Mech and Boitani 2003). From 2009 through June 2015, wolf depredation in Oregon resulted in confirmed losses of 79 sheep, 37 cattle, 2 goats, and 2 livestock protection dogs. Management of wolf-livestock conflict utilizes a three-phased approach based on population objectives and emphasizes non-lethal measures while increasing management flexibilities as the wolf population increases (Oregon Department of Fish and Wildlife 2010). In all phases of implementation the Wolf Plan requires that non-lethal techniques remain the first choice of managers when addressing wolf-livestock conflicts. Currently, we are implementing Phase II of the Wolf Plan in the eastern WMZ and OAR 635-110-0020 outlines conditions for legal harassment and take of wolves in response to wolf-livestock conflict in the federally delisted portion of the eastern WMZ. The total incidence of livestock depredation is expected to increase as Oregon's wolf population increases and expands their geographic range. However, we have no data indicating whether the proportional rate of depredation will increase or decrease.

In all areas where wolves occur with people, some wolves are killed (Fritts et al. 2003), and human-caused mortality was responsible for the initial extirpation of wolves from Oregon. There are many references which relate human tolerance to successful wolf management (Mech 1995, Bangs et al. 2004, Smith 2013), and for our analysis we consider that the primary human-related impacts to wolves are realized through direct human-caused mortality.

The Wolf Plan (and associated rules) outlines conditions for when human-caused mortality is authorized. In the federally delisted portion of the eastern WMZ, OAR 635-110-0020 is currently in effect regardless of OESA listing status, and this rule allows human take for wolf-livestock conflict under the following: 1) take of wolves caught in the act of attacking or chasing livestock; and 2) agency take of wolves in response to chronic livestock depredation. To date, no wolves

have been killed while attacking or chasing livestock in Oregon. Since 2009, four wolves have been lethally removed by ODFW in response to chronic depredation of livestock. We expect that total lethal take of wolves in response to wolf-livestock conflict will increase as the wolf population increases, but we have no indication of whether proportional lethal take of wolves will change.

Other sources of human-mortality include capture-related loss, incidental take loss, accidental take, and illegal take. To date, we have documented one capture-related death in Oregon (OR8 in 2011) in which a wolf died following aerial capture. Four wolves have been incidentally captured in Oregon by trappers targeting other animals, but all were released unharmed and no mortalities as a result of incidental capture have been documented. Accidental loss is documented by one vehicle collision in 2000 in eastern Oregon. Five wolves are known to have been illegally killed (all shot) in Oregon between 2000 and 2014. We consider that under current and near-future regulatory and management mechanisms, and regardless of state and federal listing status, total incidental, accidental, and illegal losses will increase as Oregon's wolf population increases, however, we expect losses to remain proportionally similar. In addition, we acknowledge that documented losses to date necessarily represent minimums and that the actual loss may be higher.

Using baseline parameter estimates in our PVA, Oregon's wolf population is projected to increase if total human-caused mortality, as implemented in our PVA, is initially kept below 0.10 (<10 wolves during first year). From 2009-2014, human-caused mortality did not exceed this figure, and though human-caused mortality could increase under implementation of current Phase II rules, we have no information suggesting human-caused mortality it will exceed 0.10. Further, because at least a portion of human-caused mortality is regulated by ODFW, the agency could presumably control this level of mortality so that it does not exceed this amount.

The Wolf Plan sets a management population objective of seven breeding pairs for three consecutive years in eastern Oregon, and this is referred to as Phase III. Based on current population figures described elsewhere in this document, Oregon could enter into Phase III as early as 2017. In Phase III, controlled take of wolves may be permitted as a management tool if the wolf population objectives have been exceeded and other biological considerations indicate that it would not affect wolf viability in the region. In this situation, controlled take could only be authorized as a response to: 1) chronic livestock depredation problems in a localized region; or 2) wild ungulate population declines (below management objective levels) that can be attributed to wolf predation. Though it is difficult to predict the number of wolves removed through controlled take, at least a portion of controlled take which could occur in Phase III may likely replace other types of agency take (in federally delisted portions of Oregon only) – especially take related to chronic livestock depredation. In addition, our analysis shows increasing population resilience to human-caused losses as the wolf population increases to Phase III levels. Because of these two factors and within the findings of our population analysis we contend that the effect of human-caused mortality related to Phase III of the Wolf Plan will not affect the future viability of wolves in Oregon.

Summary Conclusions for Criterion 2

Oregon's known wolf population is relatively small but increasing in both distribution and abundance. Using population growth rates observed from 2009-2014, our simulation results indicated wolves had no risk of conservation-failure or biological-extinction over the next 50 years. Using biological conservative input parameters resulted in an estimated mean population

growth rate of 1.07 with a probability of conservation failure (i.e., dropping below 4 breeding-pairs) of 5% and a biological extinction (i.e., dropping below 5 wolves) probability of 1% over the next 50 years. Most of the simulated conservation failures occurred in the first 10 years when the simulated wolf population was small. Increasing the modeled starting population to 100 wolves reduced the probability of conservation failure to 1%.

Observed occurrence of disease and predation in Oregon has been low. We accounted for these types of mortality in our analysis and we have no information suggesting that either factor will limit population growth or affect the future viability of the species in Oregon. Other factors considered important for wolves in Oregon are connectivity of habitats and management of forested areas. Oregon is part of a larger meta-population of wolves which includes Idaho, and we identified no landscape features which prevent dispersing wolves from immigrating to or emigrating from Oregon. Furthermore, the ability of dispersing wolves to colonize available habitat in western Oregon has been confirmed. Given the wolf's generalized habitat requirements, forest conditions are not expected to change on a large scale or in a manner to affect habitat suitability for wolves.

The genetic health of NRM wolves is high. In context of a larger meta-population, Oregon's wolf population is neither small, nor isolated. It follows that the genetic variation of Oregon wolves is also high. Our dispersal data shows immigration and emigration of wolves, a clear indication that Oregon's wolf population is biologically connected to other sub-populations of wolves within in the NRM area, and is expected to continue to exchange genetic diversity over time.

Human-caused mortality rates included in our PVA, which are higher than currently observed in Oregon, didn't cause a significant risk of conservation failure or biological extinction. Based on existing management/regulatory guidelines and regardless of listing status, future rates of human-caused mortality are not likely to exceed those rates used in our PVA/population model.

Criterion 3: Most populations are not undergoing imminent or active deterioration of range or primary habitat.

Wolves were extirpated from Oregon as a result of direct eradication effort, but have undergone active expansion of range within Oregon since the natural re-establishment of wolves in 2008.

In 2009, two wolf territories occupied an area of 1,440 km² in northeastern Oregon. In 2014, 15 wolf territories covered an estimated 12,582 km² in two distinctly separate geographic regions of the state; northeastern Oregon and the southern Oregon Cascades (Figure 7).

Not all of Oregon's historical range is available to wolves and in addressing Criterion 1 we estimated portions of Oregon which because of high human densities, extensive road systems, and cultivated habitats, are no longer suitable for wolves regardless of protection and management policies in place (see contracted range discussion above, Figure 6). Oregon's human population is currently estimated at 3.9 million people (Source: US Census Bureau), has increased 12% over the past 10 years, and is projected to reach 4.8 million people by 2030 (Source: 2014 World Population Review). We do not expect significant additional contraction of wolf range because much of Oregon's human population (and projected growth) is concentrated in the Willamette Valley, where range is already contracted due to conversion of habitat to agriculture. Furthermore, outside of currently developed areas, much of Oregon's geography is unsuitable for major settlement by humans.

Though wolves may use a variety of habitats, a strong relationship between persistence of wolf populations and forested cover has been established (Mladenoff et al. 1995, Larsen and Ripple 2006, Oakleaf et al. 2006). Approximately 50% of Oregon is public land with a large portion managed as forested habitat. Both state and federal forests are regulated in Oregon – National Forests are regulated by federal law and multiple-use forest plans, and state and private forests under Oregon forest protection laws and regulations. We are not aware of any planned or imminent changes in laws or policies affecting Oregon’s forest management on a broad scale. We expect that forest attributes and conditions which allowed Oregon’s wolf population to increase and expand to its present distribution, will continue in the foreseeable future.

Our analysis of potential range in Oregon did not include a metric for assessing habitat quality or effects of habitat on wolf density. However, an additional recognized definition of wolf habitat suitability is an area with sufficient food resources to support reproduction (Carroll, 2006). In Oregon, wolf prey populations (i.e., deer and elk) are widely distributed across the state and most populations are robust. Because prey population declines have not been observed to date in areas longest occupied by wolves, and deer and elk management is highly regulated under other state plans, we do not foresee near-term reductions in prey populations.

Summary conclusion for Criterion 3

Wolves are expanding their range in Oregon and therefore cannot be undergoing active deterioration of range. With the availability of widespread and publicly owned forested areas, and policies/laws in place to prevent depletion of both private and public forest, we cannot foresee imminent deterioration of important wolf habitats. Though Oregon’s human population will increase, most growth will occur in already altered or unsuitable habitats for wolves.

Criterion 4: Over-utilization of the species or its habitat for commercial, recreational, scientific, or educational purposes is not occurring or likely to occur.

Prior to federal ESA protections, gray wolves were killed for a number of reasons which included commercial use of the pelts and other parts. Historically, illegal commercial trafficking in wolf pelts or parts occurred in the U.S., but the degree to which it occurred in Oregon is unknown. The potential for prosecution for take provided by federal ESA and state regulations has likely discouraged and will continue to discourage killing of wolves for commercial or recreational purposes.

Illegal capture of wolves for commercial breeding purposes may also occur or may have occurred in Oregon, but we consider this unlikely. Under existing rules wolves in Oregon may not be legally killed or removed from the wild for commercial, recreational, or educational purposes regardless of listed status. Federal prohibitions (with criminal penalties) are in place that prohibits killing, taking, disturbing, trade and possession of wolves in areas where the federal ESA continues to apply in the state (i.e., west of Hwy 395-78-95).

Wildlife is managed in Oregon under the Oregon Wildlife Policy (ORS 496.012) which states in part: “wildlife shall be managed to prevent serious depletion of any indigenous species and to provide the optimum recreational and aesthetic benefits for present and future generations of the citizens of this state.” In 2009 the Oregon Legislative Assembly changed the status of wolves from “protected non-game wildlife” to “special status game mammal” under ORS 496.004 (9). The classification recognizes the wolf’s distinct history of extirpation and conflict with certain human activities. Under this classification, and when in Phase III of the Wolf Plan, controlled

take of wolves could be permitted only after wolf population objectives have been exceeded and other biological considerations indicate controlled take would not affect viability of the wolf population. Controlled take could be authorized as a response to chronic livestock depredation in a localized region where wolf populations are self-sustaining, or in response to reduced recruitment or declines of any wild ungulate populations below management objectives in a WMU that can be attributed to wolf predation.

Delisting gray wolves from protection from the OESA would not result in or allow any additional commercial, recreational, scientific, or educational activities except as provided by the Commission by permit.

ODFW may not authorize incidental take where the wolf is protected by the federal ESA, but incidental take has been authorized (OAR 635-100-0170(1) in Oregon for USDA, APHIS - Wildlife Services in federally delisted portions of the state from 2010 to present. Under this permit, in 2012 one wolf was incidentally taken (trapped) by a Wildlife Services agent and released unharmed. And in 2013 when three wolves were incidentally trapped by licensed trappers and released unharmed (Oregon Department of Fish and Wildlife 2014).

Per the Wolf Plan, ODFW and its collaborators will continue to capture and radio-collar wolves for monitoring and research purposes. To date, ODFW has conducted 42 wolf captures in Oregon, with a per wolf capture-caused mortality of 2.4% (2011, post-capture mortality of one wolf). Oregon uses rigorous wolf capture protocols to ensure the well-being of wolves, and personnel involved with wolf capture are specifically trained. Because of this, we expect that capture-caused mortality by federal and state agencies and universities conducting wolf monitoring, nonlethal control, and research will remain low (<5% percent of the wolves captured), and will be an insignificant source of mortality to the wolf population.

ODFW is not aware of any wolves that have been legally removed from the wild for educational purposes. Division 044 administrative rules make it unlawful for keeping pure-bred gray wolves in captivity for education, breeding or sale except for a limited number of education facilities licensed by U.S. Department of Agriculture. Wolves that are used for such purposes are usually the captive-reared offspring of wolves that were already in captivity for other reasons.

There is a growing public interest in wildlife viewing and ecotourism in Oregon and across the U.S. When carefully planned and implemented, fish and wildlife-based tourism can promote fish and wildlife conservation through public outreach and support; diversity to local economies; and provide rewarding experiences for a variety of people. In Oregon, 1.4 million residents and nonresidents participate in wildlife viewing. Viewing wolves on public lands is largely compatible with wolf conservation, provided that it does not disturb sensitive den and rendezvous sites. ODFW will continue to work with federal partners to ensure wolf safety, management compatibility and visitor enjoyment. Wolf-based tourism has proven to be highly profitable in and around Yellowstone National Park and elsewhere (Wilson and Heberlein 1996, Wilson 1997, Montag et al. 2005).

Wolves are strongly associated with forested habitats, but are generally recognized as habitat generalists. As discussed in Criterion 3 above, management of both public and private forest lands are highly regulated in Oregon. Wolves are increasing and expanding under Oregon's current forest management policies and we have no information which indicates that current utilization of forests is negatively affecting the wolf population.

Summary conclusion for Criterion 4

Current statutory classification and specific wolf policy in Oregon is adequate to prevent overutilization of wolves in any management phase of the Wolf Plan. We have no information indicating overutilization of gray wolves or their habitat for commercial, recreational, scientific, or educational purposes is occurring or likely to occur in Oregon.

Criterion 5. Existing state or federal programs or regulations are adequate to protect the species and its habitat.

The following summarizes current and future protection programs and regulations for wolves in Oregon. Appendix C of this document contains a list of statutes and technical administrative rules pertaining to this section.

State Protection

Wolves are currently protected throughout Oregon by the OESA. The OESA generally prohibits ‘take’ of wolves by persons anywhere in the state (ORS 498.026). Take is defined by ORS 496.004(16)] as killing or obtaining possession or control. In 2013, the Oregon Legislature increased take flexibilities for livestock producers in situations where wolves, if federally delisted, are caught in the act of biting wounding, killing, or chasing livestock in certain situations (HB3452, 2013 Oregon Legislative Assembly). The provisions of the 2013 legislative action are contained within 635-110 rules referenced below. See Appendix D in the Wolf Plan (Oregon Department of Fish and Wildlife 2010) for statutory protections and authorities afforded wolves while listed under OESA.

Regardless of OESA listing status, wolves are managed under the Phase II of the Wolf Plan (Oregon Department of Fish and Wildlife 2010) and associated technical administrative rules (Division 110) which govern harassment and take of wolves in federally delisted portions of Oregon. In Phase II, management activities are directed toward achieving the management population objective of seven breeding pairs of wolves present in eastern Oregon for three consecutive years. This phase also provides a buffer whereby management actions do not allow declines which could lead to relisting under the OESA. Phase II is currently in effect in eastern Oregon, these protections and regulations would not change following delisting.

The Wolf Plan sets a management population objective of seven breeding pairs for three consecutive years in eastern Oregon, and this is referred to as Phase III. Based on current population figures described elsewhere in this document, eastern Oregon could enter into Phase III as early as 2017. In Phase III, controlled take of wolves may be permitted as a management tool if the wolf population objectives have been exceeded and other biological considerations indicate that it would not affect wolf viability in the region. In this situation, controlled take would only be authorized as a response to: 1) chronic livestock depredation problems in a localized region; or 2) wild ungulate population declines (below management objective levels) that can be attributed to wolf predation. As discussed above (Criterion 2), the expected level of human-caused mortality related to Phase III of the Wolf Plan will not negatively affect the future viability of wolves in Oregon.

The Wolf Plan is incorporated in Division 110 administrative rules by reference. On July 12, 2013, the Commission adopted amendments to OAR 635-110-0010 and 635-110-0020 which regulates harassment and take of wolves during Phase I and Phase II of the Wolf Plan, respectively. OAR 635-

044 -0051 governs the holding of pure-bred wolves in Oregon. The rules makes it unlawful for keeping pure-bred gray wolves in captivity for education, breeding or sale except for a limited number of education facilities licensed by the U.S. Department of Agriculture. ORS 498.026 makes transactions in threatened or endangered wildlife species unlawful. No person shall take or attempt to take, import, export, transport, purchase, or sell any threatened or endangered species or the skin, hides, or other parts.

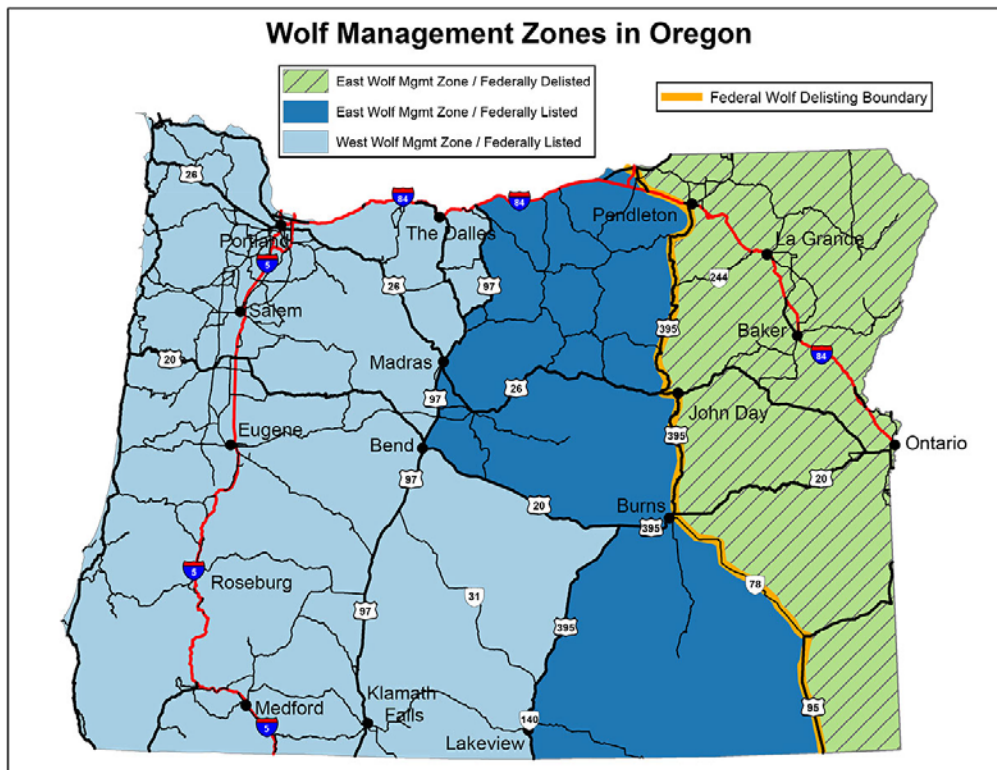
The Wolf Plan calls for periodic evaluation with the next scheduled evaluation set to begin in 2016. The results of any evaluation may result in rulemaking by the Commission to change or revise the Wolf Plan. At this time there are no planned recommendations from ODFW which would weaken protections for wolves to a level which would threaten future population viability.

Federal Protection

On May 5, 2011, the USFWS published a final rule – as directed by Congressional legislative language in the enacted Fiscal Year 2011 appropriations bill – reinstating the Service’s 2009 decision to delist biologically recovered gray wolf populations in the NRM, including a portion of Oregon. Wolves in Oregon located west of Highways 395-78-95 remain protected by the federal ESA. The USFWS is the lead management agency for wolves that occur west of Highways 395-78-95 and all provisions of the federal ESA apply.

All actions regarding harassment and take of wolves in federally listed portion of Oregon are governed by the USFWS. This includes a portion of the eastern WMZ currently in Phase II of the Wolf Plan (Figure 8).

Figure 8. Federal status within Oregon’s East and West Wolf Management Zones.



Incidental take has been authorized (OAR 635-100-0170(1) and 653-110-0040) in Oregon for USDA APHIS-Wildlife Services. ODFW issued Wildlife Services an Incidental Take Permit (ITP) from 2010 to the present, and in 2012 one wolf was incidentally taken (trapped) and released unharmed. ODFW may not issue ITPs where the wolf is protected by the federal ESA. Three other situations of incidental take have occurred in Oregon. In 2013, three wolves were incidentally trapped by licensed trappers, and in all three cases the wolves were released unharmed (Oregon Department of Fish and Wildlife 2014).

In 2009, Oregon Legislative Assembly changed the status of wolves from “protected non-game wildlife to “special status game mammal” under ORS 496.004 (9). The classification recognizes the wolf’s distinct history of extirpation and conflict with certain significant human activities. Under this classification, and when in Phase III of the Wolf Plan, controlled take of wolves would be permitted as a management response tool to assist ODFW in its wildlife management efforts only after the wolf population objectives in the region to be affected have been exceeded and other biological considerations indicate the use of these management tools would not result in the impairment of wolf viability in the region.

Summary conclusion for Criterion 5

The combination of programs and regulations listed above have proved adequate as conservation measures by allowing wolves which entered Oregon to become established and ultimately increase to their present levels. The Wolf Plan and associated rules currently in place will continue to be followed regardless of OESA listing status, and we contend these protections are adequate and comprehensive to allow wolf populations to continue to increase in Oregon. Specifically, protections and provisions currently associated with Phase II of the Wolf Plan will be in place before and after delisting. Wolves are managed in Oregon under the state wildlife policy (ORS 496.012) and though the Wolf Plan is scheduled to be evaluated in 2016, we do not anticipate significant changes that would threaten the future viability of wolves in Oregon.

Effects of a Delisting Decision by Commission

A delisting decision by the Commission is not expected to significantly affect the management of wolves. This is because the Wolf Plan and associated OAR’s guide the management of wolves regardless of OESA listing status, and a delisting decision would not inherently alter the management aspects of the Wolf Plan. Wolves within the eastern WMZ are currently managed under Phase II of the Wolf Plan until the Phase III objectives are met, and wolves in the western WMZ are managed under Phase I until the Phase II objectives are met.

A decision to delist wolves would have no effect on the federal classification status, and wolves outside of the NRM Distinct Population Segment (all portions of Oregon west of Highways 395-78-95) are federally listed as endangered. All harassment and take of wolves in the federally listed portion of Oregon is regulated by the USFWS.

The Wolf Plan requires reevaluation on a five year interval, with the next evaluation scheduled to begin in 2016. The Commission could enter into rulemaking to amend or change the Wolf Plan as a result of any evaluation. Specifically, rules and provisions regarding protection, harassment,

and take of federally delisted wolves could be changed. We anticipate that the scheduled upcoming plan evaluation will be completed prior to the end of 2016.

Wolves within the eastern WMZ could enter into Phase III as early as 2017. In Phase III, controlled take of wolves may be permitted as a management response tool if wolf population objectives have been exceeded and other biological considerations indicate that it would not affect wolf viability in the region. In this situation, controlled take would be authorized as a response to: 1) chronic livestock depredation problems in a localized region; or 2) wild ungulate population declines (below management objective levels) that can be attributed to wolf predation. Though not specifically defined, any authorized take of wolves in Phase III assumes wolves are delisted from OESA.

While a delisting decision by the Commission will not otherwise affect decisions related to harassment or take of wolves in Oregon, it may have social implications. Indeed the Commission's decision to divide the state into two wolf management zones was a tacit effort to provide the flexibility needed to manage increasing numbers of wolves in eastern Oregon while maintaining conservation in western Oregon. This approach was intended to promote social tolerance for wolves by effectively addressing conflict with competing human values through the use of management measures consistent with long-term wolf conservation in all phases of wolf management.

Conclusion

As predicted when the Wolf Plan was developed, wolves have become established in Oregon and have increased in both distribution and abundance from 2008 through 2014. Our analysis of future population growth using conservative parameter inputs indicates a very high probability that Oregon's wolf population will grow and remain extant in future years. There is a low probability of decline below conservation levels, and most of our simulated failures occurred within the first 10 years of simulation when the population is lowest. Based on observed population growth rates in Oregon the wolf population should surpass 100 to 150 individuals in the next 1-3 years regardless of listed status, and the risk of conservation failure is even further reduced. Factors related to wolf health, habitat, dispersal, habitat connectivity, and wolf survival all indicate a healthy and growing population that is unlikely to decline in the near-term.

Wolves do not yet occupy all of their estimated potential range in Oregon. However, wolves occur throughout most of the state. Wolf collar data shows that wolves move freely between the eastern and western management zones and that they traverse the entirety of the Cascades within the Western WMZ. Wolves have proven capable of crossing all types of potential barriers (e.g. rivers, highways) and there are no known conditions which prevent wolves from occupying much of the currently unoccupied areas of range. Documented wolf population growth and dispersal patterns support the conclusion that wolves are not at risk of extinction in the state. This situation was accurately predicted by the Commission when the 2005 Oregon Wolf Plan was adopted and the decision to divide the state into two management zones was a tacit effort to provide the flexibility needed to manage increasing numbers of wolves in eastern Oregon while maintaining conservation measures for colonizing sub-populations in western Oregon. Our evaluation of the threat of extinction in Oregon's potential and current wolf range we determined that: 1) wolves were once extirpated as a result of historical efforts to eradicate them, and now in absence of those efforts and under current management frameworks, are increasing in abundance

and distribution; 2) there are no known conditions, which prevent wolves from inhabiting currently unoccupied portions of range in Oregon; 3) observed movement and dispersal patterns indicate connectivity from source populations and 4) the probability of population failure in Oregon is very low.

Option 2:

Evaluation of delisting criteria specifically for wolves within the eastern Oregon Wolf Management Zone

Note: This section is added at the direction of the Oregon Fish and Wildlife Commission on April 24, 2015. Because most of Oregon's wolves occur within the eastern WMZ, most of the biological information contained in Part 1 of this analysis is directly applicable here. In this analysis we present biological and scientific information which is specific to evaluation of delisting criteria within the eastern WMZ. Appendix B (page 33) contains an additional section related specifically to population viability of wolves within the eastern WMZ in Oregon.

Biological Status of Wolves in the Eastern WMZ

The wolf population has increased within the eastern WMZ at a mean growth rate of 1.40 (\pm 0.18 SD) since 2009. In July, 2015 the non-pup wolf population was 76 known wolves (Table 4). Eight successful breeding pairs of wolves were documented within the eastern WMZ in 2014 and this was the third consecutive year in which at least 4 successful breeding pairs of wolves were documented in this zone (Table 4). All factors influencing reproduction, survival, dispersal, distribution, and disease are outlined in Part 1 of this document.

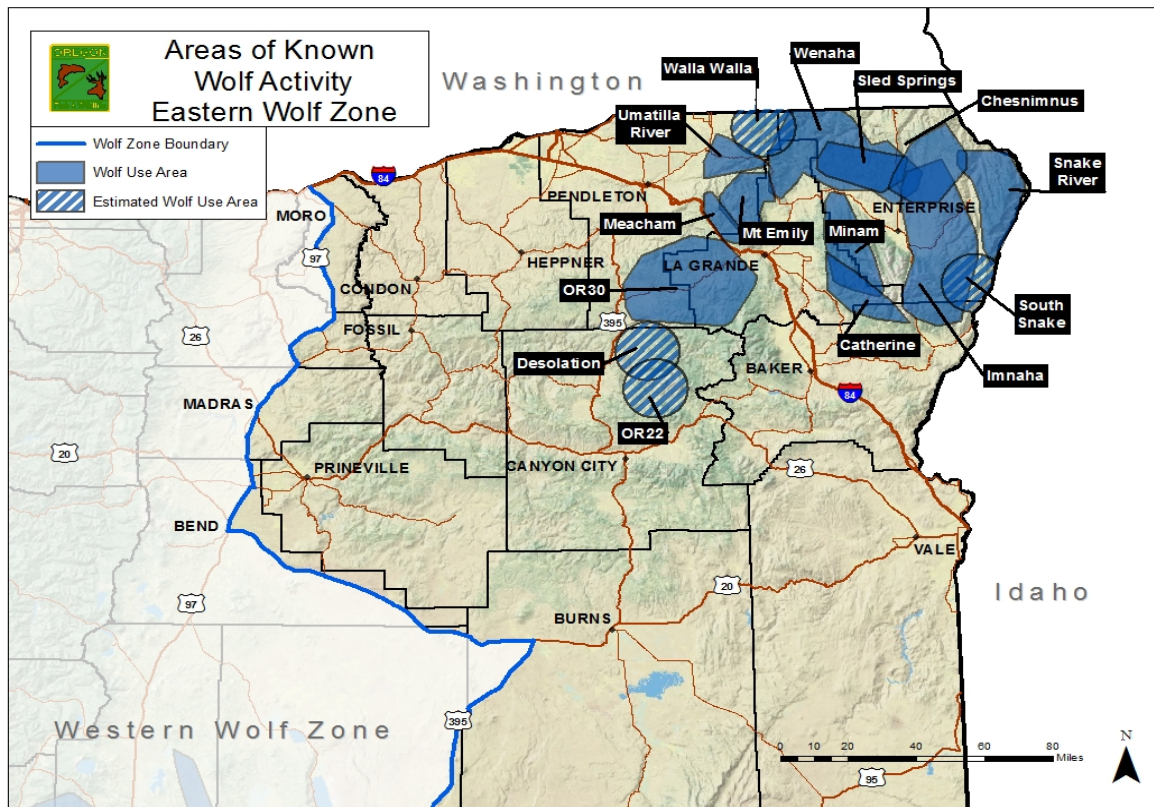
Table 4. Eastern WMZ wolf population. Shaded cells denote successful breeding pairs.

Pack/Area	2009	2010	2011	2012	2013	2014	July 2015*
Imnaha Pack	10	15	5	8	6	5	4
Wenaha Pack	4	6	5	11	9	11	10
Walla Walla Pack			8	6	9	9	9
Snake River Pack			5	7	9	6	6
Umatilla River Pack			2	4	6	8	6
Minam Pack				7	12	9	9
Mt Emily Pack					4	7	8
Meacham Pack						5	5
Catherine Cr / Keating Units Pack					5	0	0
Desolation Pair						2	2
Chesnimmus Pair						2	2
Catherine Pair						2	2
Sled Springs Pair				2		2	2
South Snake Wolves						6**	6
OR13 wolves							3
Individual wolves			4	3	3	0	2
Minimum Total	14	21	29	48	63	74	76

Criterion 1; eastern WMZ: The species is not now (and is not likely in the foreseeable future to be) in danger of extinction throughout any significant portion of its range in Oregon or is not at risk of becoming endangered throughout any significant portion of its range in Oregon.

Appendix A contains a report describing methods used for evaluating historic, contracted, and potential range for wolves in Oregon, including the eastern WMZ. Currently, wolves occupy 31.6% of potential wolf range within the eastern WMZ (11,313 km² out of 35,842 km² of potential range).

Figure 8. Current distribution of known wolves within the eastern WMZ



We assessed risk of population failure or extinction of Oregon’s wolves using an individual-based population model. Methods and results of this analysis are presented in detail in Appendix B. Specifically; an eastern WMZ analysis is contained on Page 33 of that report. The results are also summarized in Criterion 2 below.

Using conservative parameter inputs, our analysis indicated a low (6%) probability of wolves dropping below 4 breeding pairs or fewer within the next 50 years. None of our simulations resulted in the population becoming biologically extinct (i.e., < 5 wolves) over the same time period. The modeled risk of extinction was reduced even further in our analysis when using an initial population (100 or more) larger than the current minimum wolf population. However, as discussed elsewhere in this document, initial population size used in the model was based on observed minimum counts and the actual population is likely larger. Based on conservative

parameter inputs, the eastern WMZ wolf population is projected to increase at a mean annual population growth rate of 1.06 (\pm 0.17 SD).

Conclusion for Criterion 1; eastern WMZ

Wolves continue to increase in both distribution and abundance and occupy a significant portion (31.6%) of the estimated potential wolf range in the eastern WMZ. Conditions exist (e.g., habitat capability, connectivity, and prey availability) to support wolves throughout the zone. Successful range expansion of a species is one measure of population fitness, and there are no known conditions which prevent wolves from colonizing currently unoccupied areas of range within the eastern WMZ.

Criterion 2; eastern WMZ: The species' natural reproductive potential is not in danger of failure due to limited population numbers, disease, predation, or other natural or human-related factors affecting its continued existence.

To assess the risk of population failure in Oregon wolves specifically within the eastern WMZ, we used our existing model (Appendix B) to assess viability of wolves. In this analysis, we restricted our starting population size to those wolves known to occur in the eastern WMZ as of April 1, 2015 ($N = 76$) and set the density threshold to 600 wolves compared to 1,500 wolves used in the statewide analysis. Remaining methods and parameter inputs for this analysis were identical to those used in the statewide assessment of wolf population viability. As with the statewide analysis, we used two metrics to assess population viability: 1) conservation-failure, defined as the population dropping below 4 breeding pairs and 2) biological-extinction, defined as the population having fewer than 5 individuals. The following summarizes the results of that analysis.

1. The eastern WMZ modeled wolf population is projected to increase at a mean population growth rate of 1.06 (\pm 0.17 SD)
2. Using conservative input parameters, we estimated a 6% probability of the population reaching the conservation-failure threshold (< 4 breeding pairs). Half of the simulated conservation-failures occurred within the first 10 years of simulation.
3. No simulated populations dropped below the biological-extinction threshold over the next 50 years.
4. Risk of conservation-failure in the eastern WMZ was slightly higher, but not significantly different, than risk at a statewide level (0.06 vs. 0.05)

Conclusion for Criterion 2; eastern WMZ

Risk of conservation-failure in the eastern WMZ was slightly higher, but not significantly different, than risk at a statewide level (0.06 vs. 0.05). Our results suggested that risk of conservation-failure declined with increasing starting population size, so it was not surprising that the slightly smaller starting population in the eastern WMZ ($N = 76$) had a slightly higher risk of conservation-failure compared to the statewide population ($N = 85$).

Criterion 3; eastern WMZ: Most populations are not undergoing imminent or active deterioration of range or primary habitat.

Similar to the statewide analysis, wolves in the eastern WMZ have expanded their range rapidly. Since 2009 the area occupied by known wolves has increased by approximately 1,975 km² per year and wolves currently occupy approximately 11,313 km² within northeastern Oregon (Appendix A). As summarized in Part 1, we are not aware of any planned or imminent changes in laws or policies affecting Oregon's forest management on a broad scale. We expect that forest attributes and conditions which allowed Oregon's wolf population to increase and expand to its present distribution, will continue in the foreseeable future.

Conclusion for Criterion 3; eastern WMZ

As they are statewide, wolves are expanding their range in the eastern WMZ of Oregon and therefore cannot be undergoing active deterioration of range. With the availability of widespread and publicly owned forested areas, and policies/laws in place to prevent depletion of both private and public forest, we cannot foresee imminent deterioration of important wolf habitats. Though Oregon's human population will increase, most growth will occur in areas already altered or unsuitable habitats for wolves.

Criterion 4; eastern WMZ: Over-utilization of the species or its habitat for commercial, recreational, scientific, or educational purposes is not occurring or likely to occur.

For this criterion there are no factors specific to the eastern WMZ which differ from the statewide analysis presented earlier in Part 1 of this document.

Criterion 5; eastern WMZ. Existing state or federal programs or regulations are adequate to protect the species and its habitat.

For this criterion there are no significant differences between the eastern WMZ analysis and the statewide analysis. All known and resident wolves within the eastern WMZ which are the basis of this evaluation are currently within the federally delisted portion of Oregon, and the regulatory mechanisms presented in Part 1 of this document apply entirely.

Effects of an Eastern WMZ Delisting Decision by the Commission

A delisting decision by the Commission is not expected to affect the management of wolves within the eastern WMZ. This is because the Wolf Plan and associated OAR's guide the management of wolves regardless of OESA listing status, and a delisting decision by the Commission would not inherently alter the management aspects of the Wolf Plan. Wolves within the eastern Oregon WMZ are currently managed under Phase II of the Wolf Plan until the Phase III objectives are met.

A decision to delist wolves would have no effect on the federal classification status, and wolves outside of the NRM Distinct Population Segment (all portions of Oregon west of Highways 395-78-95) are federally listed as endangered. All harassment and take of wolves in the federally listed portion of Oregon is regulated by the USFWS.

The Wolf Plan requires reevaluation on a five year interval, with the next evaluation scheduled to begin in 2016. The Commission could enter into rulemaking to amend or change the Wolf Plan as a result of any evaluation. Specifically, rules and provisions regarding protection, harassment, and take of federally delisted wolves could be changed. However, this evaluation is based only on the management strategies and protective mechanisms contained within the current Wolf Plan.

Wolves within the eastern WMZ could enter into Phase III as early as 2017. In Phase III, controlled take of wolves may be permitted as a management response tool if wolf population objectives have been exceeded and other biological considerations indicate that it would not affect wolf viability in the region. In this situation, controlled take would be authorized as a response to: 1) chronic livestock depredation problems in a localized region; or 2) wild ungulate population declines (below management objective levels) that can be attributed to wolf predation. Though not specifically defined, full implementation of Phase III assumes wolves are delisted from OESA.

Conclusion

As predicted when the Wolf Plan was developed, wolves have become established within the eastern WMZ and have increased in both distribution and abundance from 2008 through 2014. Our analysis of future population growth using conservative parameter inputs indicates a very high probability that the eastern WMZ population will remain extant in future years. In our analysis there is a low probability of decline below conservation levels. Based on observed population growth rates in the eastern WMZ, and the current year's observations the wolf population will likely surpass 100 individuals in 2015 and the risk of conservation failure is even further reduced. Factors related to population fitness (e.g., wolf health, habitat, dispersal, habitat connectivity, and wolf survival) all indicate a healthy and growing population that is unlikely to decline in the near-term.

Wolves occupy a significant portion of the estimated potential range within the eastern WMZ and there are no known conditions which prevent wolves from occupying much of the currently unoccupied areas of range. When evaluating the threat of extinction in Oregon's potential and current wolf range we considered that: 1) wolves were once extirpated as a result of historical efforts to eradicate them, and now in absence of those efforts and under current management frameworks, are increasing in abundance and distribution; 2) there are no known conditions, which prevent wolves from inhabiting currently unoccupied portions of range within the eastern WMZ; 3) observed movement and dispersal patterns indicate connectivity from source populations and 4) the probability of extinction in Oregon is very low.

Option 3

Analysis of a no-action decision by the Commission

This summary analysis is added at the request of the Commission at its April 24, 2015 meeting.

If the Commission takes no action with regard to delisting, wolves in Oregon will simply remain listed as endangered under the OESA. In general, this will have few biological implications for wolves in Oregon for many of the same reasons given above. The following is a brief summary analysis of the effects of a no-action decision by the Commission as related to the five delisting criteria above.

Criterion 1 – *the species is not now (and is not likely in the foreseeable future to be) in danger of extinction in any significant portion of its range in Oregon or in danger of becoming endangered.* Wolves will continue to increase and expand. The current observed rate of annual increase is 1.43 ($\pm .15SD$) and this is expected to continue in the near years. Our long-term projected rate of annual increase is 1.07 ($\pm .17SD$) but is based on conservative parameter inputs moving forward. We have no data to suggest that the continued listing of wolves as endangered would improve their long-term viability, projected population growth rate, or continued range expansion. This is because under the Wolf Plan, wolves are given identical protections whether listed or delisted and our population model indicated wolves are capable of long-term persistence and population growth under these conditions. At the point in the future that delisting is reconsidered, our population trend and viability analysis shows there will simply be more wolves in more areas of Oregon, and this will occur whether the species is delisted or not.

Criterion 2 – *the species' natural reproductive potential is not in danger of failure due to limited population numbers, disease, predation, or other natural or human-related factors affecting its continued existence.* Our population trend and viability analysis shows that if wolves are considered for delisting in the future, the population will be higher, more dispersed, and will have a lower probability of conservation-failure or extinction. Our analysis shows that wolf populations are likely to increase regardless of OESA listing status and risk of population or reproductive failure declines with larger “starting” populations. Oregon’s wolf population will likely surpass 100 animals in 2015, and at this population size using our population model, risk of population or reproductive failure is almost eliminated. Therefore, reductions of population viability risk gained by continued listing under OESA are nominal.

If the Commission deems that the biological criteria are met, a no-action decision may have the effect of eroding support for the Wolf Plan by some and thereby reducing public tolerance for wolves. Though it is nearly impossible to predict or enumerate a biological effect, a reduction of public tolerance by some may be manifested through increased take (both illegal and authorized take) of wolves. It cannot be ignored that it was lack of public tolerance for wolves which led to the wolf’s original extirpation. The importance of anthropogenic mortality is the primary factor that influences dynamics in most wolf populations and our model shows that at current rates of both legal and illegal anthropogenic mortality the population will continue to grow. However, if those rates are increased to sustained high levels (e.g., .20) the population would be expected to decline.

Criterion 3 – *most populations are not undergoing imminent or active deterioration of range or primary habitat.* A no-action decision is not expected to affect the condition of range or primary habitat for wolves because wolves continue to expand their range into potential habitat

in Oregon, and we identified no factors specifically related to the current listed status of wolves which would affect future expansion or deterioration of range.

Criterion 4 – *over-utilization of the species or its habitat for commercial, recreational, scientific, or educational purposes is not occurring or likely to occur.* Statutory classification of wolves in Oregon allows protection from over-utilization regardless of listing status – there are no additional opportunities for recreational, scientific, or educational purposes if wolves were delisted. Thus, a no-action decision would not be expected to change these levels of utilization.

Criterion 5 – *existing state or federal programs or regulations are adequate to protect the species and its habitat.* The combination of statutory classification (i.e., special status game mammal) and the Wolf Plan and its associated rules, provide an adequate regulatory framework regardless of listing status. Because neither will change significantly as a result of delisting, a no-action decision is unlikely to affect the protection status of wolves. For example, damages assessed under ORS 496.705 for unlawful taking of wolves’ remains the same for listed or delisted wolves.

Conclusion

A no-action decision by the Commission will likely have nominal biological effects on Oregon’s wolf population. This is because our analysis shows that wolves will continue to increase in Oregon under a listed or a delisted OESA status, and the probability of wolves dropping to currently defined conservation levels is very low. However, continued support for the Wolf Plan is important for the management of wolves and public tolerance for wolves is an important outcome of plan implementation. Though it is unknown at this time the level to which public tolerance for wolves might decrease as a result of a no-action decision, any loss of support or tolerance may negatively affect wolves in the future.

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